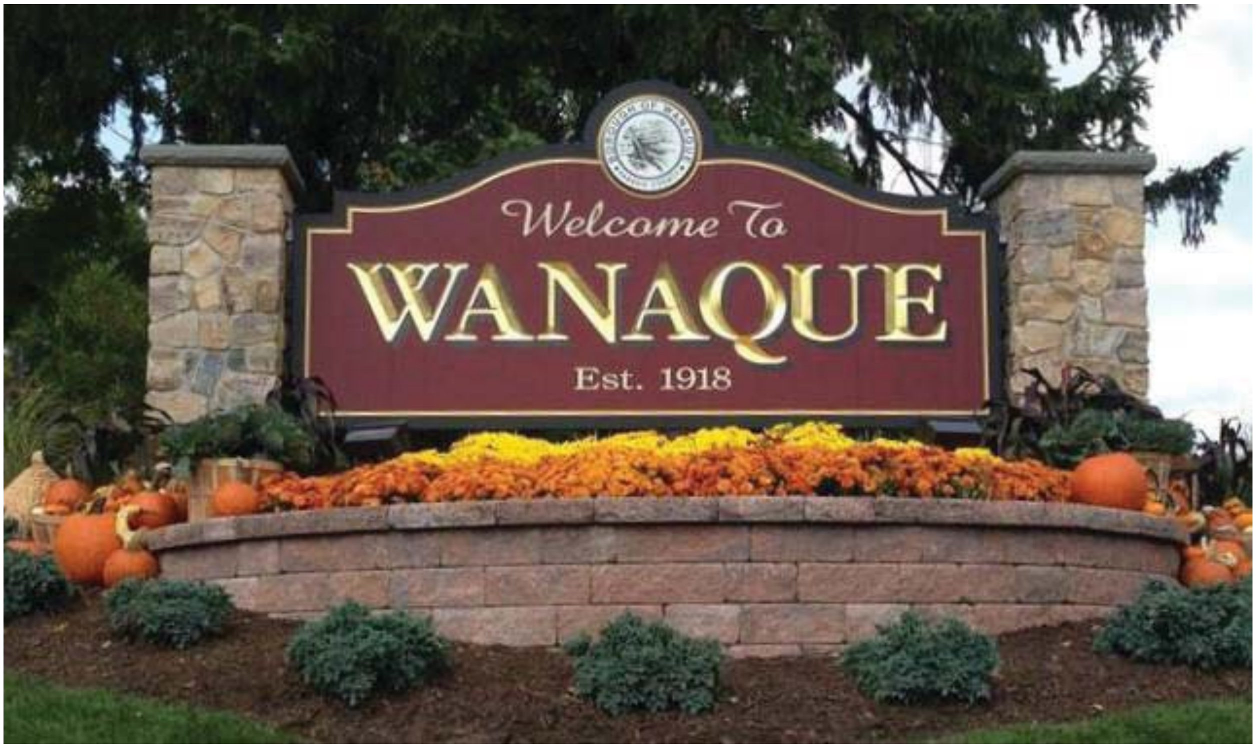

WANAQUE SCHOOL DISTRICT

Energy Savings Plan

A Hybrid Energy Savings Improvement Program

WILLDAN

Contacts

Site Details

Address:	Wanaque School District 973-A Ringwood Avenue, Haskell, NJ 07420
Points of Contact:	William Mullanaphy Supervisor of Buildings and Grounds 973 Ringwood Ave. Haskell, NJ 07420 Phone: 973.835.8200 E-mail: wmullanaphy@wanaqueps.org

Di Cara | Rubino Architects

Address:	30 Galesi Dr #200 Wayne, NJ 07470
Point of Contact:	Joseph Di Cara Principle Architect E-mail: JDicara@dicararubino.com

Willdan Energy Solutions Contacts

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Section 1. Executive Summary

Willdan Energy Solutions was selected by Wanaque School District and Di Cara | Rubino in January 2020 for engineering services related to the development of an Energy Savings Plan (ESP) to be used in a Hybrid Energy Savings Improvement Program (ESIP). The scope of work is to develop an ESP for Wanaque School District's two (2) schools. This report includes ECMs that were based on site surveys, data collection, consulting facility personnel and reviewing baseline utility bills. This report includes a financially viable plan to implement the Energy Conservation Measures (ECMs) and achieve operational energy savings to comply with the requirements of New Jersey Energy Savings Improvement Program (NJ ESIP) in accordance with NJ PL2012, c.55.

The main requirement of NJ ESIP is to justify cost estimate and energy saving calculations for all the proposed ECMs that will pay for itself through energy savings over fifteen (15) years. Pursuant to the NJ ESIP Law, N.J.S.A. 18A:18A-4.6(d)(2), the ESP shall:

- Contain the results of an Energy Audit.
- Describe the ECMs that will comprise the program.
- Estimate greenhouse-gas reductions resulting from those energy savings.
- Include an assessment of risks involved in the successful implementation of the plan.
- Identify the eligibility for, and the costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities.
- Include schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings.
- Identify maintenance requirements necessary to ensure continued energy savings and describe how they will be fulfilled.

The purpose of this ESP report is to provide a Hybrid ESIP project with all the ECMs. There were many energy conservation measures evaluated during development of this ESP, and after careful consideration, the list of ECMs were included in this report. This ESP is structured to comply with the ESIP Law with all the necessary information to make a firm decision. The possible areas of energy savings for Wanaque School District and Di Cara | Rubino, as described initially, are as follows:

- Lighting
- Unit Ventilators
- Windows
- Boilers
- Plug-load controllers
- Solar
- Rooftop units and Air Handling Units

Willdan Energy Solutions has carefully considered the above possible areas of energy improvement and assessed the schools to present a feasible ESIP project. The energy cost savings for all schools have been derived through detailed energy analysis using both spreadsheet calculations and NJ Tech Manual FY2020. The following tables highlight the overall energy savings per school. Note that the savings table does not include on-site electric generation potential from installation of solar PV panels.

Table 1: Wanaque Elementary School Energy Savings

Savings		
Annual Electric Energy	158,867	kWh
Annual Electric Demand	39	kW
Annual Natural Gas	4,808	therms
Annual Utility Cost Savings	$24,199	$

Table 2: Haskell Elementary School Energy Savings

Savings		
Annual Electric Energy	158,498	kWh
Annual Electric Demand	38	kW
Annual Natural Gas	4,599	therms
Annual Utility Cost Savings	$23,771	$

Based on the Energy Conservation Measures (ECMs) included in this Energy Savings Plan, the following tables highlight the overall savings district-wide. The measures considered in this ESP could result in an annual utility savings of 1,008,763 kWh of electricity and 9,406 therms of natural gas. The project also includes installing 607 kW solar rooftop and canopy PV resulting total production of approximately 691,399 kWh. The project will also reduce energy cost by $843,938 over 15 years. This project is estimated to receive a maximum financial incentive of $8,400 from NJOCE programs and PJM's Demand Response (DR) Program. This project shall also reduce Operational and Maintenance cost by $105,000. Additionally, the energy savings will result in a net reduction of greenhouse gases and will reduce the school district's carbon footprint by 592,449 lbs. of CO2 annually.

Table 3: Energy Conservation Measures for Wanaque School District

ECM Description	Haskell Elementary School	Wanaque Elementary School
ECM#1 - Direct Install	X	X
ECM#2 - Install High Efficiency Hot Water Boilers	X	X
ECM#3 - RCx for Unit Ventilators	X	X
ECM#4 - Weather Treatment near Multipurpose Room	X	
ECM#5 - Transformer Upgrades	X	X
ECM#6 - Vending Misers	X	X
ECM#7 - Plug Load Controls	X	X
ECM#8 - Add Photovoltaic Systems	X	X

Table 4: Energy Savings for Wanaque Schools

Measure		Annual Estimated Savings				Estimated Implementation Cost ($)	Estimated Simple Payback Period
		Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	Cost Savings ($)		
ECM-1	Direct Install	227,831	57	2,466	$30,407	$200,730	6.6
ECM - 2	Install High Efficiency Hot Water Boilers	305	2	6,690	$6,342	$1,175,000	185.3
ECM - 3	RCx for Unit Ventilators	15,000	3	-	$1,848	$20,000	10.8
ECM - 4	Weather Treatment near Multipurpose Room	-	0	250	$231	$40,000	173.5
ECM - 5	Transformer Upgrades	52,500	15	-	$6,467	$67,000	10.4
ECM - 6	Vending Misers	3,224	0	-	$397	$2,400	6.0
ECM - 7	Plug Load Controls	18,504	0	-	$2,279	$23,400	10.3
ECM - 8	Add Photovoltaic Systems	691,399	607	-	$53,929	$0	0
	Total	**1,008,763**	**682**	**9,406**	**$101,899**	**$1,528,530**	**15.0**

In accordance with the NJ ESIP process, the next step in the project development phase is for Willdan to work with Di Cara | Rubino Architects and Wanaque School District to select the desired ECMs based on the Wanaque School District's goals and objectives. The selection will consider project cost, projected energy and operation savings, available financing options at the time of the agreement, interest rates, length of term and Wanaque School District's priorities, which will all play a part in the final selection and cash flow of ECMs. The definitive requirement under NJ PL2012, c. 55 is the project is self-funding within the 15-year term as outlined in legislation.

Overall, it is evident that Wanaque School District is well positioned to implement a program that will upgrade facility equipment, while funding itself with in the requirements of the law. We look forward this opportunity to partner with Di Cara | Rubino, and Wanaque School District to improve the comfort and efficiency of their facilities through the successful implementation of this Energy Saving Plan.

Willdan is supporting Wanaque School District with a percentage of implementation costs through ESIP. From a list of improvements and additions, the chosen ECMs under this ESP have yield the following savings and cash flow, also presenting the ESIP forms, required by law.

Table 5: Wanaque School District Form I

FORM I

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):

GENERAL INFORMATION: CONTRACTOR

Wanaque Public Schools

ENERGY SAVING IMPROVEMENT PROGRAM

1. Name of Firm	Willdan Energy Solutions
2. Address	3910 Park Ave, Suite 5 Edison, NJ 08820
3. Contact Person	Tejas Desai, VP
4. Telephone	646-357-6340
5. E-mail	tdesai@willdan.com

Lead Personal for this project (persons who will have supervisory or other responsibility for the work to be performed)

Name	Title
Tejas Desai, PE	Program Manager
Rahul Sheth, EIT	IGA Team lead
Aaron Etzkorn, PE	QA/QC
Robert Ventriglia	Senior Account Executive
Robert Braun, PE	Principal in Charge

Table 6: Wanaque School District Form II

FORM II
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM

Wanaque Public School

ENERGY SAVING IMPROVEMENT PROGRAM
ESCO Name: Willdan Energy Solutions
Proposed Preliminary Energy Savings Plan: Base Project 15 years @ 2.3%

Energy Conservation Measures	Estimated Installed Hard Costs (1) ($)	Estimated Annual Savings ($)	Estimated Simple Payback (Yrs)
ECM#1 - Direct Install Measures	$200,730	$30,407	6.6
ECM#2 - Boiler Replacement with High Efficiency Boiler	$1,175,000	$6,342	185.3
ECM#3 - RCx for Unit Ventilators	$20,000	$1,848	10.8
ECM#4 - Weather treatment near multipurpose room	$40,000	$231	173.3
ECM#5 - Replace Existing Transformer with New High Efficiency Transformers	$67,000	$6,467	10.4
ECM#6 - Vending Misers	$2,400	$397	6.0
ECM#7 - Plug Load Controls	$23,400	$2,279	10.3
ECM#8 - Install PV	$-	$53,929	-
Project Summary:	**$1,528,530**	**$101,899**	**15.0**

(1) The total value of Hard Costs is defined in accordance with standard AIA definitions that include: Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead, Profit, etc.

Table 7: Wanaque School District Form III

FORM III

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM

Wanaque Public Schools

ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Willdan Energy Solutions

Proposed Preliminary Energy Savings Plan: Base Project 15 years @ 2.3%

The projected annual savings for each fuel type MUST be completed using the following format. Data should be given in the form of fuel units that appear in the utility bills.

Energy/Water	ESCO Developed Baseline (Units) (2)	ESCO Developed Baseline (Costs $) (2)	Proposed Annual Savings (Units) (3)	Proposed Annual Savings (Costs $) (3)
Electric Demand (kW)	452		77	
Electric Energy (kWh)	985,920	$121,440	1,008,763	$93,020
Natural Gas (ccf)	66,433	$64,879	9,071	$8,879
Fuel Oil (gallons)	0	$-	0	$-

AVOIDED EMISSIONS (1)	Provide in Pounds (Lbs)	
NOX	975	Lbs
SO_2	2,063	Lbs
CO_2	592,449	Lbs

(1) ESCOs are to use the rates provided as part of this RFP to calculate Avoided Emissions. Calculation for all project energy savings and greenhouse gas reductions will be conducted in accordance with adopted NJBPU protocols

(2) "ESCOs Developed Baseline": Board's current annual usages and costs as determined by the proposing ESCO; based off Board's utility information as provided to proposing ESCO.

(3) "Proposed Annual Savings": ESCOs proposed annual savings resulting from the Board's implementation of the proposed ESP, as based upon "ESCOs Developed Baseline".

Table 8: Wanaque School Form IV

FORM IV
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUs
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM

Wanaque Public Schools

ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Willdan Energy Solutions

Proposed Preliminary Energy Savings Plan: Base Project 15 years @ 2.3%

The projected annual energy savings for each fuel type MUST be completed using the following format. Data should be given in equivalent MMBTUs.

ENERGY	ESCO Developed Baseline	ESCO Proposed Savings Annual	Comments
Electric Energy (MMBTUs)	336,396	344,190	
Natural Gas (MMBTUs)	6,889	941	
Fuel Oil (MMBTUs)	0	0	
Steam (MMBTUs)	0	0	
Other (Specify) **(MMBTUs)**	0	0	

NOTE: MMBTU Defined: A standard unit of measurement used to denote both the amount of heat energy in fuels and the ability of appliances and air conditioning systems to produce heating or cooling.

Table 9: Wanaque School Form V

FORM V

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):

ESCOs PROPOSED FINAL PROJECT COST FORM FOR BASE CASE PROJECT

Wanaque Public Schools

ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Willdan Energy Solutions

Proposed Preliminary Energy Savings Plan: Base Project 15 years @ 2.3%

PROPOSED CONSTRUCTION FEES

Fee Category	Fees (1) Dollar ($) Value	Percentage of Hard Cost
Estimated Value of Hard Costs (2):	$1,327,800	
Project Service Fees		
Investment Grade Energy Audit	$39,834	3.00%
Design Engineering Fees	$26,556	2.00%
Construction Management & Project Administration	$69,046	5.20%
System Commissioning	$13,942	1.05%
Equipment Initial Training Fees	$9,295	0.70%
ESCO Overhead	$39,834	3.00%
ESCO Profit	$39,834	3.00%
Project Service Fees Sub Total	$238,340	
TOTAL FINANCED PROJECT COSTS:	$1,566,140	

PROPOSED ANNUAL SERVICE FEES

Fee Category	Fees (1) Dollar ($) Value	Percentage of Hard Cost
SAVINGS GUARANTEE (*OPTION*)		
Measurement and Verification (*Associated w/ Savings Guarantee Option*)	$0	0%
ENERGY STAR™ Services (*optional*)	included above	0%
Post Construction Services *(If applicable)*	included above	0%
Performance Monitoring	included above	0%
On-going Training Services	included above	0%
Verification Reports	included above	0%
TOTAL FIRST YEAR ANNUAL SERVICES	$0	0%

NOTES:

(1) Fees should include all mark-ups, overhead, and profit. Figures stated as a range will NOT be accepted.

(2) The total value of Hard Costs is defined in accordance with standard AIA definitions that include:

Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead and Profit, etc.

Table 10: Wanaque School Form VI (Cash Flow)

FORM VI

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):

ESCO's PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM

Wanaque Public Schools

ENERGY SAVINGS IMPROVEMENT PROGRAM

ESCO Name: Willdan Energy Solutions

Proposed Preliminary Energy Savings Plan: Base Project 15 years @ 2.3%

Note: Respondents must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at ***2.4% gas, 2.2% electric*** per year; and

1. Term of Agreement: 15 years — 180 months
2. Construction Period [(2)] — 12 Months
3. Cash Flow Analysis Format:
4. MEP Fees — $129,500.00
5. Legal Fees — $25,000.00
6. Third Party Fees — $10,000.00
7. AE Fees — $142,946.00
9. Project Hard Costs — $1,566,140.10
10. District Cost — ($293,212.34)
11. DI Contribution — ($274,511.20)
12. DI Install Cost — $200,730.00

Project Cost [(1)]: $1,496,593

Interest Rate to Be Used for Proposal Purposes: 2.3%

Year	Annual Energy Savings	Annual Operational Savings	Energy Rebates/ Incentives	Solar PPA	Total Annual Savings	Annual Project Costs	Board Cost*	Annual Service Costs	Net Cash-Flow to Client	Cumulative Cash Flow
1	$47,970.22	$27,000.00	$8,400.00	$53,929.12	$137,299.35	$118,065.96	$0	$0.00	$7,483.95	$7,483.95
2	$49,043.33	$27,000.00		$54,953.78	$130,997.10	$118,065.96		$0.00	$7,483.95	$14,967.90
3	$50,140.47	$17,000.00		$55,997.90	$123,138.36	$118,065.96		$0.00	$7,483.95	$22,451.84
4	$51,262.18	$17,000.00		$57,061.86	$125,324.03	$118,065.96		$0.00	$7,483.95	$29,935.79
5	$52,409.01	$17,000.00		$58,146.03	$127,555.04	$118,065.96		$0.00	$7,483.95	$37,419.74
6	$53,581.54			$59,250.81	$112,832.34	$118,065.96		$0.00	$7,483.95	$44,903.69
7	$54,780.32			$60,376.57	$115,156.90	$118,065.96		$0.00	$7,483.95	$52,387.63
8	$56,005.96			$61,523.73	$117,529.69	$118,065.96		$0.00	$7,483.95	$59,871.58
9	$57,259.06			$62,692.68	$119,951.74	$118,065.96		$0.00	$7,483.95	$67,355.53
10	$58,540.23			$63,883.84	$122,424.07	$118,065.96		$0.00	$7,483.95	$74,839.48
11	$59,850.10			$65,097.63	$124,947.73	$118,065.96		$0.00	$7,483.95	$82,323.42
12	$61,189.31			$66,334.49	$127,523.80	$118,065.96		$0.00	$7,483.95	$89,807.37
13	$62,558.53			$67,594.84	$130,153.37	$118,065.96		$0.00	$7,483.95	$97,291.32
14	$63,958.42			$68,879.14	$132,837.56	$118,065.96		$0.00	$7,483.95	$104,775.27
15	$65,389.68			$70,187.85	$135,577.52	$118,065.96		$0.00	$7,483.95	$112,259.21
Totals	**$843,938**	**$105,000**	**$8,400**	**$925,910**	**$1,883,249**	**$1,770,989**	**$0**	**$0.00**	**$112,259**	

NOTES:

(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"

(2) No payments are made by Board during the construction period.

(3) This figure should equal the value indicated on the ESCO's PROPOSED "FORM V". DO NOT include in the Financed Project Cost

(4) No additional savings included during the Installation year as required by the NJ Clean Energy Program guidelines which states savings are only for 15 years or for 20 years with CHP installation.

***Board will be adding $250,000 to the overall project cost**

Section 2. Facility Information

Wanaque Elementary School

Figure 1: Wanaque Elementary School

Wanaque Elementary School is located at 1 1st street, Wanaque, NJ. The facility consists of one floor. The building includes classrooms, offices, computer rooms, a multipurpose room, kitchen, and storage spaces. The exterior area is mainly comprised of a parking lot and softball fields.

The facility is occupied year-round with school hours from 7:00 am to 4:30 pm, Monday to Friday. The school has an occupancy of 531 students accompanied with 85 staff members.

Building Condition

Envelop
Building walls are made of concrete masonry units (CMUs) with a brick facade. The roof is flat, covered with stones, and in fair condition. Most of the windows are aged, but in reasonable condition. The glass-to-frame seals and operable window weather seals are in good condition. Exterior doors are metal with metal frames and have adequate door seals.

Lighting
Wanaque Elementary School uses a variety of interior fixtures throughout the building. The most prevalent lamp type used in the school is 4-feet 32-watt linear fluorescent T8 lamps in fixtures equipped with 2, 3 or 4 lamps per fixture. Additionally, the range of lamps used in interior lighting varies from 4-feet T5 & T12 linear fluorescent lamps, 2-feet T8 linear fluorescent lamps and T8 U-bend fluorescent tubes. Fixtures using T5 and T8 lamps are equipped with electronic ballasts while T12 lamps are used with magnetic ballasts. There are also compact fluorescent and incandescent lamps used for interior lighting. Occupancy sensors are installed in classrooms and offices. Much of the high energy consuming exterior lighting consists of metal halide HID lamps of 50, 100 or 250-watts. Fixtures equipped with incandescent, compact fluorescent, 4-feet T8 and T12 lamps are also found in exterior areas.

Mechanical
The hot water system consists of two (2) 10,071 MBH input capacity, gas-fired, hot water boilers. The hot water supply temperature is manually adjusted between 180ºF. These

units were installed in 1971 and are way past their useful service life. The burners on the boilers are controlled with a high fire/low fire sequence. Based on the set-points, burners switch between the low-fire and high-fire stages to meet the needs of the facility. A piston operated mechanical lever controls the air intake opening of the burner based on the mode of operation. According to building operators, the boilers have no outside air heating hot water reset control.

The hydronic distribution system for WES consists of a two-pipe heating system. Pipe insulation appeared to be missing. The hot water system is configured as a variable flow distribution with two (2) 20 hp hot water pumps operating in a lead-lag control sequence. The boilers provide hot water to radiators, unit ventilators, and air handling units throughout the building. Table below summarizes the inventory of the pumps at the facility.

Figure 2: Wanaque ES Boiler Plant

Table 11: Wanaque ES Boiler Schedule

Tag	Manufacturer	Year Installed	Natural Gas Input (MBH)	Output (MBH)	Description
Boiler No. 1	Superior	1971	10,069	7,853	Gas-fired boiler
Boiler No. 2	Superior	1971	10,069	7,853	Gas-fired boiler

Table 12: Wanaque ES Pump Schedule

Tag	Location	Service	Make	Motor HP	Speed Control
HWP-1	Boiler Room	Hot Water Loop	Baldor Industrial Motor	20	Variable
HWP-2	Boiler Room	Hot Water Loop	Baldor Industrial Motor	20	Variable

Most classrooms and offices are conditioned by unit ventilators that supply heating and ventilation. All of the units are DX split coils. Most of the air-cooled condensers are installed on the roof or right outside the building. There is a total of forty-eight (48) unit ventilators in the building. These unit ventilators have supply fan motors and outside air dampers that operate with the building energy management system (BMS). The BMS is in good operating condition. Unit ventilators have three-way control valves that are operating in reasonable operating condition.

Domestic Water Heater (DWH)
Hot water is produced with a storage tank water heater. This serves the majority of the building's domestic hot water needs. This water heater is beyond its useful service life.

Plug loads
There are various plug loads in both elementary schools. There is fax machine, printers, refrigerators, desktop computer, monitors, displays and vending misers are plug loads. Many of these plug loads are connected and on during unoccupied time.

Plumbing Fixtures
The restrooms, locker rooms and kitchen are equipped with standard flowing plumbing fixtures.

Haskell Elementary School

Figure 3: Haskell Elementary School

Haskell Elementary School is located at 973 Ringwood Ave, Haskell, NJ 07420. The facility consists of two floors with partial basement. The building includes classrooms, offices, computer rooms, a multipurpose room, kitchen, and storage spaces. The exterior area is mainly comprised of a parking lot and softball fields.

Haskell Elementary School is occupied year-round. The main school year is from September through June. Typical weekday occupancy consists of approximately 72 staff members and 426 students. The building is occupied after hours for continuing custodial and maintenance activities. There are no regular weekend activities.

Building Condition

Envelop

Building walls are made of concrete masonry units (CMUs) with a brick facade. The roof is flat, covered with stones, and in fair condition. Most of the windows are aged, but in reasonable condition. The glass-to-frame seals and operable window weather seals are in good condition. Exterior doors are metal with metal frames and have und adequate door seals.

Lighting

Similar to the elementary school the most prevalent lamp type used in the Haskell Elementary School is 4-feet 32-watt linear fluorescent T8 lamps in fixtures equipped with 1 and up to 4 lamps per fixture. 4-feet T5 & T12 linear fluorescent lamps, compact fluorescent & incandescent lamps, 2-feet T8 linear fluorescent lamps and T8 U-bend fluorescent tubes are also commonly used in interior lighting fixtures. In some areas such as gym, auditorium, restrooms and storage spaces, fixtures are already upgraded with LED screw-in, LED linear tubes and LED high-bay lamps. However, the vast majority of the existing interior lighting inventory is comprised of non-LED lighting. Occupancy sensors are installed on some of the fixtures throughout the school, mainly in areas such as classrooms, library, gym, corridors and storage spaces. Majority of the exterior lighting has already been upgraded to LED lighting. There are only a handful of fixtures remaining that are equipped with metal halide HID and compact fluorescent lamps serving the exterior spaces.

Mechanical

The hot water system consists of one 5,369 MBH gas-fired, hot water boiler. The school also has 2,200 MBH low pressure steam boiler. These units were installed in 1971 and are way past their useful equipment life. The hot water supply temperature is manually adjusted between 180F. According to the site personnel, during peak heating season, hot water is typically generated using one boiler.

The hydronic distribution system for HES consists of a two pipe heating system. Pipe insulation appeared to be missing. The hot water system is configured as a constant flow distribution with two (2) 15 hp hot water pumps operating in a lead-lag control sequence and VFDs. The other section of the building also receives hot water via steam boilers through a heat exchanger, powered by two (2) 20HP constant speed motors in a lead-lag control sequence. The boilers provide hot water to radiators, unit ventilators, and air handling units throughout the building. Table below summarizes the inventory of the pumps at the facility.

Figure 4: Haskell ES Boiler

Table 13: Haskell ES Boiler Schedule

Tag	Manufacturer	Year Installed	Natural Gas Input (MBH)	Output (MBH)	Description
Boiler No. 1	HB Smith	1971	5,369	4,295	Gas-fired Boilers HW
Boiler No. 2	HB Smith	1999	2,200	1,760	Gas-fired Boilers Steam

Table 14: Haskell ES Pump Schedule

Tag	Location	Service	Make	Motor HP	Speed Control
CHW/HWP-1	Boiler Room	Hot Water Loop	Marathon Electric	15	Variable
CHW/HWP-2	Boiler Room	Hot Water Loop	Marathon Electric	15	Variable
CHW/HWP-3	Boiler Room	Steam Loop	N/A	20	Constant
CHW/HWP-4	Boiler Room	Steam Loop	N/A	20	Constant

Most classrooms and offices are conditioned by unit ventilators that supply heating and ventilation. All of the units are DX split coils. Most of the air-cooled condensers are installed on the roof or right outside the building. There is a total of forty-two (42) unit ventilators in the building. These unit ventilators have supply fan motors and outside air dampers that operate with the building energy management system (BMS). The BMS is in good operating condition. Unit ventilators have three-way control valves that are operating in reasonable operating condition.

Domestic Water Heater (DWH)
Hot water is produced with a storage tank water heater. This serves the majority of the building's domestic hot water needs. This water heater is beyond its useful service life.

Plug loads
There are various plug loads in both elementary schools. There is fax, printers, refrigerators, desktop computer, monitors, displays and vending misers are plug loads. Many of these plug loads are connected and on during unoccupied time.

Plumbing Fixtures
The restrooms, locker rooms and kitchen are equipped with standard flowing plumbing fixtures.

Section 3. Utility Summary and Benchmarking

Wanaque School District has included two (2) schools under their scope of work. The following table is the list and location of these schools:

Table 15: List of Schools

Wanaque School District	
Wanaque Elementary School	1 1st Street, Wanaque, NJ 07465
Haskell Elementary School	973 Ringwood Ave, Haskell, NJ 07420

In order to justify any energy savings, a baseline has to be set for comparison. The following tables and charts display the pre-construction utility analysis of all the schools.

Table 16: Wanaque Schools Utility Summary

	Total	Haskell Elementary School	Wanaque Elementary School
Area (sqft)	154,521	88,000	66,521
Annual utility $	$186,319	$96,141	$90,178
Total kBtu	10,253,059	5,448,854	4,804,205
Total therms	68,891	37,433	31,457
$ therms	$64,879	$34,569	$30,310
kW	239	213	239
Total kWh utility	985,920	499,840	486,080
$ kWh	$121,440	$61,572	$59,868
Number of stories		2	1
staff	157	72	85
students	957	426	531
$/kWh	$0.12	$0.12	$0.12
$/therm	$0.94	$0.92	$0.96
$/kBtu	$0.02	$0.02	$0.02
$/sf	$1.21	$1.09	$1.36
$/p	$167	$193.05	$146.39
kBtu/sf	134	61.9	72.2
kBtu/p	9,204	10,941	7,799

Wanaque Elementary School

A summary of monthly utility consumption and costs for the Wanaque Elementary School was analyzed for the 12-month period between January and December 2019. This summary is useful for understanding the various uses of energy and the annual variation in energy usage. The total electricity consumed by the facility in the analyzed period was 506,080 kWh, with a peak demand of 239 kW. Additionally, the facility also consumed 31,457 therms of natural gas based on the utility bills provided by the facility.

The utility cost data was used to determine a blended rate. The blended rate is the overall annual rate per unit of consumption that the facility pays for electricity and natural gas. The blended rate is determined by dividing the total electric/natural gas cost for a time period by the total electric/natural gas consumption in kWh/therms for the same time period.

The blended rate for electricity was determined to be $0.12 per kilowatt-hour. The blended rate for natural gas was determined to be $0.92 per therm.

Table 17: Wanaque ES Electric Usage Summary

Account #: 100 007 299 413			
Month-Year	**Usage (kWh)**	**Demand (kW)**	**Total Electric Cost**
Jan-19	46,240	130	$5,065
Feb-19	47,840	138	$5,268
Mar-19	40,320	148	$4,636
Apr-19	37,280	152	$4,448
May-19	43,360	188	$5,309
Jun-19	43,520	189	$5,314
Jul-19	42,400	192	$5,088
Aug-19	49,760	239	$5,971
Sep-19	19,200	189	$4,704
Oct-19	39,200	216	$5,093
Nov-19	36,640	139	$4,358
Dec-19	40,320	139	$4,614

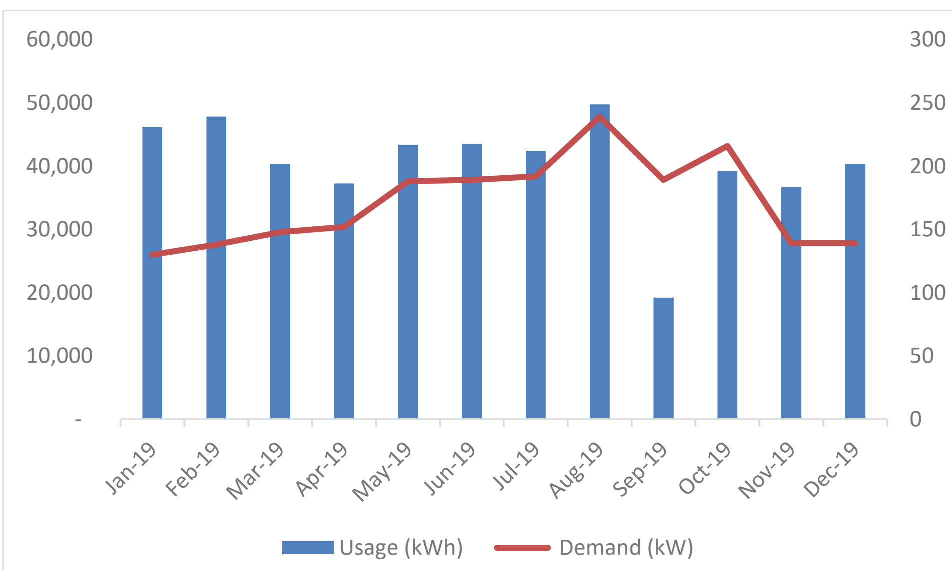


Figure 5: Wanaque ES Electric Usage Graph

Table 18: Wanaque ES Natural Gas Usage Summary

Account #: 734 309 1808		
Month-Year	Usage (Therms)	Total Gas Cost
Jan-19	4,874	$4,696
Feb-19	6,056	$5,835
Mar-19	5,692	$5,484
Apr-19	4,684	$4,514
May-19	547	$527
Jun-19	0	$0
Jul-19	0	$0
Aug-19	1	$1
Sep-19	0	$0
Oct-19	583	$5,62
Nov-19	3,732	$3,596
Dec-19	5,288	$5,095

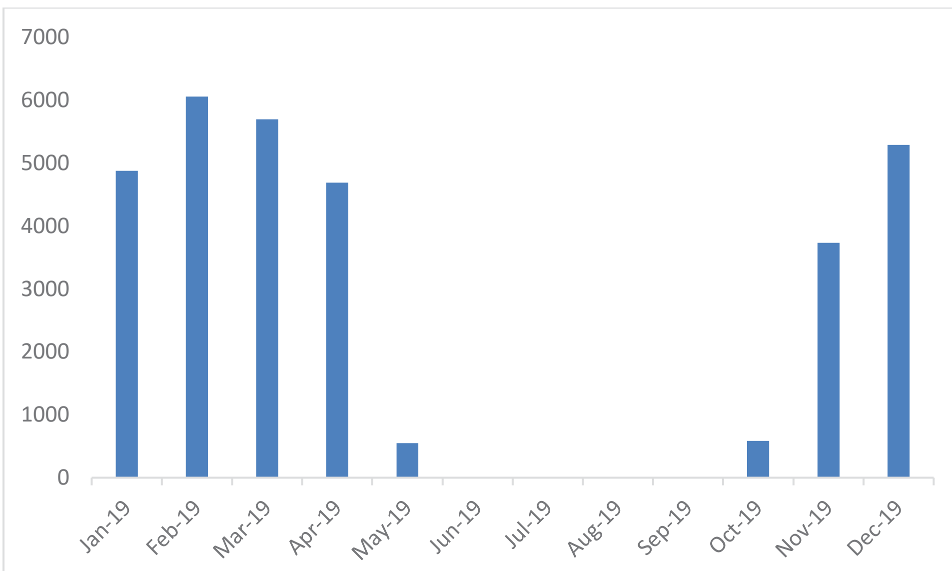


Figure 6: Wanaque ES Natural Gas Usage Graph

Haskell Elementary School

A summary of monthly utility consumption and costs for the Haskell Elementary School was analyzed for the 12-month period between January and December 2019. This summary is useful for understanding the various uses of energy and the annual variation in energy usage. The total electricity consumed by the facility in the analyzed period was 499,840 kWh, with a peak demand of 213 kW. Additionally, the facility also consumed 37,433 therms of natural gas based on the utility bills provided by the facility.

The utility cost data was used to determine a blended rate. The blended rate is the overall annual rate per unit of consumption that the facility pays for electricity and natural gas. The blended rate is determined by dividing the total electric/natural gas cost for a time period by the total electric/natural gas consumption in kWh/therms for the same time period.

The blended rate for electricity was determined to be $0.12 per kilowatt-hour. The blended rate for natural gas was determined to be $0.96 per therm.

Table 19: Haskell ES Electric Usage Summary

Account #: 100 008 253 310			
Month-Year	**Usage (kWh)**	**Demand (kW)**	**Total Electric Cost**
Jan-19	57,760	142	$6,201
Feb-19	47,040	164	$5,353
Mar-19	44,800	164	$5,147
Apr-19	36,960	166	$4,502
May-19	40,480	189	$5,043
Jun-19	36,640	175	$4,582
Jul-19	39,200	166	$5,124
Aug-19	33,760	182	$5,124
Sep-19	40,320	213	$5,124
Oct-19	37,280	210	$5,124
Nov-19	39,520	135	$5,124
Dec-19	46,080	135	$5,124

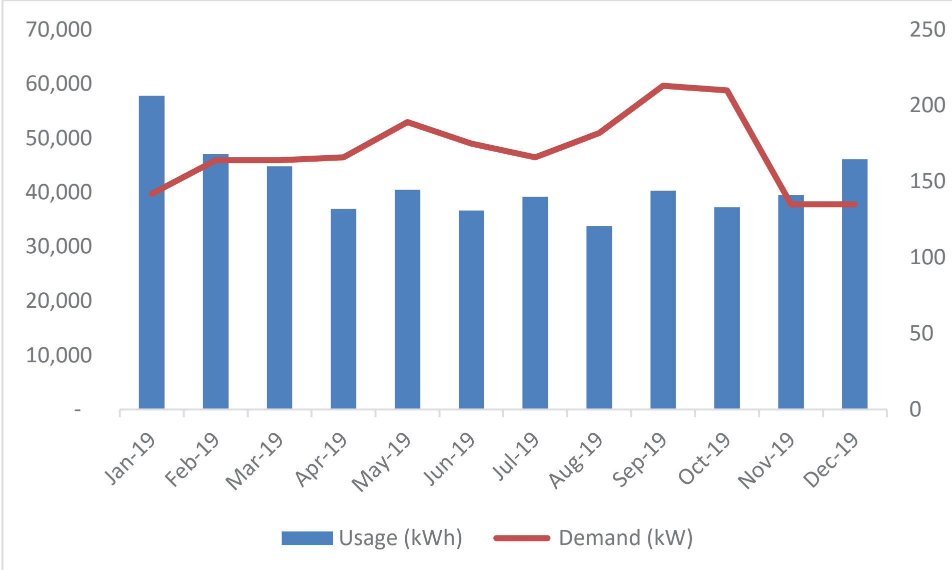


Figure 7: Haskell ES Electric Usage Graph

Table 20: Haskell ES Natural Gas Usage Summary

Account #: 734 309 1905		
Month-Year	**Usage (Therms)**	**Total Gas Cost**
Jan-19	6266	5786
Feb-19	7122	6576
Mar-19	6596	6091
Apr-19	5775	5333
May-19	727	672
Jun-19	0	0
Jul-19	0	0
Aug-19	143	132
Sep-19	137	127
Oct-19	202	187
Nov-19	4276	3949
Dec-19	6190	5716

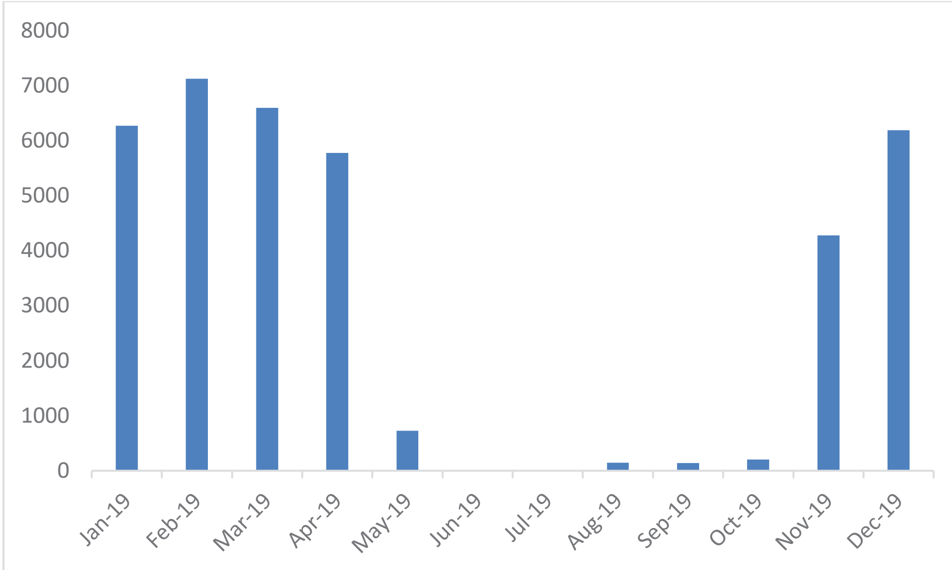


Figure 8: Haskell ES Natural Gas Usage Graph

Energy Star Portfolio Benchmarking

Willdan uses the U.S. Environmental Protection Agency (EPA) Portfolio Manager to rate the building on a scale of 1 to 100, as defined by its Energy Star score. This score compares a property under consideration to similar properties nationwide. The building is compared using a database of similar buildings from a national survey conducted by the Department of Energy. An Energy Star score of 50 indicates that the building, from an energy consumption standpoint, performs better than 50% of all similar buildings nationwide, while a rating of 75 indicates that the building performs better than 75% of all similar buildings nationwide. The Site Energy Use Intensity (EUI) is the amount of heat and electricity consumed by a building, as commonly reflected in utility bills, divided by the facility's conditioned square footage. The Source EUI is the total amount of natural gas consumed in the generation and use of energy consumed at a building, such as electricity and Natural Gas, divided by the facility's square footage. A facility's site and source EUI can be obtained from the Statement of Performance (SOP). The SOP for this facility has been reiterated in table below. It incorporates generation, transmission, and storage losses, thereby enabling a complete assessment of energy use in a building. The site and source U.S. Median EUIs mentioned below have been obtained from the EPA Portfolio Manager.

Table 21: Wanaque ES Energy Benchmarking

Benchmarking	This Facility	National Median
Site Energy Use Intensity (EUI kBTU/sf/yr)*	65.3	70.8
Source Energy Use Intensity (EUI kBTU/sf/yr)*	114.4	123.9
Energy Star Score	57	50

Table 22: Haskell ES Energy Benchmarking

Benchmarking	This Facility	National Median
Site Energy Use Intensity (EUI kBTU/sf/yr)*	56.7	80
Source Energy Use Intensity (EUI kBTU/sf/yr)*	96.6	136.4
Energy Star Score	79	50

Section 4. Energy Conservation Measures (ECMs)

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU as part of the final report. The baseline for the facility was obtained from monthly utility bills, equipment schedules, electric and natural gas usage data and other industry standard sources such as ASHRAE. Energy consumption associated with each measure was analyzed based on the technical performance of the recommended measure. It was then compared to the corresponding baseline energy consumption data to determine the resulting energy savings. Energy cost savings for each measure was determined using the projected energy savings and energy rates obtained from the utility information provided by the facility. The following were assumed when calculating the energy savings:

- Building energy usage patterns will remain relatively unchanged in the near future (no significant occupancy changes and/or space conversion).
- Energy costs will remain relatively stable in near future.
- Building system operation will remain relatively unchanged (unless a change is related to a recommended ECM).

An economic analysis was performed for each measure using historical implementation cost estimates from industry standard sources, data obtained from similar projects and pricing solicited from vendors. Energy cost savings and implementation costs for each ECM were used to determine a simple payback associated with each measure. Below presents a summary of energy-conservation measures. Payback in this report refers to simple payback associated with the implementation of each measure.

Table 23: Wanaque School District ECM Summary

Measure		Annual Estimated Savings				Estimated Implementation Cost ($)	Estimated Simple Payback Period
		Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	Cost Savings ($)		
ECM-1	**Direct Install**	227,831	57	2,466	$30,407	$200,730	6.6
ECM - 2	**Install High Efficiency Hot Water Boilers**	305	2	6,690	$6,342	$1,175,000	185.3
ECM - 3	**RCx for Unit Ventilators**	15,000	3	-	$1,848	$20,000	10.8
ECM - 4	**Weather Treatment near Multipurpose Room**	-	0	250	$231	$40,000	173.5
ECM - 5	**Transformer Upgrades**	52,500	15	-	$6,467	$67,000	10.4
ECM - 6	**Vending Misers**	3,224	0	-	$397	$2,400	6.0
ECM - 7	**Plug Load Controls**	18,504	0	-	$2,279	$23,400	10.3
ECM - 8	**Add Photovoltaic Systems**	691,399	607	-	$53,929	$0	0
	Total	**1,008,763**	**682**	**9,406**	**$101,899**	**$1,528,530**	**15.0**

Wanaque Elementary School

The table below highlights the ECMs considered and the overall savings for Wanaque Elementary School.

Table 24: Wanaque ES ECM Summary

Measure	Annual Estimated Savings				Estimated Implementation Cost ($)	Estimated Simple Payback Period
	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	Cost Savings ($)		
Direct Install Measures	113,225	28	1,659	$15,543	$118,730	7.6
Boiler Replacement with High Efficiency Boiler	-	-	3,149	$3,034	$600,000	197.7
RCx for Unit Ventilators	7,500	2	-	$924	$10,000	10.8
Replace Existing Transformer with New High Efficiency Transformers	26,250	8	-	$3,233	$32,000	9.9
Vending Misers	1,612	-	-	$199	$1,200	6.0
Plug Load Controls	10,280	-	-	$1,266	$13,000	10.3
Install PV	381,708	332	-	$29,773	$0	0
Total	540,575	371	4,808	$53,972	$774,930	14.4

ECM-1: Direct Install Measures

Existing Conditions

A thorough survey was conducted at Wanaque Elementary School. A variety of lighting fixtures exist at the school. The most prevalent lamp type used in the school is 4-feet 32-watt linear fluorescent T8 lamps in fixtures equipped with 2, 3 or 4 lamps per fixture. Additionally, the range of lamps used in interior lighting varies from 4-feet T5 & T12 linear fluorescent lamps, 2-feet T8 linear fluorescent lamps and T8 U-bend fluorescent tubes. Fixtures using T5 and T8 lamps are equipped with electronic ballasts while T12 lamps are used with magnetic ballasts. There are also compact fluorescent and incandescent lamps used for interior lighting. They also have packaged rooftop units that have reached its useful life. The faucets in bathrooms or kitchen do not have aerators.

ECM Description

Willdan recommends retrofitting fixtures with T5, T8 and T12 lamps with more efficient Linear LED tubes eliminating ballast from the fixtures. The existing compact fluorescent and incandescent lamps will be replaced with compatible LED replacements. In addition to electric usage and demand savings, maintenance savings may also be achieved since LED lamps last longer than other light sources, and therefore, do not need to be replaced as often. All recommended lighting is DLC and/or Energy Star compliant. Direct Install Program installs all LED lamps and fixtures. It also replaces two rooftop units at Wanaque Elementary School. The proposal also included insulating the uninsulated piping and installing low flow aerators for faucets.

Measure Baseline and Proposed Upgrades

Baseline:

- Existing fluorescent
- Two (2) RTUs

Proposed

- High-efficiency LED lighting fixtures
- Two (2) highly efficient RTUs

Calculation Methodology

Savings have been calculated using NJ Tech Manual FY2020 and Direct Install EAT tool v4c.

Maintenance Considerations

- None

ECM-2: Boiler Upgrade

Existing Conditions

Wanaque Elementary School has two (2) 10,071 MBH hot water boilers. There are three (3) 10 HP hot water circulating pumps, where two of them sequenced for lead and one on standby.

ECM Description

Willdan recommends replacing the boilers with five (5) 1,500 MBH new modular condensing boilers. The average expectancy of a traditional gas boiler is 20 years. The existing boilers were inspected and found to be functional, but they are at the end of their useful service life. A condensing boiler extracts additional heat from the waste gases by condensing this water vapor to liquid water, thus recovering its latent heat of vaporization. While the effectiveness of the condensing process varies depending on the temperature of the water returning to the boiler, it is always at least as efficient as a non-condensing boiler. Compared to 77 - 80% with conventional designs, the proposed condensing boiler efficiency was conservatively taken as 88% based on the expected heating hot water return temperatures in the building.

Measure Baseline and Proposed Upgrades

Baseline:

- Two (2) 10,071 MBH hot water boiler

Proposed

- Five (5) 1,500 MBH Aerco BMK15 boilers.
- These boilers will operate at non-condensing boiler during design conditions but will operate near condensing or condensing return hot water temperature during milder winter months or shoulder months.

Calculation Methodology

Savings have been calculated using NJ Tech Manual FY2020.

Design Considerations

- High efficiency boilers and boiler reset controls are installed, so the boilers can achieve higher efficiency at part loads, especially in milder outside temperatures.
- Rigging & demolition of existing units.
- Scheduling of unit downtime during construction.
- New combustion air intake and exhaust flue design.
- Reconfigure discharge of condensate.

Maintenance Considerations

- Boilers shall be maintained as per manufacturer's guidelines.

ECM-3: RCx for Unit Ventilators

Existing Conditions

A thorough survey of the unit ventilators was conducted at Wanaque Elementary School. From site observations, it was noticed that the coils were not maintained or cleaned over regular intervals, which has impacted the energy usage by the unit ventilators at an individual level.

ECM Description

Willdan recommends coil cleanup and overall unit ventilator cleanup to mitigate any clogged space which will improve the efficiency, and the savings overall. A study found states that coil cleanup can improve the efficiency of a unit ventilator between 5% and 7%.

Measure Baseline and Proposed Upgrades

Baseline:

- Forty-Two (42) unit ventilators with coils that were rarely maintained.

Proposed

- Coil cleanup and overall unit ventilator cleanup for Forty-Two (42) unit ventilators.

Calculation Methodology

Savings have been calculated using a study done by Inextechnology which claims over 50% in energy operational costs.

Design Considerations

- It is a retro-commissioning measure hence no design consideration.

Maintenance Considerations

- Regular maintenance of the unit ventilators as per the manufacturer

ECM-4: Replace existing transformer with high efficiency transformers

Existing Conditions

The facility consists of two (2) transformers with various kVA capacities ranging from 30 kVA to 75 kVA. The transformers are operating at a small fraction of their nameplate capacity, resulting in very low efficiency, and are often producing large amounts of excess heat, resulting in energy losses, and higher electric costs.

ECM Description

Willdan recommends replacing the dry-type transformers with E-Saver transformers. Designed to provide the lowest life cycle cost, the E-Saver goes beyond US DOE 2016 efficiency, ensuring lower operating losses than standard off-the-shelf transformers. To provide superior performance and reduce environmental impact, the E-Saver comes with a superior Nomex based insulation system impregnated with an organic epoxy adhesive. Superior insulation prevents shorts as well, substantially prolonging the life of the transformer. Based on the detailed field survey, the replacement E-Saver transformers will be a like-for-like, nominal kVA capacity, designed and manufactured to minimize losses for the application and fit within the existing constraints. This ECM can achieve energy saving by increasing the transformer efficiency.

Measure Baseline and Proposed Upgrades

Baseline

- Two (2) transformers

Proposed

- Two (2) E-Saver-80R transformers.

Calculation Methodology

Energy savings have been calculated using previous experience.

Design Considerations

- Coordination with facility manager to minimize the effect on day-to-day operation.
- Disruption to electrical loads served by existing transformers.
- Seasonal loading on transformers.

Maintenance Considerations

- As recommended by the manufacturer

ECM 5: Vending Machine Controls

Existing Conditions

There is one (1) refrigerated beverage vending machine at the school. It is not equipped with an occupancy-based controls and is operated 24/7.

ECM Description

Willdan recommends installing occupancy sensor controls for vending machines. Vending machines operate continuously, even during unoccupied hours and consume several hundred dollars per year in electrical energy costs. The installation of the Vending Miser product will reduce the run time of the vending machines during periods when no occupancy is sensed in the area surrounding the machines. The smart electronics in the device will ensure product is kept cold through a cycling process while reducing total energy consumption. Another benefit from implementing vending miser controls is to extend useful equipment life due to reduced run time hours. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines. This ECM can be successfully implemented with proper permissions from the supplier, if necessary.

Measure Baseline and Proposed Upgrades

Baseline

- One (1) existing refrigerated vending machine operated 24/7.

Proposed

- Install occupancy sensor (vending miser controls) for the refrigerated vending machines.

Calculation Methodology

Energy savings have been recognized using NJ Tech Manual FY2020.

Maintenance Considerations

- Ongoing maintenance shall be performed by the control's contractor.

ECM 6: Plug Load Controls

Existing Conditions

There are 100 plugged control points at Wanaque ES that power Desktop PCs and printers. These devices have no control from the plug point.

ECM Description

Willdan recommends installing a wireless plug load device at these locations which enables a scheduled control of the devices throughout the year. Schneider Electric's BERT Control offers a user-friendly user interface that can be operated from the comfort of a Smartphone.

Measure Baseline and Proposed Upgrades

Baseline

- 100 Plug points, uncontrolled.

Proposed

- Simple plugging of BERT CONTROL plug to 100 plug points.

Calculation Methodology

Energy savings have been calculated using NJ Tech Manual FY2020.

Maintenance Considerations

- Updating the front-end software.

ECM-7: Install Solar PV Panels

Existing Conditions

There is no solar photovoltaic system installed at the school.

ECM Description

Willdan recommends installing a solar photovoltaic system to reduce dependence on the electric grid. The solar system can provide 381,708 kWh of electricity annually. Solar panels work by absorbing sunlight with photovoltaic cells, generating direct current (DC) energy and then converting it to usable alternating current (AC) energy with the help of inverter technology. AC energy then flows through the facility's electrical panel and is distributed accordingly. The solar PV sizing in the current phase is preliminary assessment of solar potential. A more in-depth study will be performed to further evaluate the solar energy production potential.

Design Considerations

- Effect on utility tariffs and rate structures.
- Integration with existing building infrastructure

Maintenance Considerations

- As agreed within the PPA.

Haskell Elementary School

Table 25: Haskell ES ECM Summary

Measure	Annual Estimated Savings				Estimated Implementation Cost ($)	Estimated Simple Payback Period
	Electricity (kWh)	Annual Demand (kW)	Natural Gas (Therms)	Cost Savings ($)		
Direct Install Measures	114,607	29	808	$14,863	$82,000	5.5
Boiler Replacement with High Efficiency Boiler	305	2	3,541	$3,308	$575,000	173.8
RCx for Unit Ventilators	7,500	2	-	$924	$10,000	10.8
Weather treatment near multipurpose room	-	-	250	$231	$40,000	173.3
Replace Existing Transformer with New High Efficiency Transformers	26,250	8	-	$3,234	$35,000	10.8
Vending Misers	1,612	-	-	$199	$1,200	6.0
Plug Load Controls	8,224	-	-	$1,013	$10,400	10.3
Install PV	309,691	275	-	$24,156	$0	0
Total	468,189	313	4,599	$47,422	$753,600	15.9

ECM-1: Direct Install Measures

Existing Conditions

A thorough survey was conducted at Haskell Elementary School. A variety of lighting fixtures exist at the school. The most prevalent lamp type used in the school is 4-feet 32-watt linear fluorescent T8 lamps in fixtures equipped with 2, 3 or 4 lamps per fixture. Additionally, the range of lamps used in interior lighting varies from 4-feet T5 & T12 linear fluorescent lamps, 2-feet T8 linear fluorescent lamps and T8 U-bend fluorescent tubes. Fixtures using T5 and T8 lamps are equipped with electronic ballasts while T12 lamps are used with magnetic ballasts. There are also compact fluorescent and incandescent lamps used for interior lighting. The faucets in bathrooms or kitchen do not have aerators.

ECM Description

Willdan recommends retrofitting fixtures with T5, T8 and T12 lamps with more efficient Linear LED tubes eliminating ballast from the fixtures. The existing compact fluorescent and incandescent lamps will be replaced with compatible LED replacements. In addition to electric usage and demand savings, maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often. All recommended lighting is DLC and/or Energy Star compliant. Direct Install Program installs all LED lamps and fixtures. The proposal also includes insulating the uninsulated piping and installing low flow aerators for faucets.

Measure Baseline and Proposed Upgrades

Baseline:

- Existing fluorescent

Proposed

- High-efficiency LED lighting fixtures

Calculation Methodology

Savings have been calculated using NJ Tech Manual FY2020 and Direct Install EAT tool v4c.

Maintenance Considerations

- None

ECM-2: Boiler and Pump Motor Upgrade

Existing Conditions

Haskell Elementary School has one (1) 2,200 MBH low pressure steam boiler and one (1) 5,340 MBH hot water boiler. There are two (2) 15 HP hot water circulating pumps, two (2) 20 HP pumps to circulate hot water from steam heat exchanger and two (2) 10 HP primary hot water pumps.

ECM Description

Willdan recommends replacing the boilers with five (5) 1,500 MBH new modular condensing boilers. The average expectancy of a traditional gas boiler is 20 years. The existing boilers were inspected and found to be functional, but they are at the end of their useful service life. A condensing boiler extracts additional heat from the waste gases by condensing this water vapor to liquid water, thus recovering its latent heat of vaporization. While the effectiveness of the condensing process varies depending on the temperature of the water returning to the boiler, it is always at least as efficient as a non-condensing boiler. Compared to 77 - 80% with conventional designs, the proposed condensing boiler efficiency was conservatively taken as 88% based on the expected heating hot water return temperatures in the building. Along with the boiler replacement, Willdan recommends upgrading the circulation pumps with NEMA standard premium efficiency motors which are capable of operating on a variable frequency drive, to regulate the flow and save energy during the eating season.

Measure Baseline and Proposed Upgrades

Baseline:

- One (1) 2,200 MBH low pressure steam boiler
- One (1) 5,340 MBH hot water boiler
- Two (2) 15-HP motors with VFD controls
- Two (2) 20-HP motors
- Two (2) 10-HP motors

Proposed

- Five (5) 1,500 MBH Aerco BMK15 boilers
- Two (2) 15-HP premium efficiency motors with VFD controls
- These boilers will operate at non-condensing boiler during design conditions, but will operate near condensing or condensing return hot water temperature during milder winter months or shoulder months.

Calculation Methodology

Savings have been calculated using HVAC Rule of Thumb and NJ Tech Manual FY2020.

Design Considerations

- High efficiency boilers and boiler reset controls are installed, so that the boilers can achieve higher efficiency at part loads especially in milder outside temperatures.
- Rigging & demolition of existing units.
- Scheduling of unit downtime during construction.
- New combustion air intake and exhaust flue design.
- Reconfigure discharge of condensate.

Maintenance Considerations

- Boilers shall be maintained as per manufacturer's guidelines.

ECM-3: RCx for Unit Ventilators

Existing Conditions

A thorough survey of the unit ventilators was conducted at Haskell Elementary School. From site observations, it was noticed that the coils were not maintained or cleaned over regular intervals which has impacted the energy usage by the unit ventilators at an individual level.

ECM Description

Willdan recommends coil cleanup and overall unit ventilator cleanup to mitigate any clogged space which will improve the efficiency, and the savings overall. A study found states that coil cleanup can improve the efficiency of a unit ventilator between 5% to 7%.

Measure Baseline and Proposed Upgrades

Baseline:

- Forty-Eight (48) unit ventilators with coils that were rarely maintained.

Proposed

- Coil cleanup and overall unit ventilator cleanup for Forty-Eight (48) unit ventilators.

Calculation Methodology

Savings have been calculated using a study done by Inextechnology which claims over 50% in energy operational costs.

Design Considerations

- It is a retro-commissioning measure, hence no design consideration

Maintenance Considerations

- Regular maintenance of the unit ventilators as per the manufacturer

ECM-4: Weather Treatment near multipurpose room

Existing Conditions

A thorough survey was conducted at Haskell Elementary School. From site observations, it was noticed that the weather-stripping material on the doors were worn out or completely torn off. A minimal gap between the door and its frame can cause a huge infiltration rate in the building, directly impacting the energy use to condition the space.

ECM Description

Willdan recommends installing a hot-water heat curtain by the door that adds supplemental heat to the space when the door is operated. The existing hot water pipe can be tapped off and connected to the curtain to meet the heating requirement.

Measure Baseline and Proposed Upgrades

Baseline:

- Worn out weather-stripping material on doors

Proposed

- One (1) hot-water heat curtain

Calculation Methodology

Savings have been calculated using previous experience/ past projects.

Design Considerations

- None

Maintenance Considerations

- None

ECM-5: Replace existing transformer with high efficiency transformers

Existing Conditions

The facility consists of two (2) transformers with various kVA capacities ranging from 30 kVA to 75 kVA. The transformers are operating at a small fraction of their nameplate capacity, resulting in very low efficiency, and are often producing large amounts of excess heat, resulting in energy losses, and higher electric costs.

ECM Description

Willdan recommends replacing the dry-type transformers with E-Saver transformers. Designed to provide the lowest life cycle cost, the E-Saver goes beyond US DOE 2016 efficiency, ensuring lower operating losses than standard off-the-shelf transformers. To provide superior performance and reduce environmental impact, the E-Saver comes with a superior Nomex based insulation system impregnated with an organic epoxy adhesive. Superior insulation prevents shorts as well, substantially prolonging the life of the transformer.

Based on the detailed field survey, the replacement E-Saver transformers will be a like-for-like, nominal kVA capacity, designed and manufactured to minimize losses for the application and fit within the existing constraints. This ECM can achieve energy saving by increasing the transformer efficiency.

Measure Baseline and Proposed Upgrades

Baseline

- Two (2) transformers

Proposed

- Two (2) E-Saver-80R transformers.

Calculation Methodology

Energy savings have been calculated using previous experience.

Design Considerations

- Coordination with facility manager to minimize the effect on day-to-day operation.
- Disruption to electrical loads served by existing transformers.
- Seasonal loading on transformers.

Maintenance Considerations

- As recommended by the manufacturer

ECM 6: Vending Machine Controls

Existing Conditions

There is one (1) refrigerated beverage vending machine at the school. It is not equipped with occupancy-based controls and is operated 24/7.

ECM Description

Willdan recommends installing occupancy sensor controls for vending machines. Vending machines operate continuously, even during unoccupied hours and consumes several hundred dollars per year in electrical energy costs. The installation of the Vending Miser product will reduce the run time of the vending machines during periods when no occupancy is sensed in the area surrounding the machines. The smart electronics in the device will ensure product is kept cold through a cycling process, while reducing total energy consumption. Another benefit from implementing vending miser controls is extend useful equipment life due to reduced run hours. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines. This ECM can be successfully implemented with proper permissions from the supplier, if necessary.

Measure Baseline and Proposed Upgrades

Baseline

- One (1) existing refrigerated vending machine operated 24/7.

Proposed

- Install occupancy sensor (vending miser controls) for the refrigerated vending machines.

Calculation Methodology

Energy savings have been recognized using NJ Tech Manual FY2020.

Maintenance Considerations

- Ongoing maintenance shall be performed by the control's contractor.

ECM 7: Plug Load Controls

Existing Conditions

There are 80 plugged control points at high school that power Desktop PCs and printers. These devices have no control from the plug point.

ECM Description

Willdan recommends installing a wireless plug load device at these locations which enables a scheduled control of the devices throughout the year. Schneider Electric's BERT Control offers a user-friendly interface that can be operated from the comfort of a Smartphone.

Measure Baseline and Proposed Upgrades

Baseline

- 80 Plug points, uncontrolled.

Proposed

- Simple plugging of BERT CONTROL plug to 80 plug points.

Calculation Methodology

Energy savings have been calculated using NJ Tech Manual FY2020.

Maintenance Considerations

- Updating the front-end software.

ECM-8: Install Solar PV Panels

Existing Conditions

There is no solar photovoltaic system installed at the school.

ECM Description

Willdan recommends installing a solar photovoltaic system to reduce dependence on the electric grid. The solar system can provide 309,691 kWh of electricity annually. Solar panels work by absorbing sunlight with photovoltaic cells, generating direct current (DC) energy and then converting it to usable alternating current (AC) energy with the help of inverter technology. AC energy then flows through the facility's electrical panel and is distributed accordingly. The solar PV sizing in the current phase is preliminary assessment of solar potential. A more in-depth study will be performed to further evaluate the solar energy production potential.

Design Considerations

- Effect on utility tariffs and rate structures.
- Integration with existing building infrastructure

Maintenance Considerations

- As agreed within the PPA.

Willdan also recognized other ECMs as well that have the potential towards energy savings and energy cost savings. However, attempting to stay within the rules of ESIP, Willdan was able to only consider a handful ECMs. If additional savings or funding becomes available after the bidding process, these ECM's will be considered with District and Architect input. The table below highlights the ECMs that are viable but not considered at this time.

Table 26: ECMs considered but no recommended

Optional ECM: Considered, but not included with base project at this time	Wanaque Elementary School	Haskell Elementary School
Window Replacement/ Upgrade	X	X
Unit Ventilators	X	X
Packaged Rooftop Units		X
Split Systems	X	X
Exhaust Fans	X	X
Kitchen Hood	X	X
BMS	X	X

Assessment of Risks

Willdan has considered the above ECMs based on the current facility operational method and condition of the schools. This assessment of risks is meant to provide Wanaque an idea of potential risks that lie within ESIP. These risks are, by no means, intended to eliminate responsibility of the ESCO to provide an ESP that meets industry standards of energy analysis and expertise. This section is included just to help Wanaque BOE understand avoidable failure points that would result in lower energy savings or operational issues.

- Overall energy savings may be impacted if existing operational conditions are altered from what is laid out as the baseline in this ESP report, which includes following parameters including, but not limited to, occupancy of the buildings, operating hours, space type changes and override on controls equipment.
- Equipment which are proposed to be controlled automatically can impact energy savings if manually overridden. While such actions might be needed for regular maintenance or emergency work, the equipment control must be reset to regain automation and energy savings.
- Equipment maintenance and/or upgrades must be performed as recommended by the manufacturer. Failure to comply may impact energy savings.

Section 5. Utility and Other Rebates and Incentives Available for Project

Willdan has worked with various NJOCE Programs as well as utility programs in New Jersey. Willdan serves NJBPU as an approved Direct Install Program Implementation contractor. Willdan is the only ESCO that has been approved by NJOCE as a Direct Install Implementation Contractor, so will be able to help Wanaque Board of Education to apply as many measures under Direct Install program for qualified buildings. To date, Willdan has completed 400 projects under direct Install program. Willdan is also an approved Pay for Performance partner, so any building that qualify for Pay for Performance program, we would be able to help Wanaque to apply under NJOCE Pay for Performance Program. Willdan has help more than 200 customers with NJOCE SmartStart Program.

Willdan will work with you to apply for and maximize all available rebates, utility incentives, PJM incentives or tax incentives. Willdan will also work with Wanaque BOE to explore all available markets for Carbon Credits. There are a number of programs available to help incentivize utility customers to reduce their dependence on the grid and move towards more energy efficient technology. The developers of the incentive programs understand, as we do, that the most efficient technology is not always the least expensive from a “first cost” standpoint, but they will lead to reduced operational costs and an improved environment over the “lifecycle” of your facilities.

Some of those rebates may include but are not limited to:

- Rebates and incentives available through the NJ SmartStart
- Program (via the NJ Clean Energy Program) – Equipment
- Incentives
- New Jersey Clean Energy “Pay for Performance” Incentive Program
- Energy Efficiency and Conservation Block Grants (New Jersey)
- Renewable Energy Incentive Program (REIP) (New Jersey)
- PJM Interconnection Incentive Programs (Demand Response and Frequency Regulation)
- Federal Government Energy Policy Act (Renewable Energy Technologies Tax Credits and Funding Grants)

Stimulus Funding Sources

- State Fiscal Stabilization Fund
- Qualified Zone Academy Bonds
- Qualified School Construction Bonds
- Energy Efficiency and Conservation Block Grants
- Qualified Energy Conservation Bonds
- Recovery Zone Bonds
- Build America Bonds

1. New Jersey Office of Clean Energy Direct Install Program

Willdan is an approved Direct Install Program Contractor, who has been selected by NJBPU to implement Direct Install Program. As outlined in table 27 below, both schools would qualify for Direct Install Program. Wanaque BOE has a potential of implementing ECMs worth $770,000 through Direct Install program with a 37% of the project's total cost, paid by the NJOCE Program.

Existing small to mid-sized commercial and industrial facilities with an average peak electric demand that did not exceed 200 kW in any of the preceding 12 months are eligible to participate in Direct Install. Wanaque BOE will submit 12 months of electric utility bills manifesting their eligibility.

Included Measures:

- Lighting
- Heating, Cooling & Ventilation (HVAC)
- Pipe Insulation
- Low-flow Aeraters

Measures eligible for Direct Install are limited to specific equipment categories, types and capacities. Boilers may not exceed 1,500,000 Btuh and furnaces may not exceed 140,000 Btuh. Limitations on packaged HVAC, motors and other equipment also apply. Larger capacity equipment may be eligible for financial incentives through NJ SmartStart Buildings.

See how other small businesses owners have saved! View a step-by-step description of the program or read the Program Guide to understand what to expect.

A. CONTACT US
Give us a call at 866-NJSMART to learn more about this offer. If your building meets eligibility requirements, we'll refer you to the Participating Contractor serving your region to schedule an Energy Assessment. Or, if you prefer, you may contact the contractor right away to get started!
B. REVIEW RESULTS
After the energy assessment, the contractor will review the results with you, including what measures qualify and your share of the project cost.

C. MOVE FORWARD
You will sign a scope of work document to proceed with implementation of qualifying measures and arrange for payment of your portion of the project costs with your contractor.
D. ARRANGE INSTALLATION
You and your contractor will set a convenient start date for the installation.
E. CONFIRM INSTALLATION
Once the participating contractor completes the installation, you accept the work by signing a project completion form.
F. COMPLETE TRANSACTION

Wanaque is responsible of paying the remaining 63% of the project costs, which has been successfully covered under ESIP finance.

Benefits of Direct Install Program:

- Turnkey Process - A network of selected participating contractors addresses your project from start to finish, beginning with an assessment of your facility, and ending with the installation of eligible energy-efficient equipment.

- Minimal Cost - Your share of the project's cost could be as low as 20%, in which case the program pays the remaining amount. With incentives so dramatic, your upgrade project can very quickly pay for itself.

- Fast Turnaround Time - Project installations are typically completed within 90 days from the time of scheduling your energy assessment.

- Ongoing Savings - Your new energy-efficient equipment will provide savings for years to come through dramatically reduced energy costs on your monthly utility bills.

Table 27: District-Wide DI Incentives

School Name	NJOCE Direct Install
Wanaque Elementary School	$144,467.88
Haskell Elementary School	$130,043.32

2. New Jersey Office of Clean Energy Smart Start Program

Incentives for Qualifying Equipment and Projects

A. Financial incentives are available for size projects which can offset some - or maybe even all - of the added cost to purchase qualifying energy-efficient equipment.
B. Support for Custom Energy-Efficiency Measures
C. Custom measures give you the opportunity to receive an incentive for unique energy-efficiency measures that are not on the prescriptive equipment list but are new/innovative or project/facility specific.

Application and Eligibility Process

A pre-approval is no longer required for prescriptive measures, with the exception of prescriptive & performance lighting, lighting controls and custom measure applications. Please note that anyone who purchases and installs equipment without Program Manager approval does so at his/her own risk.

Table 28: District-Wide SmartStart Incentives

School Name	NJOCE SmartStart
Wanaque Elementary School	$4,200
Haskell Elementary School	$4,200

3. Energy Star Award Program

As part of the traditional guarantee measurement and guarantee process, Willdan will enroll Wanaque BOE schools into the EPA/DOE Energy Star program. The Energy Star Program has been developed by the EPA/DOE to reduce national energy dependency and pollution emissions. To achieve these ends, the program entices building owners to implement energy saving projects. These projects may include lighting, controls, HVAC replacement. Willdan will perform an Energy Star analysis for each building in this program. The Energy Star Benchmarking Tool provides a 1-100 ranking of a building's energy performance relative to the national building market. A higher SEP indicates a more energy efficient building. A score of 75 or higher is needed to qualify for the Energy Star label.

Willdan will prepare the information needed – utility bills and building information – for submittal to the EPA through our EnergyCAP™ program. EnergyCAP™ has a partnership with the EPA and Portfolio Manager and their program will assist in the information gathering and submittal process. After the original benchmark score, the data can be submitted monthly to see how the benchmark changes and also to renew the Energy Star rating on an annual basis. The decal will state the year in which the Energy Star rating was earned. Before the building can be Energy Star designated it must be audited by a third-party engineer. As a participant, Wanaque BOE can expect free press, on both the local and national levels, to promote the positive impact of the project.

4. PJM Incentives

PJM's Energy Efficiency program pays businesses for permanent load reduction resulting from energy efficiency projects they have completed or will be complete in the future. The program pays organization capacity revenue for up to four years following the completion of a qualified project. Qualifying projects include those with permanent energy reductions involving lighting, refrigeration equipment, HVAC, motors, VFDs, and more. There is revenue to be earned from your organization using less energy and helping PJM reduce the overall load on the grid.

- Summer EE performance period: June- Aug between 2-6pm not including weekends or public holidays
- Winter EE performance period : Jan-Feb between 7-9am and between 6-8pm not including weekends or public holidays
- Solar PV systems are not eligible as PJM Energy Efficiency Resources
- BMS Systems load reductions are difficult to qualify under PJM's Manual 18B as "permanent, continuous"
- Savings achieved by fuel switching are not eligible as PJM EE Resources.
- Transformers and Motors/VFDs may have potential but at this stage for estimated value it is not simple enough to be viable to make that analysis.
- Lighting upgrades have represented almost 100% of the PJM EE Capacity kWs that we have qualified with PJM for school district projects. (>50 school districts in NJ in last five years) We have qualified some PTAC units which were utilized in the winter for heating as well as in summer for cooling but that was not a typical ECMs.

Table 29: District-Wide PJM Incentives

School Name	PJM Savings
DY 2024/25	$0
TOTAL	**$0**

5. Operational and Maintenance Savings

ESIP Law allows energy savings as an energy cost reduction and maintenance cost reduction resulting from implementing energy conservation measures, when compared against established baseline of a previous energy cost, operating and maintenance cost including but not limited to future capital expenditure avoided because of equipment installed or services performed as part of the ESIP program. Willdan is projecting a reduction of $17,000 annually towards lighting operation and maintenance savings for five years and $10,000 annually towards mechanical operation and maintenance savings for two years.

Section 6. Measurement and Verification (M&V) Plan

Measurement and Verification

The M&V protocol developed collaboratively between Willdan and Wanaque Board of Education during the IGA process and as outlined in the M&V Plan will be utilized to measure and verify the project energy savings. Willdan will assign a dedicated M&V engineer familiar with Wanaque Board of Education facilities and its systems to work on-site throughout the M&V period. The dedicated M&V engineer will work closely with Wanaque staff on continuous optimization and commissioning of systems to ensure savings are achieved.

The International Performance Measurement and Verification Protocol (IPMVP) is the industry standard protocol that Willdan follows. The IPMVP provides four methods to measure energy savings. Willdan generally prefers IPMVP Option C – *measuring savings at the utility meter* – in cases where realizing the project savings on the utility bill is critical; however, Option C is limited on a facility that undergoes significant changes or projects that also impact the utility meter. For this reason, more measure-specific savings tracking using submetering may be most appropriate.

Computation of Baseline

Willdan's preferred approach, IPMVP Option C: Whole Facility, whenever appropriate based upon ECM selection, facility type, and customer preference. Willdan's straightforward calculations for both the baseline and any adjustments are outlined in this section.

Methodology to Determine Baseline Energy Use

In the simplest terms, the baseline is the sum of the energy consumption and costs for a specific, 12-month period prior to the installation of an energy efficiency project. The Baseline Year is the period that establishes the pre-retrofit conditions used as the point of reference for calculating energy savings. This baseline is developed prior to contract execution and established with input and agreement of Wanaque Board of Education.

Willdan's approach to calculating a baseline for Option C is summarized in this section; Option A and B baselines are customized based on ECMs implemented and measured.

Data Collection

Building and system information gathered during the IGEA is documented in the Energy Savings M&V Plan to document the conditions present that resulted in the baseline energy use. This data includes, but is not limited to:

- Building metered utility data (from utility provider meters)
- Weather conditions collected from the nearest National Weather Service Station
- A lighting level survey, with a count of the number of burned out lamps
- A summary of typical space temperatures during occupied periods

- An inventory of the HVAC and domestic water heating systems serving the building
- The operating hours of each building
- Function and utilization of each space within the building
- Building plans showing current construction and floorplans showing physical layout of spaces

Baseline Year Consumption Calculations – IPMVP Option C: Whole Facility

For IPMVP Option C: Whole Facility M&V methodology, utility consumption and demand are obtained from utility bills, shown below, for the Guarantee Meters during the baseline period, which forms the basis of the energy baseline.

The following equations will be used to determine baseline electrical consumption and demand:

> Baseline Energy (or Demand) Consumption = ∑ Tracked Utility Meters' Consumption (of Demand) ± Baseline Adjustments, where:
>
> > Baseline Adjustment = ∑ ± Routine Adjustment to reporting period conditions ± Non-Routine Adjustments to reporting-period conditions
> >
> > Routine Adjustments include, but are not limited to, weather and billing period length
> >
> > Non-Routine Adjustments include changes in key conditions from the baseline period to the reporting period, including, but no limited to, occupancy; hours of operation; changes to building function and use; changes to operation, capacity or quantity of equipment or systems within the facility; and additions to the building

Table 30: Wanaque School District Utility Baseline

	Total	Haskell Elementary School	Wanaque Elementary School
Area (sqft)	154,521	88,000	66,521
Annual utility $	$186,319	$96,141	$90,178
Total kBtu	10,253,059	5,448,854	4,804,205
Total therms	68,891	37,433	31,457
$ therms	$64,879	$34,569	$30,310
kW	239	213	239
Total kWh utility	985,920	499,840	486,080
$ kWh	$121,440	$61,572	$59,868
Number of stories		2	1
staff	157	72	85
students	957	426	531
$/kWh	$0.12	$0.12	$0.12
$/therm	$0.94	$0.92	$0.96
$/kBtu	$0.02	$0.02	$0.02
$/sf	$1.21	$1.09	$1.36
$/p	$167	$193.05	$146.39
kBtu/sf	134	61.9	72.2
kBtu/p	9,204	10,941	7,799

M&V activities are performed to assure guaranteed savings are met to satisfy the contract and legislation. A general M&V approach is necessary to outline the methods that will significantly affect how the baseline is defined and the energy savings justified. An Adjusted Baseline is also used to incorporate any changes with facility use, such as operating hours, occupancy, renovation or any other reason that will impact a significant use in energy as compared to the baseline. Willdan Energy Solutions calculates the baseline for any facility based on actual existing systems and operating conditions. There are various approached that WES takes to accumulate the necessary data to construct the baseline. Such methods are listed below:

- Site measurements for electrical loads such as lighting, HVAC equipment, plug loads, circulation pumps, process loads, etc.
- Equipment operating hours based on trend data

This section contains a description of the types of Measurement and Verification (M&V) methodologies that Willdan Energy Solutions will use to guarantee the performance of this project.
They have been developed and defined by two independent authorities:

- International Performance Measurement and Verification Protocol (IPMVP)
- Federal Energy Management Program (FEMP)

There are four guarantee options that may be used to measure and verify the performance of a particular energy conservation measure. Each of the option is described below.

Option A – Retrofit Isolation: Key Parameter Measurement

Energy savings is determined by field measurement of the key parameters affecting the energy use of the system(s) to which an improvement measure was applied separate from the energy use of the rest of the facility. Measurement frequency ranges from short-term to continuous, depending on the expected variations in the measured parameter, and the length of the reporting period.
Measurement of key parameters means that those parameters not selected for field measurement will be estimated. Estimates can be based on historical data, manufacturer's specifications, or engineering judgment. Documentation of the source or justification of the estimated parameter will be described in the M&V plan in the contract. Energy savings is determined through engineering calculations of the baseline and post-retrofit energy used based on the combination of measured and estimated parameters, along with any routine adjustments.

Option B – Retrofit Isolation: All Parameter Measurement

Like Option A, energy savings is determined by field measurement of the energy use of the systems to which an improvement measure was applied separate from the energy use of the rest of the facility. However, all of the key parameters affecting energy use are measured; there are no estimated parameters used for Option B. Measurement frequency ranges from short-term to continuous, depending on the expected variations in the savings and the length of the reporting period. Energy savings is determined through engineering calculations of the baseline and post-retrofit energy used based on the measured parameters, along with any routine adjustments.

Option C – Whole Building Metering/Utility Bill Comparisons

Option C involves the use of utility meters or whole building sub-meters to assess the energy performance of a total building. Option C assesses the impact of any type of improvement measure, but not individually if more than one is applied to an energy meter. This option determines the collective savings of all improvement measures applied to the part of the facility monitored by the energy meter. In addition, since whole building meters are used, savings reported under Option C include the impact of any other change made in facility energy use (positive or negative).
Option C may be used in cases where there is a high degree of interaction between installed improvement measures or between improvement measures and the rest of the building or the isolation and measurement of individual improvement measures is difficult or too costly.

This Option is intended for projects where savings are expected to be large enough to be discernable from the random or unexplained energy variations that are normally found at the level of the whole facility meter. The larger the savings, or the smaller the unexplained variations in the baseline, the easier it will be to identify savings. In addition, the longer the period of savings analysis after installing the improvement measure, the less significant is the impact of short-term unexplained variations. Typically, savings should be more than 20% of the baseline energy use if they are to be separated from the noise in the baseline data.

Periodic inspections should be made of all equipment and operations in the facility after the improvement measure installation. These inspections will identify changes from baseline conditions or intended operations. Accounting for changes (other than those caused by the improvement measures) is the major challenge associated with Option C-particularly when savings are to be monitored for long periods.

Savings are calculated through analysis of whole facility utility meter or sub-meter data using techniques from simple comparison to regression analysis.

Option D – Calibrated Simulation

Option D involves the use of computer simulation software to predict energy use, most often in cases where baseline data does not exist. Such simulation models must be calibrated so that it predicts an energy use and demand pattern that reasonably matches actual utility consumption and demand data from either the base-year or a post-retrofit year.

Option D may be used to assess the performance of all improvement measures in a facility, akin to Option C. However, different from Option C, multiple runs of the simulation in Option D allow estimates of the savings attributable to each improvement measure within a multiple improvement measure project.

Option D may also be used to assess just the performance of individual systems within a facility, akin to Option A and B. In this case, the system's energy use must be isolated from that of the rest of the facility by appropriate meters.

Savings are calculated using energy use simulation models, calibrated with hourly or monthly utility billing data and/or end-use metering. Using the given options, Wanaque schools will be going through various M&V options. The following is the decision per school

Wanaque Elementary School

Willdan recommends Option C – Whole Building Metering for Wanaque Elementary School. The ECMs recommended affect the overall usage of the school which makes option C a prima choice for Measurement and Verification.

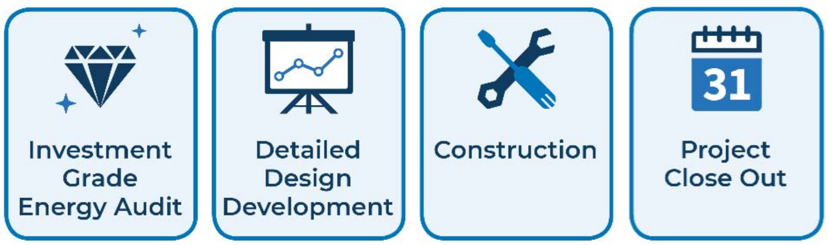
Haskell Elementary School

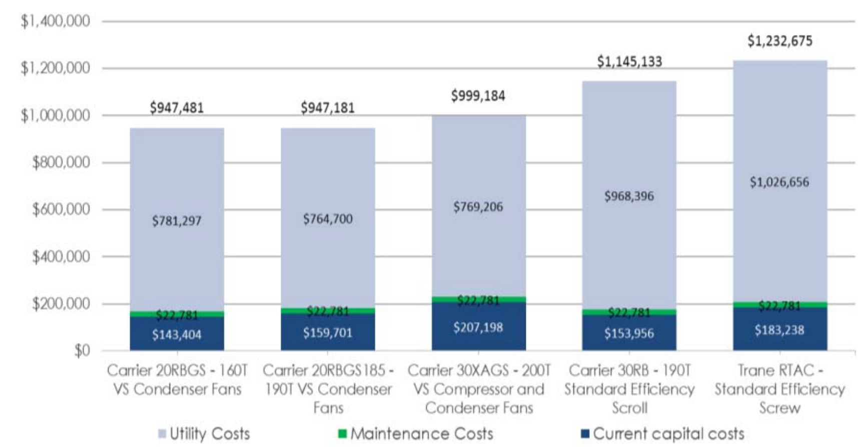
Willdan recommends Option C – Whole Building Metering for Wanaque Elementary School. The ECMs recommended affect the overall usage of the school which makes option C a prima choice for Measurement and Verification.

Section 7. Project Development and Management Overview

Willdan's approach to energy performance project development and management of Energy Savings Plans (ESP) and Energy Savings Improvement Plans (ESIP) intentionally evolved to address the common pitfalls we experienced while working for vendor based ESCOs as well as managing "traditional" performance contracting projects from the owner's side of the table. Our ESP process is designed around core principles that have earned us the reputation of delivering the best value to our clients.

The following components set our ESP and ESIP process apart from others for Wanaque Board of Education:





Detailed Design Development
Willdan's Product and Vendor Independent Approach
Willdan does not manufacture, sell, distribute or install any specific equipment or system and are not tied to any brand. We recommend equipment based on customer preference, what is best and most cost effective for the application. Our standard approach is to select the best long-term equipment and systems based on Life Cycle Cost (LCC) analysis and then competitively bid sub-contracted work to obtain the best price value for our clients.

Willdan knows a competitive atmosphere is essential to ensuring that our clients receive the highest quality project delivered at the lowest total cost. Willdan's independence from specific equipment or contractors provides us the freedom to incorporate our clients' preferences for products and contractors on every project.
Our engineering team will work closely with Di Caro | Rubino architects, and Wanaque School District engineering and facilities staff to understand their product preferences. Qualitative and quantitative benefits of these preferred products relative to alternatives will be evaluated and discussed with staff to arrive at a final basis of design and to inform

the project specifications. Willdan began as – and remains – an engineering company with the in-house engineering resources to effectively serve public entities.

Our engineers will work with Di Cara | Rubino to develop design documents, they remain involved in the construction management process to ensure that the design intent and requirements are properly installed, preventing contractors from omitting, neglecting, or modifying essential components of the original design intent. Table below compares traditional the ESCO approach with Willdan's approach to energy performance contacting.

The top priority of Willdan's project implementation team is to ensure that the installed project stays on schedule, maintains the highest standards during installations, and promptly addresses Wanaque Board of Education's questions or concerns. Willdan will provide as requested oversight during construction.

Table 31: Willdan's Construction Management Process Key Elements

Process Element	Overview
Equipment Submittals	Willdan's methodical approach to receiving and reviewing equipment submittals from contractors is essential because it ensures that appropriate equipment is ordered and installed. Detailed submittal requirements are presented in "SECTION 013300 - SUBMITTAL PROCEDURES" of Willdan's standard specification package.
Construction Oversight	The construction management team works with the design engineer to ensure systems are properly installed and operating efficiently, comfortably, and with minimal maintenance. Willdan monitors project installation daily, and all construction issues are addressed by our team.
Client Communication	Willdan ensures contractors implement projects as designed, and keeps clients apprised of the project through construction update meetings, update memos, and additional avenues as requested. Any challenges, scheduling conflicts, etc., are resolved at these meetings.
Operations and Maintenance Manuals	Prior to closing out projects, contractors are required to submit detailed Operation and Maintenance manuals for all equipment specified. Detailed Operations and Maintenance requirements are presented in "SECTION 017823 - OPERATION AND MAINTENANCE" of Willdan's specification package.
Warranty Procedures	Willdan protects equipment warranties and lays out expectations and requirements related to warranties in "SECTION 016000 - PRODUCT REQUIREMENTS" of our specification package. This portion – in addition to the remainder of Willdan's specifications – will be transferred to s. Willdan maximizes the benefit of warranties to our clients by providing subcontractors with specific required steps and actions related to product, manufacturers', and workmanship warranties.

During the design phase of our projects, Willdan selects systems, regardless of manufacturer or distributor. Every facility will receive customized solutions designed to maximize occupant comfort, efficiency, maintenance, and total life cycle cost.

Throughout the project Willdan is the sole source of contact and accountability for Wanaque Board of Education for warranty-related issues. These costs are included within the Willdan standard pricing model.

Safety Practices and Procedures
All Willdan employees and managed contractors are required to follow well-defined safety procedures that not only protect themselves, but more importantly, protect Wanaque Board of Education students, staff and the general public. Incident prevention is our highest priority. As such, our Safety Coordinator will perform risk assessments of all projects and develop Site- and Task-Specific Safety Plans. Well-marked access restrictions, visible signage, and daily clean-ups all are strictly enforced to ensure the safety of everyone at the facility. Willdan's safety plan and procedures are consistent with the requirements of the State of New Jersey and Wanaque School District. Willdan maintains an impeccable safety record and continues to promote safety as its #1 priority.

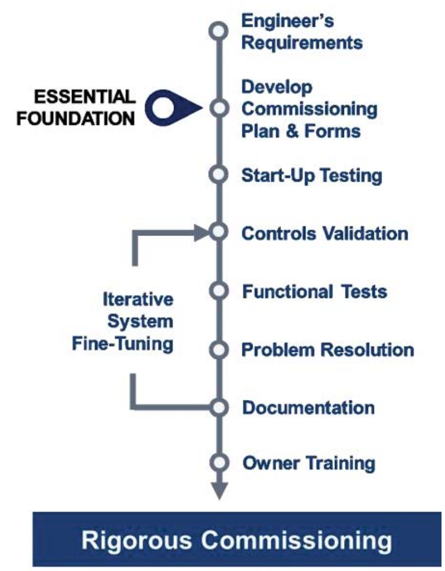
Management of Hazardous Materials
Willdan adheres to a Corporate Environmental Health and Safety Plan (EHASP) that provides the basic policies, objectives, organizational structure, and guidelines that govern all work we perform. The EHASP identifies potential hazards and specifies an appropriate level of response to protect the health and safety of our workers, subcontractors, clients and the public. This includes the management of hazardous materials encountered in the installation of energy conservation measures, such as asbestos, PCB ballasts, lead, etc. For each contract, Willdan updates our EHASP to account for specific hazards that may be encountered.

Willdan will assign Gerard Mondesir Safety Officer to ensure environmental health and safety principles are strictly adhered to by all program staff. Gerard will engage with AON (the world's largest construction insurance broker), CNA (Willdan's insurance carrier) and Willdan's Senior Management to identify best practices for safety. Under Gerard's leadership, Willdan has experienced four consecutive years of improving Experience Modification Rate scores with an excellent score of 0.77 as of 2016 (a business with a score of <1 is safer than average).

Project Closeout
Construction close-out inspections, punch lists, operation and management documents, owner training, commissioning, and warranty information are all important to the successful completion of any project. Willdan takes this process one step further with its comprehensive commissioning process described below.

Systems Commissioning
Commissioning (Cx) is the systematic process of ensuring that all facility systems perform interactively and acceptable to the owner's operational needs and Willdan's design intent. This process requires the preparation of facility operations personnel, as all HVAC, controls, and lighting systems will be commissioned.

Willdan's commissioning process is the fundamental quality control mechanism that ensures the final installation efficiently satisfies the Owner's Project Requirement (OPR). This process begins at project inception and remains in operation throughout project development to prevent – or catch – potential issues during design, construction, and final system testing. Ideally, this process works preemptively, but Willdan also recognizes the importance of continuous commissioning after construction completion to guarantee appropriate system installation and optimized system performance.



The Willdan team uses a systematic commissioning process that eliminates the common disconnects between the owner's goals, the engineers' design, the contractor installation, and the final operation and performance of each building system.

It is this systematic process coupled with our use of in-house commissioning group that eliminates disjointed handoffs. Willdan's commissioning process begins in the pre-design phase and ends one-year after construction. At the commencement of construction system functional testing is conducted.

Subsequent testing of HVAC systems and controls continues to capture performance in all four seasons. A comprehensive commissioning plan, extensive documentation, and a complete "issues checklist" is maintained through project management software. This rigorous process ensures every issue is corrected before the project is considered complete.

Specific components of our commissioning process are described in more detail below.

- Continual Quality Assurance – Willdan's engineers and construction teams continually build quality into all project phases. They monitor construction progress and verify compliance with design and specification documents and overall standards of quality to preemptively address issues. This attention to detail throughout the construction process means issues that could potentially cost a great deal of time, money, and aggravation are eliminated before they have a chance to fester.
- Commissioning Plan – Willdan develops and utilizes the Commissioning Plan to define the scope and format of the commissioning process and the responsibilities of all involved parties. This plan is provided to all commissioning team members to inform them of the commissioning work intent and scope, ensure inclusion in the project scope, document all process steps, and expedite the overall commissioning process.
- Preparation for Functional Testing – Willdan's commissioning team verifies preparations before functional testing begins by reviewing construction documents, submittals, and signed documentation from contractors certifying all

systems are installed in compliance with the construction documents and manufacturer's recommendations, are clean and properly prepared for operation, are functional for test and balance (TAB), and are ready for functional performance testing.

- Functional Testing – Willdan's engineers verify proper sequencing, operation, and performance of installed equipment and systems under real operating conditions, including seasonal commissioning. Qualified technicians working for the contractor who installed the equipment and implemented the programming perform these tests under Willdan's certified commissioning engineers' supervision.
- Documentation – Startup forms, TAB forms, and functional test procedures guide the commissioning process, and specific written documentation is maintained for all commissioning activities. Willdan's commissioning team generates commissioning reports documenting project issues and resolutions, deficiencies, and the status of testing, and these reports are tracked for the duration of a project.
- Problem Resolution – When a report is issued to address an identified deficiency, Willdan's construction manager forwards it to the appropriate parties to initiate immediate corrective action. Willdan's engineers are responsible for any design modification and issuing final design details.

Provision of Record Drawings

Accurate as-built drawings are as important to future facility operation as the O&M manuals delivered at the end of the construction process. Up-to-date documentation makes the generation of record drawings seamless at the end of construction and provide an accurate basis for discussion of field changes with all project stakeholders when they occur. Documents are provided in both hard copy and electronic form (AutoCAD and PDF format) to our clients, or as requested.

Provision of Records

As-Built Construction Drawings
Commissioning Plan/Issues Log
Pre-Functional Checklist
Scope Change Documentation
Operations & Maintenance Manuals
Manufacturers Testing/Inspection Report
Design Clarifications
Design Change Documentation
Final Measurement & Verification Plan
Equipment Start-Up Report
Plan Review Changes
Warranty Letters
Functional Performance Test Report
Test & Balance Report
Service Contact Information

Post-Implementation Reporting

Willdan will provide Wanaque Board of Education a full description of the energy baseline(s) corresponding with the M&V plan at the end of the construction period during a dedicated M&V kickoff meeting. This report details parameters that describe both the energy and water consumed in the baseline year and the conditions that caused that consumption to occur to facilitate accurate M&V of guaranteed savings.

Factors including utility consumption and demand data; weather; building physical and thermal properties; energy consuming equipment and system parameters; space temperature setpoints and schedules; facility use and occupancy schedules; and other key information describing base-year conditions are outlined in this report. Willdan does not adjust our baseline or savings for changes necessary for project implementation. Only

Wanaque Board of Education-initiated scope changes during construction are subject to adjustment.

Description of Post Construction Training and Services

Flexibility in Assignment of Operation and Maintenance Responsibilities

Willdan does not use Operation and Maintenance services as a source of profit; our role is to ensure Wanaque Board of Education has resources in place to provide sufficient ongoing maintenance – either with a third-party subcontractor or using in-house personnel. If outside assistance is desired or required, Willdan facilitates a competitive process to obtain preventative maintenance from local, high-quality contractors.

Wanaque Board of Education Staff Training

Willdan recognizes that the success – both in terms of performance and client satisfaction – hinges on operators understanding how to properly operate and maintain the systems. We will deliver technical training to Wanaque Board of Education staff and operations personnel on all new equipment and dynamic systems. We will arrange and facilitate these trainings at Wanaque Board of Education, and we bring in equipment experts to provide advanced technical training and advocate that Wanaque engineering and facilities staff participate in the functional testing of major systems to gain first-hand knowledge of their design and operation.

Customized Maintenance Staff Training and Cross Training

Personal interviews of maintenance staff are conducted by Willdan as an integral part of the equipment handover process. We then can develop a maintenance staff training program targeted to staff skill levels, experience, education, and prior training. Interviews conducted during IGA site surveys and equipment installation provides an opportunity to educate the maintenance staff about the project, as well as obtain their support and assistance from the beginning of the project. Willdan will work with Wanaque Board of Education personnel to evaluate individual capabilities and propose tailored training programs that meet the needs of the staff.

Willdan has significant in-house resources and advanced technical capabilities to provide Wanaque Board of Education with a better understanding of energy conservation technologies and their energy usage. The complete understanding of overall facility operations and energy consumption that Willdan incorporates into its energy cost reduction training will be of great benefit to Wanaque. The use of in-house Willdan personnel for this component of the training, and their extensive experience in identifying and implementing energy conservation methods, will ensure the Board realizes all available energy and operational savings.

Manufacturer Training

Willdan is vendor and product neutral, with no vested interest in any vendor or manufacturer. This impartiality allows us to incorporate the training from the appropriate manufacturer or service provider as the situation warrants. Most manufacturing companies offer excellent training programs, but the training is often focused solely on their product lines. Willdan will coordinate and organize vendor training on proper equipment operation for personnel and will work with the manufacturer of each major piece of equipment to develop training manuals and a core curriculum that includes assembly/reassembly instructions, troubleshooting tips and parts lists.

This training will include operation, maintenance, and troubleshooting for all major equipment items. Willdan provides on-site training for all equipment installed under the performance contracting program. Our research indicates that the most effective training takes place when performed on the actual equipment.

Training is performed throughout the term of the contract to update skills, provide the latest information and train new personnel. Training programs are recorded as a reference tool for personnel and new staff. Willdan will prepare tutorials and other training materials (including videos, CDs, and text) that will assist the Board of Education in training new staff, as well as providing a library of training materials for existing personnel.

Section 8. Appendices

- **Appendix A: Statement of Energy Performance**
- **Appendix B: Direct Install Proposal**
- **Appendix C: Equipment Cutsheets**
- **Appendix D: Formulae**
- **Appendix E: ASHRAE 90.1 Minimum Performance Requirement**

Appendix A

Statement of Energy Performance (Energy Star Portfolio)

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Wanaque Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 66,521
Built: 1990

For Year Ending: November 30, 2019
Date Generated: August 18, 2020

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Wanaque Elementary School 1 1st Street Wanaque, New Jersey 07465	___________________ , (____)____-______	____ ________ , (____)____-______ ___________________

Property ID: 12069002

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
65.3 kBtu/ft²

Source EUI
114.4 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	2,602,276 (60%)
Electric - Grid (kBtu)	1,741,348 (40%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	70.8
National Median Source EUI (kBtu/ft²)	123.9
% Diff from National Median Source EUI	-8%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	315

Signature & Stamp of Verifying Professional

I ___________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: _________________________Date: ____________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect Stamp
(if applicable)

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

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ENERGY STAR® Score[1]

Haskell Elementary School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 88,000
Built: 2004

For Year Ending: November 30, 2019
Date Generated: August 18, 2020

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address
Haskell Elementary School
973 Ringwood Ave
Haskell, New Jersey 07420

Property ID: 12068880

Property Owner
____
,
(____)____-______

Primary Contact
____ ________
,
(____)____-______
____

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
56.7 kBtu/ft²

Source EUI
96.6 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	3,123,640 (63%)
Electric - Grid (kBtu)	1,865,954 (37%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	80
National Median Source EUI (kBtu/ft²)	136.4
% Diff from National Median Source EUI	-29%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	355

Signature & Stamp of Verifying Professional

I _________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect Stamp (if applicable)

Appendix B

Direct Install Proposal

New Jersey Office of Clean Energy
Direct Install Program
Energy Assessment Tool (V4.0C)

General Project Information

Participating Customer:	Wanaque Boro BD Of ED	Facility Type:	Education – Primary School
Contractor / Project #:	Lime / 126336	HVAC Type:	AC & Gas Heat
Facility Name:	Haskell Elementary School	Total Facility Square Footage:	56,000
Street Address:	973 Ringwood Ave	Avg Weekly Hrs of Operation:	55
City / Zip Code:	Haskell / 07420	# of Full-Time Employees:	40
Is this facility publicly owned?:	Y	Year Constructed:	1942
BOE, MUA or other public entity property?	Y	Tax Exempt?:	Y
		Project Permitting Costs:	$500.00

Enhanced Incentive Eligibility

Project in UEZ?	N	K-12 School?	Y
Project in OZ?	N	Municipality?	N
		County Facility?	N

Electric Utility Information

Electric Provider:	Jersey Central Power & Light
Service Class:	GSS 3 Phase
Account #:	100008253310
Billing Period Start Date:	01/01/19
Billing Period End Date:	01/31/19
Billing Period kWh Consumption:	57,760
Billing Period Total Cost:	$6,201.00
Total Taxes + Fees on Bill:	$11.13
Electric - Average Cost ($/kWh):	$0.107

Gas Utility Information

Gas Provider:	PSE&G
Service Class:	LVG
Account #:	7343091905
Billing Period Start Date:	01/28/19
Billing Period End Date:	02/26/19
Billing Period Therm Consumption:	6,596
Billing Period Total Cost:	$5,969.00
Total Taxes + Fees on Bill:	
Gas - Average Cost ($/Therm):	$0.905

Oil Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Oil - Average Cost ($/Gallon):	$0.000

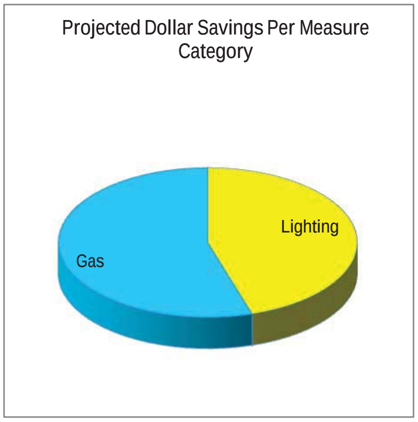
Propane Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Propane - Average Cost ($/Gallon):	$0.000

Project Summary

	Annual Energy Savings	Energy Units	Annual Cost Savings	Total Measure Cost	Estimated Incentive Amount	Total Cost to Customer
Lighting Measures Total:	127,341	kWh	$13,646.56	$75,618.32	$26,698.56	$48,919.76
Motors & VFD Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
HVAC Electric Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
Refrigeration Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
ELECTRIC MEASURES:	127,341	kWh	$13,646.56	$75,618.32	$26,698.56	$48,919.76
GAS MEASURES:	18,275	Therms	$16,537.60	$292,703.28	$103,344.76	$189,358.52
OIL MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
TOTAL PROPANE MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES (OIL):	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES GAS:	0	Therms				
COMBINED PROJECT TOTALS:			$30,184.17	$368,321.60	$130,043.32	$238,278.28

SIMPLE PAYBACK (YEARS): 7.89 | PROJECT TRC TEST: 1.78



New Jersey Office of Clean Energy
Direct Install Program
Energy Assessment Tool (V4.0C)

General Project Information

Participating Customer:	Wanaque Boro BD of ED	Facility Type:	Education – Primary School
Contractor / Project #:	Lime / 126335	HVAC Type:	AC & Gas Heat
Facility Name:	Wanaque Boro BD of ED	Total Facility Square Footage:	70,000
Street Address:	1 First St	Avg Weekly Hrs of Operation:	40
City / Zip Code:	Wanaque / 07465	# of Full-Time Employees:	15
Is this facility publicly owned?:	Y	Year Constructed:	1971
BOE, MUA or other public entity property?	Y	Tax Exempt?:	Y
		Project Permitting Costs:	

Enhanced Incentive Eligibility

Project in UEZ?	N	K-12 School?	Y
Project in OZ?	N	Municipality?	N
		County Facility?	N

Electric Utility Information

Electric Provider:	Jersey Central Power & Light
Service Class:	GSS Secondary 3 Phase
Account #:	100 007 299 413
Billing Period Start Date:	11/27/19
Billing Period End Date:	12/31/19
Billing Period kWh Consumption:	40,320
Billing Period Total Cost:	$4,614.21
Total Taxes + Fees on Bill:	$11.13
Electric - Average Cost ($/kWh):	$0.114

Gas Utility Information

Gas Provider:	PSE&G
Service Class:	LVG
Account #:	73 430 918 08
Billing Period Start Date:	10/25/19
Billing Period End Date:	11/25/19
Billing Period Therm Consumption:	3,595
Billing Period Total Cost:	$1,545.38
Total Taxes + Fees on Bill:	$139.84
Gas - Average Cost ($/Therm):	$0.391

Oil Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Oil - Average Cost ($/Gallon):	$0.000

Propane Information

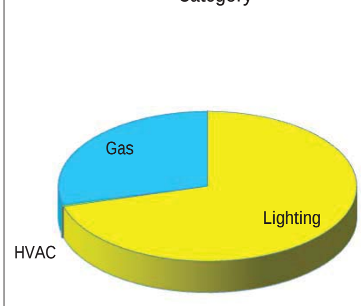
Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Propane - Average Cost ($/Gallon):	$0.000

Project Summary

	Annual Energy Savings	Energy Units	Annual Cost Savings	Total Measure Cost	Estimated Incentive Amount	Total Cost to Customer
Lighting Measures Total:	144,765	kWh	$16,526.85	$84,134.36	$30,134.63	$53,999.73
Motors & VFD Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
HVAC Electric Measures Total:	671	kWh	$76.59	$26,505.32	$9,493.48	$17,011.84
Refrigeration Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
ELECTRIC MEASURES:	**145,435**	**kWh**	**$16,603.44**	**$110,639.68**	**$39,628.12**	**$71,011.56**
GAS MEASURES:	**17,362**	**Therms**	**$6,787.94**	**$292,707.28**	**$104,839.77**	**$187,867.51**
OIL MEASURES:	**0**	**Gallons**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
TOTAL PROPANE MEASURES:	**0**	**Gallons**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
CONVERSION MEASURES (OIL):	**0**	**Gallons**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
CONVERSION MEASURES GAS:	**0**	**Therms**				
COMBINED PROJECT TOTALS:			**$23,391.38**	**$403,346.96**	**$144,467.88**	**$258,879.08**

SIMPLE PAYBACK (YEARS): 11.07 **PROJECT TRC TEST:** 1.62

Projected Dollar Savings Per Measure Category



Appendix C

Proposed Equipment

Technical Data Sheet

Benchmark 750-6000 with Edge Controller

High Efficiency Boilers

The AERCO Benchmark® (BMK) Water Boiler is designed for condensing application in any closed loop hydronic system. It delivers unmatched burner modulation to match energy input directly to fluctuating system. No other product packs as much capacity into such a small footprint that fits through a standard door and can be transported in a freight elevator.

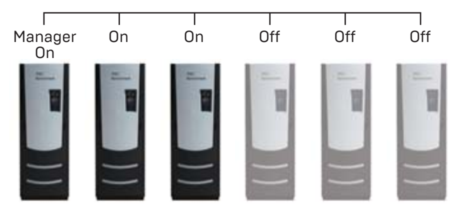
Energy Efficient

To minimize emissions, the BMK Series is fitted with a low NOx burner whose emissions will meet the most stringent NOx and CO requirements. The fully modulating burner also maintains AERCO standards for energy efficiency, longevity, reliability and construction quality.

The BMK Series comes standard with AERCO's Patent Pending, Oxygen Level (O_2) monitoring system. This monitoring system, designed to display the O_2 level directly on the unit in real time, can also be remotely monitored via Modbus giving the customer the ability to measure the emissions level and fuel economy of the boiler without traditional combustion calibration devices.

Application and Plant Design

The BMK boilers can be used as an individual unit or in modular arrangements and offers selectable modes of operation. In addition to controlling the boiler according to a constant set point, indoor/outdoor reset schedule or 4-20mA signal, one or more units can be integrated via Modbus communications protocol. For boiler plants ranging from 2-16 boilers, the AERCO Edge® built-in Boiler Sequencing Technology (BST)* can be utilized. The Benchmark can be easily integrated with a facility-wide Energy Management or Building Automation System.



*See BST System technical data sheet for additional system details and capabilities

Features

- Natural gas, propane, or dual fuel (model dependent)
- 20:1 turndown ratio (5%) depending on capacity
- Integrated O_2 monitoring and alert for critical conditions
- 439 stainless steel fire tube heat exchanger
- Capable of variable primary flow Installations
- NOx emissions capable of 9PPM or less @ all firing rates *depending on capacity
- Compact footprint, light weight, freight elevator friendly
- Ducted combustion air capable
- Easy open access for service
- Acceptable vent materials AL29-4C, Polypropylene, PVC, cPVC (model dependent)
- Reliable quiet operation
- Optional gas train with VPS (Value Proving System) for BMK Platinum 4000/5000/6000

Edge [i]

- Precise temperature vontrol
- On-board Boiler Sequencing Technology (BST)
- Controls options: constant setpoint, indoor/outdoor reset, remote setpoint, 4-20mA signal or ModBus

Specifications

	BMK									
	750	1000	1500	2000	2500	3000	4000	5000N	5000[4]	6000[4]
Boiler Category	ASME Sect.IV									
Gas Connections (NPT)	1"		2"				3"		2 / 3"	
Max. Gas Pressure	14"								2psi/10"[4]	
Min. Gas Pressure [1]	4"								14 / 4"[4]	
Max. Allowed Working Pressure	160 PSIG								80PSIG/150 PSIG Optional	
Electrical Req. 120V/1PH/60Hz [2]	13 FLA		16 FLA		N/A					
Electrical Req. 208V/3PH/60Hz [2]	N/A				10 FLA		N/A		19 FLA	
Electrical Req. 460V/3PH/60Hz [2]	N/A				5 FLA		12 FLA		9 FLA	
Electrical Req. 575V/3PH/60Hz [2]	N/A				N/A		N/A		7 FLA	
Water Connect. (Flanged)	3"		4"				6"		6"	
Min. Water Flow (GPM)	12		25				35		75	
Max. Water Flow (GPM)	175		250	350			500		600	
Water Volume Gallons	16.25	14.25	44	40	58	55	75		110	
Water Pressure Drop	3.0 PSIG @100 GPM		3.0 PSIG @170 GPM		3.0 PSIG @218 GPM	3.0 PSIG @261 GPM	5.0 PSIG @475 GPM		4.0 PSIG @500 GPM	
Turndown Ratio	15:1 (7%)	20:1 (5%)		20:1 (5%)	15:1 (7%)	15:1 (7%)	15:1 (7%)	20:1 (7%)	12:1 (8%)	15:1 (7%)
Vent/Air Intake Connections	6 Inch			8 Inch			12 Inch Vent/10 Inch Air Intake		14 Inch Optional/ 12 Inch Flue Venting	
Vent Materials	AL29-4C Polypro, CPVC, PVC		AL29-4C Polypro							
Type of Gas	Natural Gas, Propane		Natural Gas, Propane, Dual Fuel, Natural Gas,				Natural Gas		Natural Gas, Dual Fuel	
NOx Emissions <9ppm Capability[4]	✓		✓		<13 ppm		✓		✓	
Temp. Control Range	50°F to 190°F									
Ambient Temp. Range	0°F to 130°F									
Standard Listings & Approvals	UL, CUL, CSD-1, ASME									
Gas Train Operations	FM Compliant or Factory Installed DBB (IRI)						FM Compliant or Factory Installed DBB (IRI), VPS (Value Proving System)		FM Compliant, VPS (Value Proving System)	
Sound Rating dbA	65	65	70	70	72	72	75		79	
Weight (dry) lbs.	669	700	1406	1500	2,000	2,170	2200		3,000	
Shipping Weight lbs.	862	900	1606	1700	2,200	2,300	2350		3,800	

1. Values are for natural gas FM compliant gas trains only. See Benchmark Gas Components & Supply Design Guide GF-2030 for propane, DBB & dual fuel gas train minimum gas pressure requirements.
2. See Benchmark Electrical Power Guide GF-2060 for Service Disconnect Switch amperage requirements.
3. BMK5000/6000 operating at standard gas pressure (>14" W.C.) can achieve 9 ppm NOx.
4. BMK5000/6000 low gas pressure option is available as a different style number. It operates between 4" and 10" of gas pressure.

Ratings

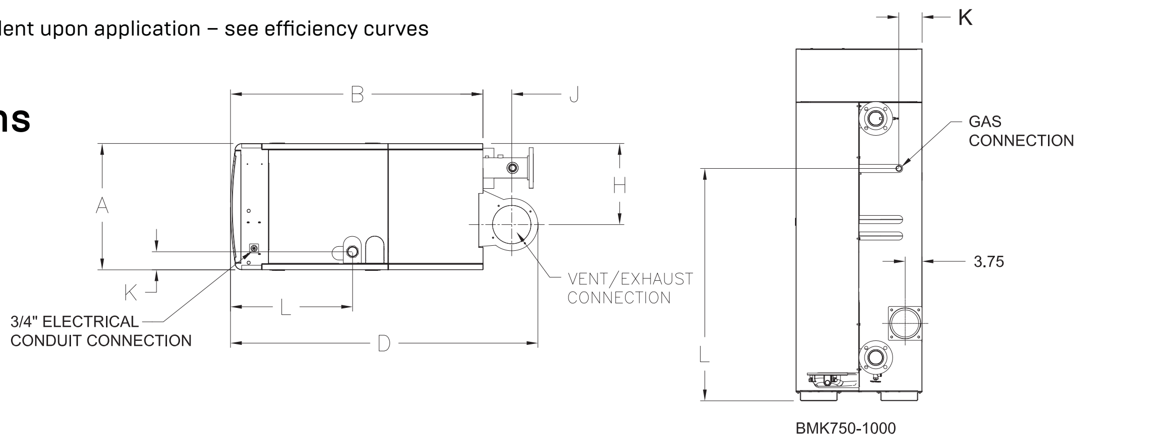
BMK	Min Input MBH	Max Input MBH	Max Output[1] MBH	Efficiency Range	Thermal Efficiency 80° to 180°F
750	50	750	653-720	87%-98%	95.6%
1000	50	1000	870-960	87%-98%	96.8%
1500	75	1500	1305-1440	87%-98%	94.6%
2000	100	2000	1740-1920	87%-98%	94.6%
2500	167	2500	2175-2400	87%-98%	93.5%
3000	200	3000	2610-2880	87%-98%	94.6%
4000	267	4000	3480-3840	87%-98%	94.1%
5000N	250	4990	4341-4790	87%-98%	93.8%
5000	400	5000	4350-4800	87%-98%	93.9%
6000	400	6000	5220-5760	87%-98%	94.5%

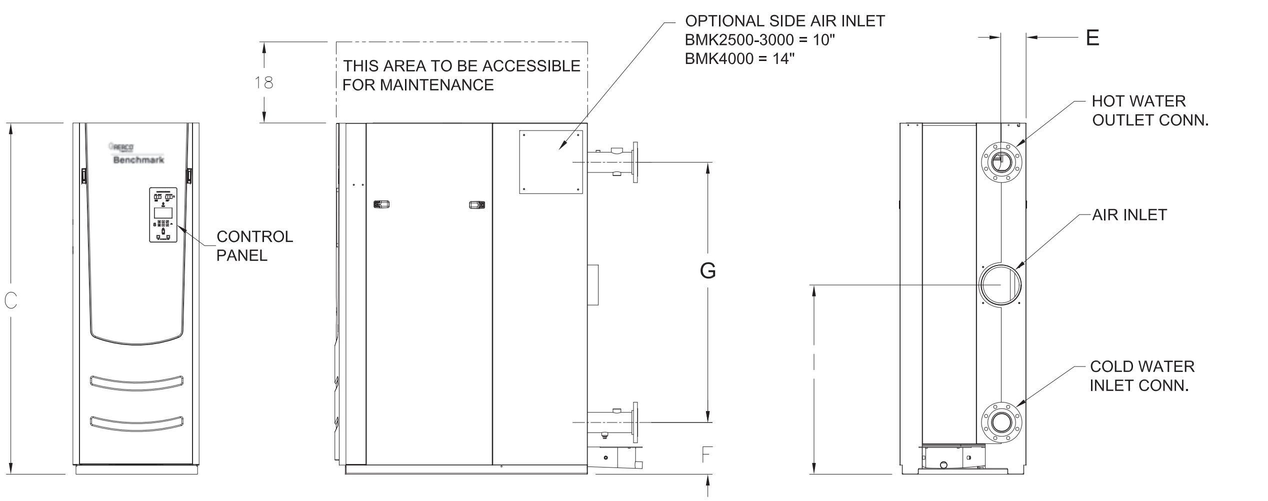
[1]Max output dependent upon application – see efficiency curves

Dimensions

750-4000

Dim: Inches



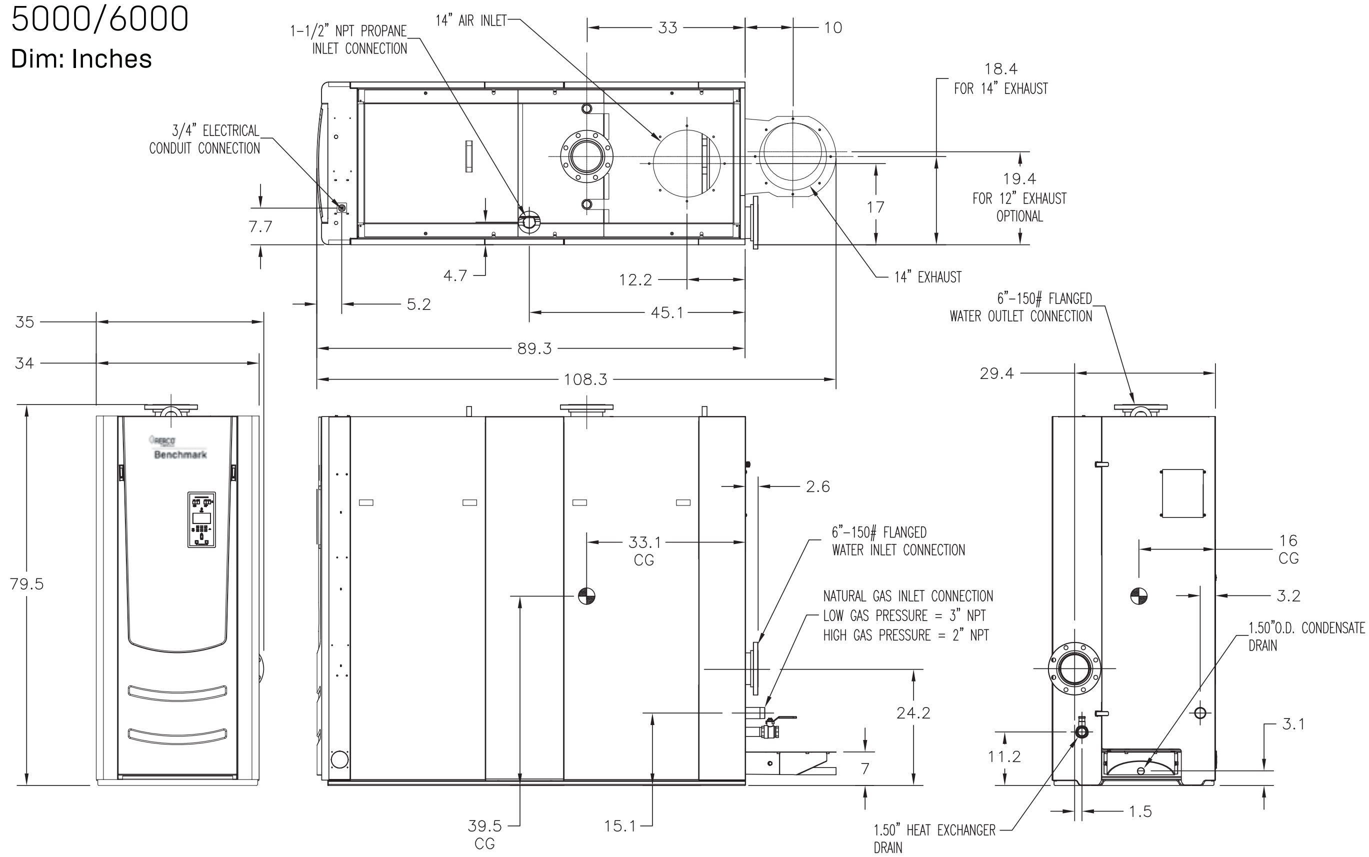


BMK Models	(Width) A	(Depth) B	(Height) C	D	E	F	G	H	I	J	K	L
750	28″	24.5″	78″	34″	10.2″	9.6″	53″	21″	17.1″	4.5′	5.1″	51.5″
1000	28″	25″	78″	34″	10.2″	9.6″	53″	21″	17.1″	4.5″	5.1″	51.5″
1500	28″	43.6″	78″	58.4″	6.6″	11.5″	57.8″	18″	42″	8.9″	4.4″	19.1″
2000	28″	43.6″	78″	58.4″	7″	11.5″	57.8″	18″	42″	8.9″	4.4″	19.1″
2500	28″	56″	78″	68.4″	5.6″	11.5″	57.8″	18″	42″	6.4″	4.4‴	27.1″
3000	28″	56″	78″	68.4″	5.6″	11.5″	57.8″	18″	42″	6.4″	4.4‴	27.1‴
4000	34″	63.5″	78.2″	80.6″	6″	12.4″	56″	21.4″	44.4″	9″	5.5″	28.7″
5000N	34″	63.5″	78.2″	80.6″	6″	12.4″	56″	21.4″	44.4″	9″	5.5″	28.7″

Dimensions

5000/6000

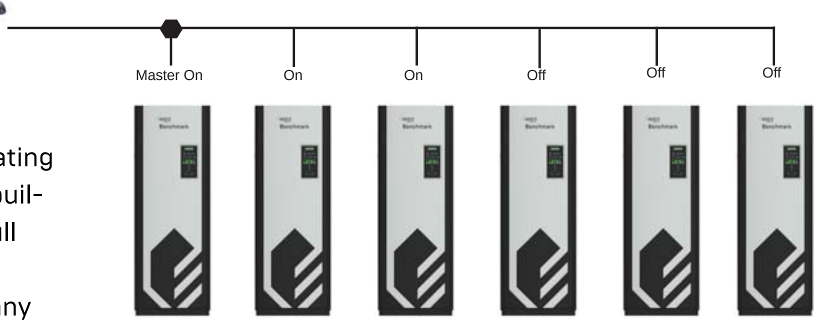
Dim: Inches



BMK Models	(Width) A	(Depth) B	(Height) C
5000	35″	89.3″	79.8″
6000	35″	89.3″	79.8″

Technical Data Sheet

C-More Controller With Boiler Sequencing Technology (BST)



Load Sharing Strategy Maximizes Energy Efficiency

It requires less energy for a group of modulating boilers, each firing at "part load," to heat a building, than for a single boiler operating at "full fire" to carry the entire workload. To meet building demand, the BST will employ as many boilers as available, each operating at its most efficient firing rate. Importantly, because the BST reacts in real-time to, up to 8 boilers, changes in the number of boilers available, users can take a unit offline for maintenance at any time or bring on back-up boilers for extremely cold conditions without changes to the BST. And as individual boilers are added or deleted, the energy delivered is automatically adjusted to prevent fluctuations in the header temperature of the plant.

Typical Staging Example Demonstrates "Part Load" Efficiency

The first boiler unit comes online and will gradually increase its air-fuel valve position to meet demand. When it reaches 50% – a second unit is called into service.

The two boilers will split the load – each firing at 30% air-fuel valve position to meet demand. If additional heat is required, a third unit is called into service.

Three boilers, each firing at 30% air-fuel valve position, satisfies the demand more efficiently than either two units at 50% or one unit at 100%. This same principle applies to much larger plants.

Features

- Increase system turndown to maximize operating efficiency
- Control Up to 8 Boilers via Modbus Interface
- Automatic load matching precisely meets demand changes
- "Bumpless" energy transfer
- Multiple configuration options
- User-friendly software makes programming easy
- Full system information VFD display on master unit
- Controls external 24V AC/DC motorized isolation valve
- Easy integration to BAS or EMS via Modbus open protocol (requires a Gateway Protonode)
- Single point BAS or EMS data gathering for up to 20 BAS system operating parameters and 18 operating parameters of each boiler
- Available standard on all AERCO Benchmark boilers. No additional panel necessary.
- Can incorporate different unit capacities for optimized efficiency.
- Utilizes a header sensor directly connected to the BST master unit, or an optional Modbus header sensor.

Control System Supports Efficient Boiler Plant Operation

The AERCO C-MORE with Boiler Sequencing is a flexible controller designed to maximize energy savings in modular boiler plants. The BST can stage and coordinate the operations of up to 8 boilers and is uniquely designed to maximize uptime reliability and the operating efficiency of condensing equipment capable of unmatched modulation. For boiler plants greater than 8 boilers, the AERCO Control System (ACS) panel is required.

Able to regulate overall plant output with precise accuracy, a boiler plant with ±4°F header temperature variation is assured under normal load conditions. It offers sequential or parallel operation flexibility, and user programmable modes of operation that can be changed in the field. The C-MORE automatically rotates the lead unit to help equalize boiler runtime or number of cycles.

Fully Compatible with BAS or EMS Systems via Modbus Open Protocol

For facilities that have taken a building-wide approach to energy efficiency, the C-MORE supports easy integration with Building Automation Software (BAS) or Energy Management Software (EMS) programs via Modbus protocol and RS-485 interface. A standards-based open protocol used throughout the buildings controls market, Modbus integration will enable facility managers to monitor all operations from any building control platform. BAS or EMS can poll 20 System Operating Parameters, and 18 unit Operating Parameters per boiler through a single connection, including (for greater detail consult Modbus Communications Manual GF-114).

BST System Parameters

- Cmore BST mode
- BST setpoint
- BST setback setpoint
- BST setback start
- BST setback end
- BST auto master
- BST Unit outlet temp
- BST num units enabled
- BST units faulted
- Master Unit Address
- BST header temp
- BST outdoor temp
- BST fire rate output
- BST Unit Ignited
- BST Active Setpoint
- Next turn on fire rate
- BST sp high limit
- BST sp low limit
- BST temp high limit
- BST setpoint mode

Boiler Parameters

- Comm addr
- Unit Status
- Fault status
- Outlet temp
- Ffwd temp
- Inlet temp
- Exhaust temp
- Air temp
- Flame strength
- Fire rate in
- Fire rate out
- Unit type
- Unit size
- Boiler Isolation Valve State
- Network remote setpoint
- Run cycles
- Run hours
- O_2 Level

Configuration Options	Typical Applications
Indoor/Outdoor Reset A change in the outside air condition results in a Process Application proportionate change in header temperature – a function of the adjustable reset ratio (0.3 – 3.0).	Indoor/Outdoor Reset Hydronic Heating Process Application
Constant Setpoint Delivers fixed supply water temperature at set points of 50°F-220°F (dependent upon boiler maximum temperature limit).	Water Source Heat Pump Domestic Water Generation Supplemental Heat Recovery Equipment Swimming Pool Heating
4-20mA Signal Header temperature responds linearly to an external 4-20mA control signal.	Computer Controlled Building Management Industrial Process Greenhouse Application
Network Communications Enables EMS or BAS system to drive boiler plant setting for header set point temperature via Modbus connection to BST. Also provides communication link between the boiler and the BST to allow direct communication. This enables the EMS/BAS to query and capture faults of BST and 20 BST System operating parameters as well as 18 operating parameters of each individual boiler. *A Gateway Protonode is required for seamless integration between Modbus native BAS systems and the BST system.	Computer Controlled Building Management EMS Data Logging & Trend Analysis

NOTE: Supply Header Temperature Sensor Is Sold Separately (See Benchmark & C-More Control Panel O&M)

Robust Features Simplify Control

- **Application Flexibility** – Different configuration options meet the needs of any closed loop system and can be changed in the field.
- **Time Delay Between Boiler Start** – An adjustable time delay between boiler starts allows for a smooth energy input without spikes in electrical, gas or venting conditions.
- **Automatic Allowance for Maintenance** – By continuously monitoring the number of boilers available for operation, the system will automatically operate the next boiler needed to meet demand if a unit malfunctions or is taken off-line for maintenance.
- **Adjustable Off Set** – The BST includes a 7-day programmable clock to support night setback and/or daily setback periods. The BST will shift from the original set point to a higher or lower temperature.
- **Two Interlock Circuits** – Monitor pumps, combustion air dampers, or other equipment using two interlock circuits that must be completed before plant operations begin.
- **Power Off Memory** – By using non-volatile memory, programs are retained through a shut down of more than two years. No batteries required.
- **Simple Installation** – The C-MORE control system operates on boiler unit's standard power supply. Twisted pair, shielded wire connections between the Master boiler unit and slave individual boilers is required to support communications. An RS-485 interface is required to link an EMS. RS-485 communications wiring supports a distance of up to 4,000 feet between BAS and boilers.
- **Flexible & Expandable** – The BST can support up to 8 AERCO boilers – which can be fully integrated with any EMS or BAS software via the Modbus protocol and a Gateway Protonode. AERCO also offers Gateway product for LON, BACnet (additional gateway product required) and Johnson Controls N2.
- **Building Reference Temperature Inputs** – Boilers can be clamped at minimum and maximum temperatures, and the building reference temperature adjusted to drive plant header temperature. This allows a wide range of boiler responses to outside air changes for maximum comfort.
- **Accuracy** – The BST uses PID (Proportional & Integral + Derivative) and Dynamic Up/Dynamic Down Modulation control algorithm to provide a dynamic response to all changes in plant operation. Header temperatures, as well as percentage boiler input, are precisely controlled with virtually no overshoot or short cycling of equipment. A header temperature of ±4°F is assured during continual plant operation.
- **"Bumpless" Energy Transfer** – When staging boilers sequentially, the BST can bring additional units online at an adjustable percentage of input selected by the user.
- **Lead and Lag Boiler Designation** – The BST will select the Lead and Lag boilers by either Unit Size or Run Hours depending on user setting. The Lead and Lag boilers can also be manually selected by the user.
- **Lead Boiler Time Rotation** – Rotates the operating lead boiler at specified time and helps equalize runtime.
- **Anti-Cycling Features** – These features prolong the system's stay at specific state (firing/off) - reducing the number of cycles while maintaining accurate temperature control.
  - Shutoff Delay Temp
  - Deadband high
  - One Boiler Mode
  - Demand offset
  - Deadband low
- **One Boiler Mode** – is an INNOVATIVE and EXCLUSIVE feature in the AERCO BST control that detects a "low-flow" condition in a multi-boiler system. When the AERCO BST determines that a low-flow condition exists, it will slowly shut down one boiler at a time in an attempt to raise the Fire Rate of the remaining boilers. If the low-flow condition persists and only a single boiler remains ignited, the AERCO BST will use the "Outlet Temperature Sensor" of the remaining ignited boiler to control the temperature. The Outlet Temperature Sensor is mounted in the individual boiler and drastically increases the response time to precisely control temperature. The distant header sensor is ignored in this mode of operation.

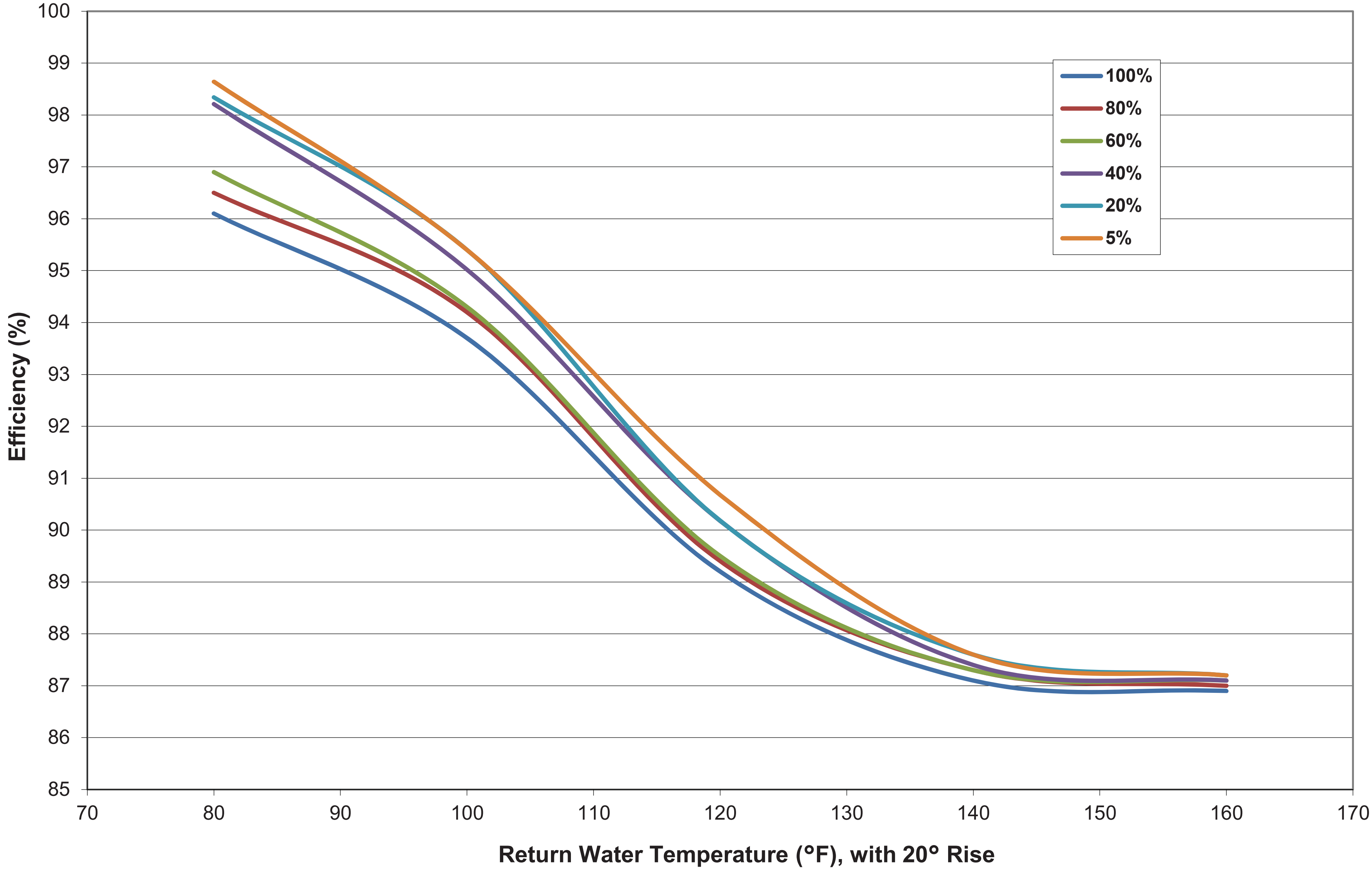
- **Setback Setpoint Gradual Decrease** – Whenever boilers are running at a high rate and the Setback-Setpoint feature is activated, the sudden decrease in setpoint will cause the PID to drastically cut back on fire rate. This sudden decrease in fire rate will often cause the boilers to drop below their Stop Levels causing them to turn off, thereby causing excessive cycling and loss of heating capacity while the boilers can re-ignite. The Setback-Setpoint gradual decrease feature will decrease the setpoint, lowered by the activation of the Setback-Setpoint feature, at a slow rate thereby allowing the PID to recover and prevent any boilers from shutting down if not required to do so.
- **Warm-Up and Low-Fire-Delay Fire Rate Hold** – When an extra boiler is ignited to meet demand, the fire rate of all ignited boilers will be held at their present level until the newly ignited boiler has completed Warm-up and Low Fire Delay. When the newly ignited boiler has completed Warm-up and Low Fire Delay, all boiler fire rates will decrease to approx 30% Fire Rate. All boiler fire rates will then rise together to the required fire rate to meet demand.
- **Next Turn On Valve Position** – When all ignited boilers reach or exceed the BST Next on VP value, another boiler will be ignited to share the load (if one is available). The default value is 50%.This feature is also useful if a user wishes to always have as few boilers on at any one time. Setting the BST Next on VP value to a high number (Example 100%) will only ignite a new boiler if all currently ignited boilers reach their total BTU capacity (100%).
- **Warm-Up and Low-Fire-Delay PID Hold** – Whenever any boiler is in either Warm-up or Low Fire Delay, the Integral portion of the BST PID will be frozen in order to prevent the PID from winding up too high causing the temperature to overshoot causing an over-temp condition.
- **Setpoint Approach Rate control** – To avoid header temperature overshoots, whenever the header temperature nears the setpoint temperature at a rate too quickly to prevent a temperature overshoot, the BST fire rate will temporarily decrease in order to lower the temperature rise momentum. This feature will help avoid temperature overshoots due to variable flow as well as other conditions.
- **Automatic Transfer of Master Function** - In the event the master unit experiences a panel failure or communication loss, the BST system will automatically transfer the master function to the next available unit in the system plant. This ensures maximum efficiency and intended plant operation in face of the events mentioned above. This capability requires Integration Panel 24444-1. Without this panel, the default failsafe is constant setpoint. Consult Benchmark or C-More Control Panel O&M for additional information.

Specifications

Standard Listings & Approvals: UL, CUL

AERCO International, Inc. • 100 Oritani Drive • Blauvelt, NY 10913
USA: T: (845) 580-8000 • Toll Free: (800) 526-0288 • AERCO.com

Thermal Efficiency of BMK 1500



Product Data

WeatherMaker®
Single Packaged Rooftop

3 to 6 Nominal Tons

ecoblue™ technology

48/50FC**04, 05, 06, 07

48FC: Single-Package Gas Heating/Electric Cooling Rooftop Units
50FC: Electric Cooling Rooftop Units with Optional Electric Heat
with Puron® Refrigerant (R-410A)

Form 48/50FC-4-7-02PD

Features/Benefits

The New Carrier WeatherMaker® rooftop units (RTU) with EcoBlue™ Technology were designed by customers for customers and integrate new technology to provide value added benefits never seen in this type of equipment before.

New major design features include:

- Patent pending, industry's first efficient indoor fan system using Vane Axial fan with electric commutated variable speed motor
- Reliable fixed speed scroll compressor on 3-5 ton sizes and 2 stage scroll technology on 6 ton sizes
- Upgraded unit control board with intuitive indoor fan adjustment
- Reliable copper tube/aluminum fin condenser coil with $^5/_{16}$-in. tubing to help reduce refrigerant charge versus prior designs
- New outdoor fan system with rugged — lightweight high impact composite fan blade

48/50FC WeatherMaker® units up to 6 tons are specifically designed to fit on Carrier roof curbs that were installed back to 1989, which makes replacement easy and eliminates the need for curb adapters or changing utility connections.

Single-stage units deliver SEERs up to 14.0. IEERs up to 15.2. All models are capable of either vertical or horizontal airflow.

The Carrier rooftop unit (RTU) was designed by customers for customers. With "no-strip" screw collars, handled access panels, and more, the unit is easy to install, easy to maintain, and easy to use. Your new 3 to 6 ton Carrier WeatherMaker rooftop unit (RTU) provides optimum comfort and control from a packaged rooftop.

Value-added features include:

- optional Humidi-MiZer® adaptive dehumidification system for improved part load humidity performance
- Puron® refrigerant (R-410A)
- single point gas and electrical connections
- optional fully integrated SystemVu™ controls
- RTU Open controller for BACnet[1], LonWorks[2], Modbus[3] and Johnson Controls N2
- 3 to 5 ton models use fixed refrigerant metering devices and 6 ton models use a TXV
- Scroll compressors with internal line-break overload protection
- Units come with an easy access tool-less filter door. Filter track tilts out for filter removal and replacement. All filters are the same size in each unit

Installation ease

All WeatherMaker units are field-convertible to horizontal airflow, which makes it easy to adjust to unexpected job-site complications. Lighter units make for easy replace. Simple, fast plug-in connections to the standard integrated unit control board (UCB). Clearly labeled connections points to reduce installation time. Also, a large control box provides room to work and room to mount Carrier accessory controls.

Easy to maintain

With the new EcoBlue Vane Axial fan system and direct drive ECM motor, there is no longer a need to adjust belts or pulleys as in past designs. This frees up maintenance and installation time.

Easy access handles by Carrier provide quick and easy access to all normally serviced components. Our "no-strip" screw system has superior holding power and guides screws into position while preventing the screw from stripping the unit's metal.

Sloped, corrosion resistant composite drain pan sheds water; and won't rust.

Easy to use

The newly re-designed Unit Control Board by Carrier puts all connections and troubleshooting points in one convenient place. Most low voltage connections are made to the same board and make it easy to access it. Setting up the fan is simple by an intuitive switch and rotary dial arrangement. Carrier rooftops have high and low pressure switches, a filter drier, and 2-in. filters standard.

1. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
2. LonWorks is a registered trademark of Echelon Corporation.
3. Modbus is a registered trademark of Schneider Electric.

Table of contents

EcoBlue™ Technology

Direct drive EcoBlue Technology indoor fan system uses Vane Axial fan design and electrically commutated motors.

This new Vane Axial design over past belt drive systems has 75% fewer moving parts, uses up to 40% less energy and has no fan belts, blower bearings and shaft.

Streamlined control and integration

Carrier controllers make connecting WeatherMaker® rooftops into existing building automation systems easy. The units are compatible with conventional thermostat controls, SystemVu™ controls and Carrier RTU Open multi-protocol controller.

Operating efficiency and flexibility

The 48/50FC rooftops meet ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) 90.1-2016, IECC[1] (International Energy Conservation Code) IECC-2018 minimum efficiency requirements.

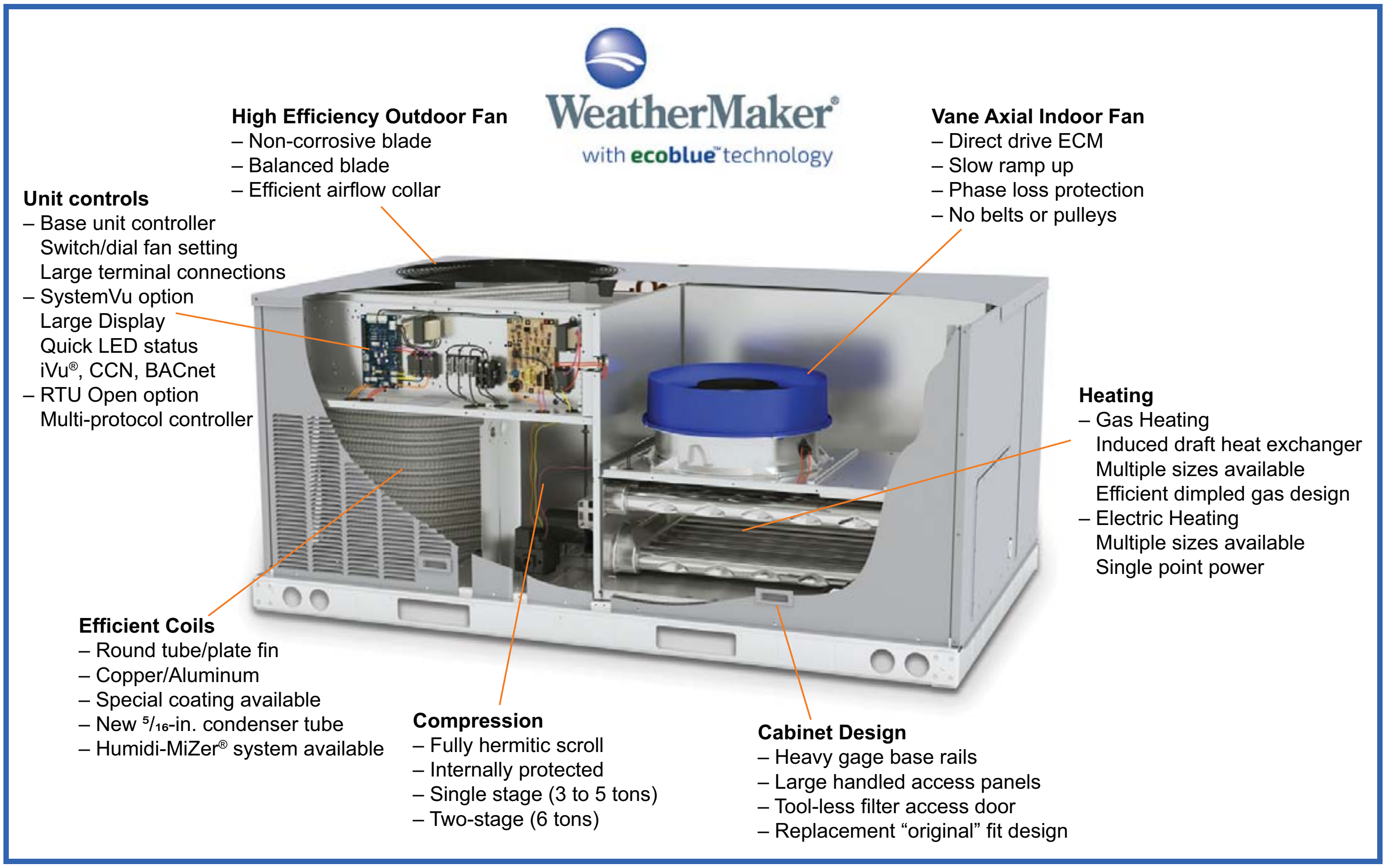
1. IECC is a registered trademark of the International Code Council, Inc.

Field convertible airflow

All WeatherMaker 3 to 6 ton units are field-convertible to horizontal airflow, which makes it easy to adjust to unexpected job-site.

Comfort control

Carrier's patented Humidi-MiZer® adaptive dehumidification system is an all-inclusive factory-installed option on gas heating/electric cooling and electric cooling/electric heat models. This system provides reliable, flexible operation to meet indoor part load sensible and latent requirements.



Model number nomenclature

48FC MODEL NUMBER NOMENCLATURE

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	4	8	F	C	D	A	0	4	A	2	A	5	-	0	A	0	A	0

Unit Heat Type
48 – Gas Heat Packaged Rooftop

Model Series - WeatherMaker®
FC – 14.0 SEER Standard Efficiency, sizes 04-06
15.0 IEER Standard Efficiency, size 07

Heat Size
D = Low Gas Heat
E = Medium Gas Heat
F = High Gas Heat
L = Low NOx – Low Gas Heat[1]
S = Low Heat w/ Stainless Steel Exchanger
R = Medium Heat w/ Stainless Steel Exchanger
T = High Heat w/ Stainless Steel Exchanger
(Low NOx models include Stainless Steel HX)

Refrig. Systems Options
A = Standard One Stage Cooling Models[1]
B = Standard One Stage Cooling Models with Humidi-MiZer® system[1, 3]
M = Single Circuit, Two Stage Cooling[2, 3]
N = Single Circuit, Two Stage Cooling with Humidi-MiZer system[2]

Cooling Tons
04 = 3 tons
05 = 4 tons
06 = 5 tons
07 = 6 tons

Sensor Options
A = None
B = Return Air (RA) Smoke Detector
C = Supply Air (SA) Smoke Detector
D = RA + SA Smoke Detector
E = CO_2 Sensor
F = RA Smoke Detector and CO_2 Sensor
G = SA Smoke Detector and CO_2 Sensor
H = RA + SA Smoke Detector and CO_2 Sensor
J = Condensate Overflow Switch
K = Condensate Overflow Switch and RA Smoke Detector
L = Condensate Overflow Switch and RA and SA Smoke Detectors
M = Condensate Overflow Switch and SA Smoke Detector

Indoor Fan Options
1 = Direct Drive – EcoBlue – Standard Static
2 = Direct Drive – EcoBlue – Medium Static
3 = Direct Drive – EcoBlue – High Static

Coil Options – (Outdoor - Indoor - Hail Guard)
A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu -Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Packaging & Seismic Compliance
0 = Standard
1 = LTL

Electrical Options
A = None
C = Non-Fused Disconnect
D = Thru-The-Base Connections
F = Non-Fused Disconnect and Thru-The-Base Connections

Service Options
0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet

Intake / Exhaust Options
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = Two-Position Damper[1]
U = Temperature Ultra Low Leak Economizer w/ Barometric Relief
W = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief

Base Unit Controls
0 = Electro-mechanical Controls – can be used with field-installed W7212 EconoMi$er® IV (Non-Fault Detection and Diagnostic)
2 = RTU Open Multi-Protocol Controller
3 = SystemVu™ Controls
6 = Electro-mechanical Controls – can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)

Design Revision
- = Factory Design Revision

Voltage
1 = 575/3/60
3 = 208-230/1/60[1]
5 = 208-230/3/60
6 = 460/3/60

[1] Size 04/05/06 models only
[2] Size 07 models only
[3] Units with Humidi-MiZer System include Low Ambient controller

Note: On single phase (-3 voltage code) models, the following are not available as a factory-installed option:
- Humidi-MiZer System
- Two-Position Damper
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2-Position Damper
- Powered 115 Volt Convenience Outlet

50FC MODEL NUMBER NOMENCLATURE

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	5	0	F	C	-	A	0	4	A	2	A	5	-	0	A	0	A	0

Unit Heat Type
50 – Electric Heat Packaged Rooftop

Model Series - WeatherMaker®
FC – 14.0 SEER Standard Efficiency, sizes 04-06
15.2 IEER Standard Efficiency, size 07

Heat Size
- = No heat

Refrig. Systems Options
A = Standard One Stage Cooling Models[1]
B = Standard One Stage Cooling Models with Humidi-MiZer® system[1, 3]
M = Single Circuit, Two Stage Cooling[2, 3]
N = Single Circuit, Two Stage Cooling with Humidi-MiZer system[2]

Cooling Tons
04 = 3 tons
05 = 4 tons
06 = 5 tons
07 = 6 tons

Sensor Options
A = None
B = Return Air (RA) Smoke Detector
C = Supply Air (SA) Smoke Detector
D = RA + SA Smoke Detector
E = CO_2 Sensor
F = RA Smoke Detector and CO_2 Sensor
G = SA Smoke Detector and CO_2 Sensor
H = RA + SA Smoke Detector and CO_2 Sensor
J = Condensate Overflow Switch
K = Condensate Overflow Switch and RA Smoke Detector
L = Condensate Overflow Switch and RA and SA Smoke Detectors
M = Condensate Overflow Switch and SA Smoke Detector

Indoor Fan Options
1 = Direct Drive – EcoBlue – Standard Static
2 = Direct Drive – EcoBlue – Medium Static
3 = Direct Drive – EcoBlue – High Static

Coil Options – (Outdoor - Indoor - Hail Guard)
A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu -Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Packaging & Seismic Compliance
0 = Standard
1 = LTL

Electrical Options
A = None
C = Non-Fused Disconnect
D = Thru-The-Base Connections
F = Non-Fused Disconnect and Thru-The-Base Connections

Service Options
0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet

Intake / Exhaust Options
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = Two-Position Damper[1]
U = Temperature Ultra Low Leak Economizer w/ Barometric Relief
W = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief

Base Unit Controls
0 = Electro-mechanical Controls – can be used with field-installed W7212 EconoMi$er® IV (Non-Fault Detection and Diagnostic)
2 = RTU Open Multi-Protocol Controller
3 = SystemVu™ Controls
6 = Electro-mechanical Controls – can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)

Design Revision
- = Factory Design Revision

Voltage
1 = 575/3/60
3 = 208-230/1/60
5 = 208-230/3/60
6 = 460/3/60

[1] Size 04/05/06 models only
[2] Size 07 models only
[3] Units with Humidi-MiZer System include Low Ambient controller

Note: On single phase (-3 voltage code) models, the following are not available as a factory-installed option:
- Humidi-MiZer System
- Two-Position Damper
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2-Position Damper
- Powered 115 Volt Convenience Outlet

Capacity ratings

48FC AHRI RATINGS

48FC UNIT	COOLING STAGES	NOMINAL CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	SEER	EER	IEER WITH 2-SPEED INDOOR FAN MOTOR
48FC*A04	1	3	34.5	3.0	14.0	11.5	N/A
48FC*A05	1	4	47.0	4.1	14.0	11.6	N/A
48FC*A06	1	5	58.5	5.3	14.0	11.0	N/A
48FC*M07	2	6	70.0	6.4	N/A	11.0	15.0

LEGEND

AHRI — Air-Conditioning, Heating and Refrigeration Institute
EER — Energy Efficiency Ratio
IEER — Integrated Energy Efficiency Ratio
SEER — Integrated Energy Efficiency Ratio

NOTES:

1. Rated in accordance with AHRI Standards 210/240 (04-06 size) and 340/360 (07 size).
2. Rating are based on:
   Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temperature and 95°F (35°C) db outdoor air temperature.
   IEER Standard: A measure that expresses cooling part-load EER efficiency for commercial unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. All 48FC units comply with ASHRAE 90.1-2016 (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) and DOE-2018 (Department of Energy) Energy Standard for minimum SEER and EER requirements.
4. 48FC units comply with US Energy Policy Act (2005). To evaluate code compliance requirements, refer to state and local codes.

50FC AHRI RATINGS

50FC UNIT	COOLING STAGES	NOMINAL CAPACITY (TONS)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	SEER	EER	IEER WITH 2-SPEED INDOOR FAN MOTOR
50FC*A04	1	3	34.4	2.9	14.0	11.7	N/A
50FC*A05	1	4	47.0	4.0	14.0	11.8	N/A
50FC*A06	1	5	58.5	5.2	14.0	11.2	N/A
50FC*M07	2	6	70.0	6.3	N/A	11.2	15.2

LEGEND

AHRI — Air-Conditioning, Heating and Refrigeration Institute
EER — Energy Efficiency Ratio
IEER — Integrated Energy Efficiency Ratio
SEER — Integrated Energy Efficiency Ratio

NOTES:

1. Rated in accordance with AHRI Standards 210/240 (04-06 size) and 340/360 (07 size).
2. Rating are based on:
   Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temperature and 95°F (35°C) db outdoor air temperature.
   IEER Standard: A measure that expresses cooling part-load EER efficiency for commercial unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. All 50FC units comply with ASHRAE 90.1-2016 (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) and DOE-2018 (Department of Energy) Energy Standard for minimum SEER and EER requirements.
4. 50FC units comply with US Energy Policy Act (2005). To evaluate code compliance requirements, refer to state and local codes.

SOUND RATINGS TABLE

48/50FC UNIT	COOLING STAGES	OUTDOOR SOUND (dB) AT 60 Hz								
		A-WEIGHTED	63	125	250	500	1000	2000	4000	8000
A04	1	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
A05	1	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
A06	1	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
M07	2	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3

LEGEND

dB — Decibel

NOTES:

1. Outdoor sound data is measured in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of “average” human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.

Capacity ratings (cont)

MINIMUM - MAXIMUM AIRFLOW RATINGS (CFM) — NATURAL GAS AND PROPANE

UNIT	HEAT LEVEL	VOLTAGE	COOLING				HEATING*	
			MINIMUM AIRFLOW CFM	MINIMUM 2-SPEED AIRFLOW (LOW SPEED)	MINIMUM 2-SPEED AIRFLOW (HIGH SPEED)	MAXIMUM AIRFLOW CFM	MINIMUM AIRFLOW CFM	MAXIMUM AIRFLOW CFM
48FC04**	LOW	1 PHASE	900	N/A	N/A	1500	890	1950
	MED						800	1520
	HIGH						N/A	N/A
48FC05**	LOW	1 PHASE	1200	N/A	N/A	2000	890	2440
	MED						1050	2280
	HIGH						1220	2170
48FC06**	LOW	1 PHASE	1500	N/A	N/A	2500	890	3250
	MED						1050	2730
	HIGH						1220	2790
48FC04**	LOW	3 PHASE	900	N/A	N/A	1500	910	2010
	MED						960	1160
	HIGH						N/A	N/A
48FC05**	LOW	3 PHASE	1200	N/A	N/A	2000	910	2010
	MED						1250	2330
	HIGH						1390	2220
48FC06**	LOW	3 PHASE	1500	N/A	N/A	2500	910	2510
	MED						1250	2720
	HIGH						1390	2780
48FC07**	LOW	3 PHASE	1800	1200	1800	3000	910	3350
	MED						1250	3260
	HIGH						1390	3170

* Heating rating values are identical for aluminum heat exchangers and stainless steel heat exchangers.

MINIMUM - MAXIMUM AIRFLOW RATINGS (CFM) — COOLING UNITS AND ACCESSORY ELECTRIC HEAT

UNIT	COOLING				ELECTRIC HEAT*	
	MINIMUM AIRFLOW CFM	MINIMUM 2- SPEED AIRFLOW (LOW SPEED)	MINIMUM 2- SPEED AIRFLOW (HIGH SPEED)	MAXIMUM AIRFLOW CFM	MINIMUM AIRFLOW CFM	MAXIMUM AIRFLOW CFM
50FC04**	900	N/A	N/A	1500	900	1500
50FC05**	1200	N/A	N/A	2000	1200	2000
50FC06**	1500	N/A	N/A	2500	1500	2500
50FC07**	1800	1200	1800	3000	1800	3000

* Electric heat modules are available as field-installed accessories for 50FC units.

HEAT RATING TABLE — NATURAL GAS AND PROPANE

48FC UNIT		GAS HEAT	AL/SS HEAT EXCHANGER		TEMPERATURE RISE (°F)	THERMAL EFFICIENCY (%)	AFUE EFFICIENCY (%)
			INPUT/OUTPUT STAGE 1 (MBH)	INPUT/OUTPUT STAGE 2 (MBH)			
Single Phase	04	LOW	–/–	65/53	25-55	81	81
		MED	–/–	90/73	45-85	82	81
		HIGH	–/–	—	—	—	—
	05	LOW	–/–	65/53	20-55	81	81
		MED	–/–	90/73	30-65	82	81
		HIGH	–/–	130/106	45-80	81	81
	06	LOW	–/–	65/53	15-55	81	81
		MED	–/–	90/73	25-65	82	81
		HIGH	–/–	130/106	35-80	81	81
Three Phase	04	LOW	–/–	67/54	25-55	81	N/A
		MED	82/65	110/93	50-85	80	N/A
		HIGH	—	—	—	—	—
	05	LOW	–/–	67/54	25-55	81	N/A
		MED	–/–	110/88	35-65	80	N/A
		HIGH	120/96	150/120	50-80	80	N/A
	06	LOW	–/–	67/54	20-55	81	N/A
		MED	–/–	110/88	30-65	80	N/A
		HIGH	120/96	150/120	40-80	80	N/A
	07	LOW	–/–	67/54	15-55	81	N/A
		MED	–/–	110/88	25-65	80	N/A
		HIGH	120/96	150/120	30-80	80	N/A

HEAT RATING TABLE — LOW NO_X

UNIT		GAS HEAT	LOW NOx HEAT EXCHANGER		TEMP RISE (°F)	THERMAL EFFICIENCY (%)	AFUE (%)
			INPUT/OUTPUT STAGE 1 (MBH)	INPUT/OUTPUT STAGE 2 (MBH)			
SINGLE PHASE	04	LOW	—	60/49	20-50	82.0	81.3
	05	LOW	—	60/49	20-50	82.0	81.3
	06	LOW	—	60/49	15-50	82.0	81.3
THREE PHASE	04	LOW	—	60/49	20-50	82.0	81.3
	05	LOW	—	60/49	20-50	82.0	81.3
	06	LOW	—	60/49	15-50	82.0	81.3

LEGEND

AFUE — Annual Fuel Utilization Efficiency
MBH — Btuh in thousands

Physical data

48/50FC 3 TO 4 TON PHYSICAL DATA

48/50FC UNIT	48/50FC*A04	48/50FC*B04	48/50FC*A05	48/50FC*B05
NOMINAL TONS	3		4	
BASE UNIT OPERATING WT (lb) 48FC/50FC*	482/437		543/498	
REFRIGERATION SYSTEM				
No. Circuits/No. Compressors/Type	1 / 1/ Scroll			
Puron® (R-410A) charge A/B (lbs-oz)	4-6	—	9-14	—
Humidi-MiZer® Puron (R-410A) charge A/B (lbs-oz)	—	7.6	—	14-6
Metering device	Acutrol			
Humidi-MiZer metering device	—	TXV-Acutrol	—	TXV-Acutrol
High-Pressure Trip/Reset (psig)	630/505			
Low-Pressure Trip/Reset (psig)	54/117	27/44	54/117	27/44
EVAPORATOR COIL				
Material (Tube/Fin)	Cu/Al			
Coil Type	$^3/_8$-in. RTPF			
Rows/FPI	2/15		3/15	
Total Face Area (ft²)	5.5			
Condensate Drain Connection Size	$^3/_4$-in.			
CONDENSER COIL				
Material	Cu/Al			
Coil Type	$^5/_{16}$-in. RTPF			
Rows/FPI	1/18		2/18	
Total Face Area (ft²)	11.7		15.9	
HUMIDI-MIZER COIL				
Material	—	Cu/Al	—	Cu/Al
Coil Type	—	$^3/_8$-in. RTPF	—	$^3/_8$-in. RTPF
Rows/FPI	—	1/17	—	2/17
Total Face Area (ft²)	—	4.1	—	4.1
EVAPORATOR FAN AND MOTOR				
Standard Static 1 Phase				
Motor Qty/Drive Type	1/Direct	—	1/Direct	—
Max Cont BHP	0.44	—	0.72	—
RPM Range	189-1890	—	190-1900	—
Fan Qty/Type	1/Vane Axial	—	1/Vane Axial	—
Fan Diameter (in.)	16.6	—	16.6	—
Medium Static 1 Phase				
Motor Qty/Drive Type	1/Direct	—	1/Direct	—
Max Cont BHP	0.71	—	1.06	—
RPM Range	219-2190	—	217-2170	—
Fan Qty/Type	1/Vane Axial	—	1/Vane Axial	—
Fan Diameter (in.)	16.6	—	16.6	—
High Static 1 Phase				
Motor Qty/Drive Type	1/Direct	—	1/Direct	—
Max Cont BHP	1.07	—	1.53	—
RPM Range	249-2490	—	246-2460	—
Fan Qty/Type	1/Vane Axial	—	1/Vane Axial	—
Fan Diameter (in.)	16.6	—	16.6	—
Standard Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	0.44		0.72	
RPM Range	189-1890		190-1900	
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			
Medium Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	0.71		1.06	
RPM Range	219-2190		217-2170	
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			

48/50FC 3 TO 4 TON PHYSICAL DATA (cont)

48/50FC UNIT	48/50FC*A04	48/50FC*B04	48/50FC*A05	48/50FC*B05
High Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	1.07		1.96	
RPM Range	249-2490		266-2660	
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			
CONDENSER FAN AND MOTOR				
Qty / Motor Drive Type	1 / Direct			
Motor HP/RPM	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan Diameter (in.)	23			
FILTERS				
RA Filter Qty / Size (in.)	2 / 16x25x2			
OA Inlet Screen Qty / Size (in.)	1 / 20x24x1			

* Base unit operating weight does not include weight of options.

Physical data (cont)

48/50FC 5 TO 6 TON PHYSICAL DATA

48/50FC UNIT	48/50FC*A06	48/50FC*B06	48/50FC*M07	48/50FC* N07
NOMINAL TONS	5		6	
BASE UNIT OPERATING WT (lb) 48FC/50FC*	556/511		607/562	
REFRIGERATION SYSTEM				
No. Circuits/No. Compressors/Type	1 / 1 / Scroll		1 / 1 / 2-Stage Scroll	
Puron® (R-410A) charge A/B (lbs-oz)	8-9	—	10-3	—
Humidi-MiZer® Puron (R-410A) charge A/B (lbs-oz)	—	15-0	—	20-8
Metering device	Acutrol		TXV	
Humidi-MiZer metering device	—	TXV-Acutrol	—	TXV
High-Pressure Trip/Reset (psig)	630/505			
Low-Pressure Trip/Reset (psig)	54/117	27/44	54/117	27/44
EVAPORATOR COIL				
Material (Tube/Fin)	Cu/Al			
Coil Type	$^{3}/_{8}$-in. RTPF			
Rows/FPI	4/15			
Total Face Area (ft^2)	5.5		7.3	
Condensate Drain Connection Size	$^{3}/_{4}$-in.			
CONDENSER COIL				
Material	Cu/Al			
Coil Type	$^{5}/_{16}$-in. RTPF			
Rows/FPI	2/18			
Total Face Area (ft^2)	15.9		15.0	
HUMIDI-MIZER COIL				
Material	—	Cu/Al	—	Cu/Al
Coil Type	—	$^{3}/_{8}$-in. RTPF	—	$^{3}/_{8}$-in. RTPF
Rows/FPI	—	2/17	—	2/17
Total Face Area (ft^2)	—	4.1	—	5.5
EVAPORATOR FAN AND MOTOR				
Standard Static 1 Phase				
Motor Qty/Drive Type	1/Direct	—		
Max Cont BHP	1.06	—		
RPM Range	215-2150	—		
Fan Qty/Type	1/Vane Axial	—		
Fan Diameter (in.)	16.6	—		
Medium Static 1 Phase				
Motor Qty/Drive Type	1/Direct	—		
Max Cont BHP	1.44	—		
RPM Range	239-2390	—		
Fan Qty/Type	1/Vane Axial	—		
Fan Diameter (in.)	16.6	—		
Standard Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	1.06		1.31	
RPM Range	215-2150		230-2300	
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			
Medium Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	1.44		1.76	
RPM Range	239-2390		253-2530	
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			
High Static 3 Phase				
Motor Qty/Drive Type	1/Direct			
Max Cont BHP	2.43			
RPM Range	284-2836			
Fan Qty/Type	1/Vane Axial			
Fan Diameter (in.)	16.6			
CONDENSER FAN AND MOTOR				
Qty / Motor Drive Type	1 / Direct			
Motor HP/RPM	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100
Fan Diameter (in.)	23			
FILTERS				
RA Filter Qty / Size (in.)	2 / 16x25x2		4 / 16x16x2	
OA Inlet Screen Qty / Size (in.)	1 / 20x24x1			

48FC 3 TO 5 TON GAS HEAT DATA — 1 PHASE UNITS

48FC UNIT	48FC**04	48FC**05	48FC**06
GAS CONNECTION			
No. of Gas Valves		1	
Natural Gas Supply Line Pressure (in. wg)/(psig)		4-13 / 0.18-0.47	
Liquid Propane Supply Line Pressure (in. wg)/(psig)		11-13 / 0.40-0.47	
HEAT ANTICIPATOR SETTING (AMPS)			
First Stage		0.14	
Second Stage		0.14	
NATURAL GAS HEAT			
LOW			
No. of Stages / No. of Burners (total)		1 / 2	
Connection Size		$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)		195 / 115	
Temperature Rise (°F)	25-55	20-55	15-55
MEDIUM			
No. of Stages / No. of Burners (total)		1 / 3	
Connection Size		$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)		195 / 115	
Temperature Rise (°F)	45-85	30-65	25-65
HIGH			
No. of Stages / No. of Burners (total)	—	1 / 3	
Connection Size	—	$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)	—	195 / 115	
Temperature Rise (°F)	—	45-80	35-80
LIQUID PROPANE HEAT			
LOW			
No. of Stages / No. of Burners (total)		1 / 2	
Connection Size		$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)		195 / 115	
Temperature Rise (°F)	25-55	20-55	15-55
MEDIUM			
No. of Stages / No. of Burners (total)		1 / 3	
Connection Size		$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)		195 / 115	
Temperature Rise (°F)	45-85	30-65	25-65
HIGH			
No. of Stages / No. of Burners (total)	—	1 / 3	
Connection Size	—	$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)	—	195 / 115	
Temperature Rise (°F)	—	45-80	35-80
LOW NOx GAS HEAT			
LOW			
No. of Stages / No. of Burners (total)		1 / 2	
Connection Size		$^{1}/_{2}$-in. NPT	
Rollout Switch Opens / Closes (°F)		195 / 115	
Temperature Rise (°F)	20-50		15-50

LEGEND

BHP — Break Horsepower
FPI — Fins Per Inch
OA — Outdoor Air
RA — Return Air

* Base unit operating weight does not include weight of options.

48FC 3 TO 6 TON GAS HEAT DATA — 3 PHASE UNITS

<table>
<tr><th>48FC UNIT</th><th>48FC**04</th><th>48FC**05</th><th>48FC**06</th><th>48FC**07</th></tr>
<tr><td>GAS CONNECTION</td><td colspan="4"></td></tr>
<tr><td>No. of Gas Valves</td><td colspan="4">1</td></tr>
<tr><td>Natural Gas Supply Line Pressure (in. wg)/(psig)</td><td colspan="4">4-13 / 0.18-0.47</td></tr>
<tr><td>Liquid Propane Supply Line Pressure (in. wg)/(psig)</td><td colspan="4">11-13 / 0.40-0.47</td></tr>
<tr><td>HEAT ANTICIPATOR SETTING (AMPS)</td><td colspan="4"></td></tr>
<tr><td>First Stage</td><td colspan="4">0.14</td></tr>
<tr><td>Second Stage</td><td colspan="4">0.14</td></tr>
<tr><td>NATURAL GAS HEAT</td><td colspan="4"></td></tr>
<tr><td>LOW</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td colspan="4">1 / 2</td></tr>
<tr><td>Connection Size</td><td colspan="4">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td colspan="4">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td colspan="2">25-55</td><td>20-55</td><td>15-55</td></tr>
<tr><td>MEDIUM</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td>2 / 3</td><td colspan="3">1 / 3</td></tr>
<tr><td>Connection Size</td><td colspan="4">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td colspan="4">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td>50-85</td><td>35-65</td><td>30-65</td><td>25-65</td></tr>
<tr><td>HIGH</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td>—</td><td colspan="3">2/ 3</td></tr>
<tr><td>Connection Size</td><td>—</td><td colspan="3">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td>—</td><td colspan="3">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td>—</td><td>50-80</td><td>40-80</td><td>35-80</td></tr>
<tr><td>LIQUID PROPANE HEAT</td><td colspan="4"></td></tr>
<tr><td>LOW</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td colspan="4">1 / 2</td></tr>
<tr><td>Connection Size</td><td colspan="4">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td colspan="4">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td colspan="2">25-55</td><td>20-55</td><td>15-55</td></tr>
<tr><td>MEDIUM</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td>2 / 3</td><td colspan="3">1 / 3</td></tr>
<tr><td>Connection Size</td><td colspan="4">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td colspan="4">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td>50-85</td><td>35-65</td><td>30-65</td><td>25-65</td></tr>
<tr><td>HIGH</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td>—</td><td colspan="3">2 / 3</td></tr>
<tr><td>Connection Size</td><td>—</td><td colspan="3">$^{1}/_{2}$-in. NPT</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td>—</td><td colspan="3">195 / 115</td></tr>
<tr><td>Temperature Rise (°F)</td><td>—</td><td>50-80</td><td>40-80</td><td>35-80</td></tr>
<tr><td>LOW NOx GAS HEAT</td><td colspan="4"></td></tr>
<tr><td>LOW</td><td colspan="4"></td></tr>
<tr><td>No. of Stages / No. of Burners (total)</td><td colspan="3">1 / 2</td><td>—</td></tr>
<tr><td>Connection Size</td><td colspan="3">$^{1}/_{2}$-in. NPT</td><td>—</td></tr>
<tr><td>Rollout Switch Opens / Closes (°F)</td><td colspan="3">195 / 115</td><td>—</td></tr>
<tr><td>Temperature Rise (°F)</td><td colspan="2">20-50</td><td>15-50</td><td>—</td></tr>
</table>

Options and accessories

ITEM	OPTION*	ACCESSORY†
GAS HEAT (48FC units only)		
Low, Medium or High Gas Heat — Aluminized Heat Exchanger	X	
Low, Medium or High Gas Heat — Stainless Steel Heat Exchanger	X	
Propane Conversion Kit		X
High Altitude Conversion Kit		X
Flue Discharge Deflector		X
Flue Shield		X
ELECTRIC HEAT (50FC units only)		
Electric Resistance Heaters		X
Single Point Kits		X
CABINET		
Thru-the-Base electrical or gas-line connections	X	X
Hinged Access Panels	X	
MERV-8 Filters	X	
COIL OPTIONS		
Cu/Cu indoor and/or outdoor coils[1]	X	
Pre-coated outdoor coils[1]	X	
Premium, E-coated outdoor coils[1]	X	
HUMIDITY CONTROL		
Humidi-MiZer® Adaptive Dehumidification System[1]	X	
CONDENSER PROTECTION		
Condenser coil hail guard (louvered deign)[1]	X	X
CONTROLS		
Thermostats, temperature sensors, and subbases		X
SystemVu™ DDC communicating controller	X	
RTU Open Multi-Protocol controller	X	
Smoke detector (supply and/or return air)	X	
Horn Strobe Annunciator[2]		X
Time Guard II compressor delay control circuit		X
Phase Monitor	X	X
Condensate Overflow switch	X	X

ITEM	OPTION*	ACCESSORY†
ECONOMIZERS AND OUTDOOR AIR DAMPERS		
EconoMi$er® IV for electro-mechanical controls - Non FDD (Standard air leak damper models)[1, 3, 9]	X	X
EconoMi$er2 for DDC controls (Standard and Ultra Low Leak air damper models)[1, 4]	X	X
EconoMi$er X for electro-mechanical controls, complies with FDD (Standard and Ultra Low Leak damper models)[1, 3, 9]	X	X
Motorized 2-position outdoor-air damper[1]	X	X
Manual outdoor-air damper (25% and 50%)		X
Barometric relief[5]	X	X
Power exhaust - prop design		X
ECONOMIZER SENSORS AND IAQ DEVICES		
Single dry bulb temperature sensors[6]	X	X
Differential dry bulb temperature sensors[6]		X
Single enthalpy sensors[6]	X	X
Differential enthalpy sensors[6]		X
CO_2 sensor (wall, duct, or unit mounted)[6]	X	X
INDOOR MOTOR AND DRIVE		
Multiple motor and drive packages	X	
LOW AMBIENT CONTROL		
Winter start kit[7]		X
Low Ambient controller to -20°F (-29°C)[7]		X
POWER OPTIONS		
Convenience outlet (powered)[1]	X	
Convenience outlet (unpowered)	X	
Non-fused disconnect[8]	X	
ROOF CURBS		
Roof curb 14-in. (356 mm)		X
Roof curb 24-in. (610 mm)		X

* Factory-installed option.

† Field-installed accessory.

NOTES:
1. Not available on single phase (-3 voltage code) models. Use field-installed accessory where available.
2. Requires a field-supplied 24V transformer for each application. See price pages for details.
3. FDD (Fault Detection and Diagnostic) capability per California Title 24 section 120.2.
4. Models with SystemVu and RTU Open DDC controls comply with California Title 24 Fault Detection and Diagnostic (FDD).
5. Included with economizer.
6. Sensors used to optimize economizer performance.
7. See application data for assistance.
8. Non-fused disconnect switch cannot be used when unit electrical rating exceeds:
   208-230/1/60 and 208-230/3/60 = 80 amps (FLA).
   480/3/60 and 575/3/60 = 80 amps (FLA).
   Carrier RTUBuilder automatically selects the amp limitations.
9. Available as a factory-installed option for 04-06 models only.

Factory-installed options

Economizer (dry-bulb or enthalpy)

Economizers save money. They bring in fresh, outside air for ventilation; and provide cool, outside air to cool your building. This is the preferred method of low-ambient cooling. When coupled to CO_2 sensors, economizers can provide even more savings by coupling the ventilation air to only that amount required.

Economizers are available, installed and tested by the factory, with either enthalpy or dry-bulb temperature inputs. Additional sensors are available as accessories to optimize the economizers. Economizers include a powered exhaust system to help equalize building pressures.

Economizers include gravity controlled barometric relief that helps equalize building pressure and ambient air pressures. This can be a cost effective solution to prevent building pressurization. Economizers are available in Ultra Low Leak and standard low leak versions. Economizers can be factory-installed or easily field-installed.

Unit mounted CO_2 sensor

The CO_2 sensor works with the economizer to intake only the correct amount of outside air for ventilation. As occupants fill your building, the CO_2 sensor detects their presence through increasing CO_2 levels, and opens the economizer appropriately. When the occupants leave, the CO_2 levels decrease, and the sensor appropriately closes the economizer. This intelligent control of the ventilation air, called demand controlled ventilation (DCV), reduces the overall load on the rooftop, saving money. It is also available as a field-installed accessory.

Smoke detector (supply and/or return air)

Trust the experts. Smoke detectors make your application safer and your job easier. Carrier smoke detectors immediately shut down the rooftop unit when smoke is detected. They are available, installed by the factory, for supply air, return air, or both.

Optional Humidi-MiZer® adaptive dehumidification system

Carrier's Humidi-MiZer adaptive dehumidification system is an all-inclusive factory-installed option that can be ordered with any WeatherMaker® 48/50FC04-07 rooftop unit, with the exception of single phase voltage (208-230/1/60) units.

This system expands the envelope of operation of Carrier's WeatherMaker rooftop products to provide unprecedented flexibility to meet year round comfort conditions.

The Humidi-MiZer adaptive dehumidification system has a unique dual operational mode setting. The Humidi-MiZer system provides greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode.

The WeatherMaker 48/50FC04-07 rooftop coupled with the Humidi-MiZer system is capable of operating in normal design cooling mode, sub-cooling mode, and hot gas reheat mode. Normal design cooling mode is when the unit will operate under its normal sequence of operation by cycling compressors to maintain comfort conditions.

Sub-cooling mode will operate to satisfy part load type conditions when the space requires combined sensible and a higher proportion of latent load control. Hot Gas Reheat mode will operate when outdoor temperatures diminish and the need for latent capacity is required for sole humidity control Hot Gas Reheat mode will provide neutral air for maximum dehumidification operation.

NOTE: Humidi-MiZer system includes Low Ambient controller.

Thru-the-base connections

Thru-the-base connections, available as a factory option, are necessary to ensure proper connection and seal when routing wire and piping through the rooftop's basepan and curb. These couplings eliminate roof penetration and should be considered for gas lines, main power lines, as well as control power.

Hinged access panels

Allows access to unit's major components with specifically designed hinged access panels. Panels are filter, control box access indoor fan motor access.

Cu/Cu (indoor) coils

Copper fins and copper tubes are mechanically bonded to copper tubes and copper tube sheets. A polymer strip prevents coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.

E-coated (outdoor and indoor) coils

A flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.

Pre-coated outdoor coils

A durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. The coating minimizes galvanic action between dissimilar metals. Coating is applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.

Condenser coil hail guard

Sleek, louvered panels protect the condenser coil from hail damage, foreign objects, and incidental contact.

Single enthalpy sensor

Prevents the wheel from rotating if the outside air conditions are acceptable for free cooling. Both exhaust and supply blowers will remain on.

Stainless steel heat exchanger (48FC units only)

The stainless steel heat exchanger option provides the tubular heat exchanger be made out of a minimum 20 gage type 409 stainless steel for applications where the mixed air to the heat exchanger is expected to drop below 45°F (7°C). Stainless steel may be specified on applications where the presence of airborne contaminants require its use (applications such as paper mills) or in area with very high outdoor humidity that may result in severe condensation in the heat exchanger during cooling operation.

Convenience outlet (powered or un-powered)

Reduce service and/or installation costs by including a convenience outlet in your specification. Carrier will install this service feature at our factory. Provides a convenient, 15 amp, 115v GFCI receptacle with "Wet in Use" cover. The "powered" option allows the installer to power the outlet from the line side of the disconnect or load side as required by code. The "unpowered" option is to be powered from a separate 115/120v power source.

The unpowered convenience outlet is available as a 15 amp factory-installed option or a 20 amp field-installed accessory.

Non-fused disconnect

This OSHA-compliant, factory-installed, safety switch allows a service technician to locally secure power to the rooftop. When selecting a factory-installed non-fused disconnect, note they are sized for the unit as ordered from the factory. The sizing of these do not accommodate field-installed items such as power exhaust devices, etc. If field installing electric heat with factory-installed non-fused disconnect switch, a single point kit may or may not be required.

SystemVu™ controller

Carrier's SystemVu controller is an optional factory-installed and tested controller.

This controller takes on a whole new approach to provide an intuitive, intelligent controller that not only monitors and controls the unit, but also provides linkage to multiple building automation systems.

Each SystemVu controller makes it easy to set up, service, troubleshoot, gain historical data, generate reports and provide comfort only Carrier is noted for.

Key features include:

- Easy to read back lit four line text screen for superior visibility.
- Quick operational condition LEDs of: Run, Alert, and Fault.
- Simple navigation with large keypad buttons of: Navigation arrows, Test, Back, Enter and Menu.
- Capable of being controlled with a conventional thermostat, space sensor or build automation system.
- Service capabilities include:
  Auto run test
  Manual run test
  Component run hours and starts
  Commissioning reports
  Data logging
- Full range of diagnosis:
  Read refrigerant pressures without the need of gages
  Sensor faults
  Compressor reverse rotation
  Economizer diagnostics that meet California Title 24 requirements
- Quick data transfer via USB port:
  Unit configuration uploading/downloading
  Data logging
  Software upgrades
- Built in capacity for:
  i-Vu® open systems
  BACnet systems
  CCN systems
- Configuration and alarm point capability:
  Contain over 100 alarm codes
  Contain over 260 status, troubleshooting, diagnostic and maintenance points
  Contain over 270 control configuration setpoints

RTU Open, multi-protocol controller

Connect the rooftop to an existing BAS (building automation system) without needing complicated translators or adapter modules using the RTU Open controller. The RTU Open controller speaks the 4 most common building automation system languages (BACnet, Modbus, Johnson Controls N2, and LonWorks). Use this controller when you have an existing BAS. Besides the 4 protocols, it also communicates with a Carrier Open system (i-Vu and VVT®).

Condensate overflow switch

This sensor and related controller monitors the condensate level in the drain pan and shuts down compression operation when overflow conditions occur. It includes:

- Indicator light – solid red (more than 10 seconds on water contact – compressors disabled), blinking red (sensor disconnected)
- 10-second delay to break – eliminates nuisance trips from splashing or waves in pan (sensor needs 10 seconds of constant water contact before tripping)
- Disables the compressor(s) operation when condensate plug is detected, but still allows fans to run for economizer.

Power exhaust with barometric relief

Superior internal building pressure control. This field-installed accessory may eliminate the need for costly, external pressure control fans.

Field-installed accessories

Filter maintenance indicator

When the optional factory-installed filter maintenance indicator is used, a factory-installed differential pressure switch measures pressure drop across the outside air filter and activates a field-supplied dry contact indicator when the pressure differential exceeds the adjustable switch setpoint.

Condenser coil hail guard

Sleek, louvered panels protect the condenser coil from hail damage, foreign objects, and incidental contact. This can be purchased as a factory-installed option or as a field-installed accessory.

Differential enthalpy sensor

The differential enthalpy sensor is comprised of an outdoor and return air enthalpy sensors to provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.

Wall or duct mounted CO_2 sensor

The IAQ sensor shall be available in duct or wall mount. The sensor provides demand ventilation indoor air quality (IAQ) control.

Propane conversion kit (48FC units only)

Convert your gas heat rooftop from standard natural gas operation to Propane using this field-installed kit.

High altitude conversion kit (48FC units only)

High altitudes have less oxygen, which affects the fuel/air mixture in heat exchangers. In order to maintain a proper fuel/air mixture, heat exchangers operating in altitudes above 2000 ft (610 m) require different orifices. To select the correct burner orifices or determine the heat capacity for a high altitude application, use either the selection software, or the unit's service manual. High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion on altitudes above 2000 ft (610 m).

NOTE: Typical natural gas heating value ranges from 975 to 1050 Btu/ft^3 at sea level nationally. The heating value goes down approximately 1.7% per every thousand feet elevation. Standard factory orifices can typically be used up to 2000 ft (610 m) elevation without any operational issues.

Flue discharge deflector (48FC units only)

The flue discharge deflector is a useful accessory when flue gas recirculation is a concern. By venting the flue discharge upwards, the deflector minimizes the chance for a neighboring unit to intake the flue exhaust.

MERV-8 return air filters

This factory option upgrades the return air filters from standard unit filters to high efficiency MERV-8 filters. Non-woven MERV-8 filter media with high strength, moisture-resistant frame. Filter media is securely fasted inside the filter frame on all four sides.

Phase monitor protection

The Phase Monitor Control will monitor the sequence of three phase electrical system to provide a phase reversal protection; and monitor the three phase voltage inputs to provide a phase loss protection for the three phase device. It will work on either a Delta or Wye power connection.

Winter start kit

The winter start kit by Carrier extends the low ambient limit of your rooftop to 25°F (–4°C). The kit bypasses the low pressure switch, preventing nuisance tripping of the low pressure switch. Other low ambient precautions may still be prudent.

Low ambient controller

The low ambient controller is a head pressure controller kit that is designed to maintain the unit's condenser head pressure during periods of low ambient cooling operation. This device should be used as an alternative to economizer free cooling when economizer usage is either not appropriate or desired. The low ambient controller will either cycle the outdoor fan motors or operate them at reduced speed to maintain the unit operation, depending on the model. This controller allows cooling operation down to –20°F (–29°C) ambient conditions.

Roof curb (14-in./356 mm or 24-in./610 mm)

Full perimeter roof curb with exhaust capability provides separate air streams for energy recovery from the exhaust air without supply air contamination.

Filter status indicator accessory

Monitors static pressure across supply and exhaust filters and provides indication when filters become clogged.

Power exhaust

Superior internal building pressure control. This field-installed accessory may eliminate the need for costly, external pressure control fans.

Manual OA Damper

Manual outdoor air dampers are an economical way to bring in ventilation air. The dampers are available in 25% and 50% versions.

NOTE: See application tip "ROOFTOP-18-01" prior to use of this damper on 07 size models.

Motorized 2-Position Damper

The Carrier 2-position, motorized outdoor air damper admits up to 100% outside air. Using reliable, gear-driven technology, the 2-position damper opens to allow ventilation air and closes when the rooftop stops, stopping unwanted infiltration.

NOTE: See application tip "ROOFTOP-18-01" prior to use of this damper on 07 size models.

Electric Heaters

Carrier offers a full-line of field-installed accessory heaters. The heaters are very easy to use, install and are all pre-engineered and certified.

Time Guard II control circuit

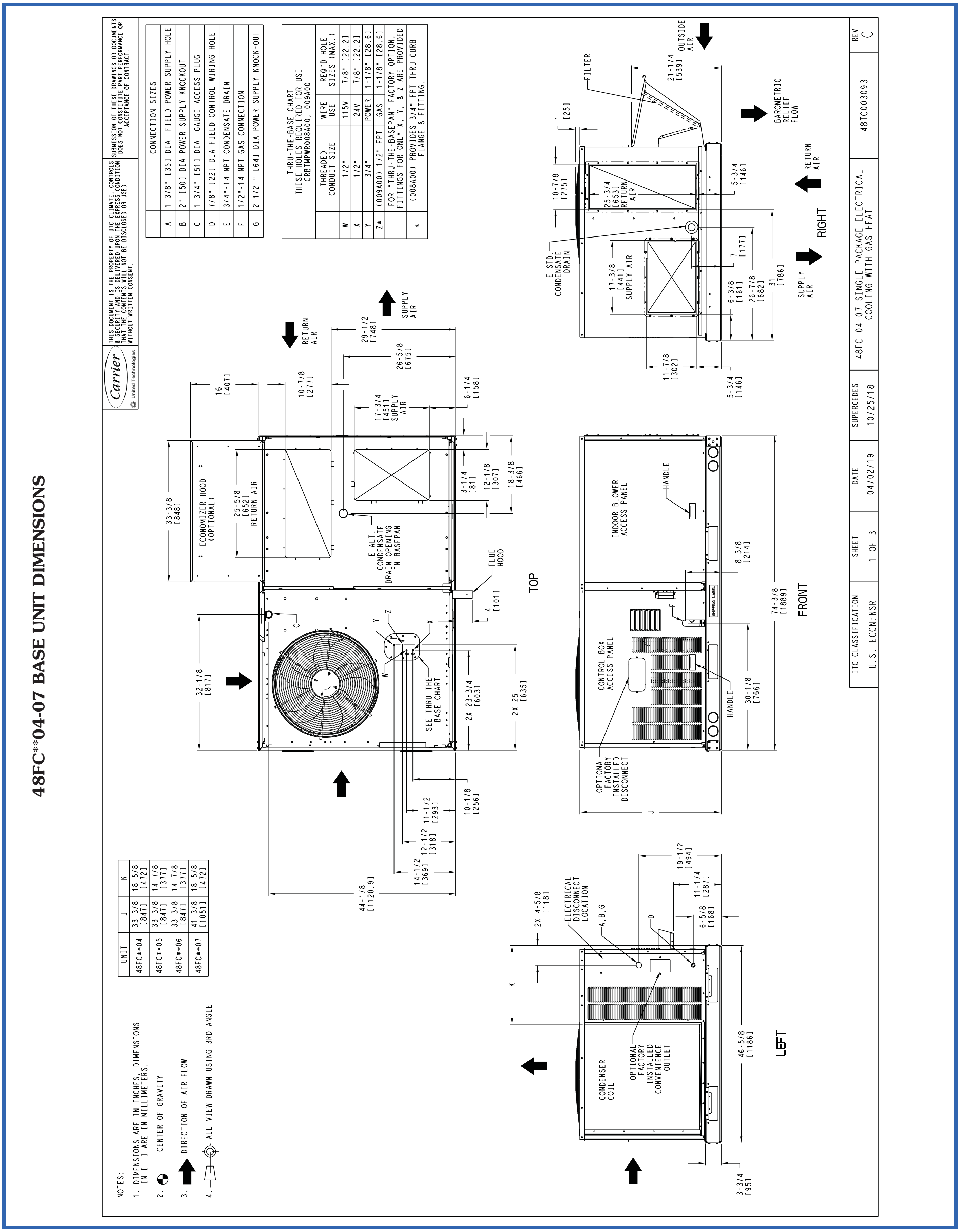
This accessory protects your compressor by preventing short-cycling in the event of some other failure, prevents the compressor from restarting for 30 seconds after stopping. Not required with SystemVu™ controller, RTU Open controller, or authorized commercial thermostats.

OPTIONS AND ACCESSORY WEIGHTS

OPTION / ACCESSORY NAME	48/50FC UNIT WEIGHT							
	04		05		06		07	
	lb	kg	lb	kg	lb	kg	lb	kg
Humidi-MiZer® System*	15	7	15	7	15	7	24	11
Power Exhaust - vertical	51	23	51	23	51	23	51	23
Power Exhaust - horizontal	39	18	39	18	39	18	39	18
EconoMi$er® (X, IV or 2)	35	16	35	16	35	16	35	16
2-Position Damper	39	18	39	18	39	18	58	26
Manual Damper	12	5	12	5	12	5	18	8
Medium Gas Heat (48FC units only)	9	4	9	4	9	4	15	7
High Gas Heat (48FC units only)	—	—	63	29	63	29	63	29
Hail Guard (louvered)	13	6	13	6	13	6	17	8
Cu/Cu Condenser Coil	37	17	74	34	74	34	95	43
Cu/Cu Condenser and Evaporator Coils	75	34	112	51	112	51	165	75
Roof Curb (14-in. curb)	95	43	95	43	95	43	95	43
Roof Curb (24-in. curb)	150	68	150	68	150	68	150	68
CO_2 sensor	2	1	2	1	2	1	2	1
Flue Discharge Deflector	7	3	7	3	7	3	7	3
Optional Indoor Motor/Drive	10	5	10	5	10	5	15	7
Low Ambient Controller	9	4	9	4	9	4	9	4
Winter Start Kit	5	2	5	2	5	2	5	2
Return Air Smoke Detector	7	3	7	3	7	3	7	3
Supply Air Smoke Detector	7	3	7	3	7	3	7	3
Fan Filter Switch	2	1	2	1	2	1	2	1
Non-Fused Disconnect	15	7	15	7	15	7	15	7
Powered Convenience Outlet	36	16	36	16	36	16	36	16
Unpowered Convenience Outlet	4	2	4	2	4	2	4	2
Enthalpy Sensor	2	1	2	1	2	1	2	1
Differential Enthalpy Sensor	3	1	3	1	3	1	3	1

LEGEND
— Not Available
* For Humidi-MiZer system, add Low Ambient controller weight.

NOTE: Where multiple variations are available, the heaviest combination is listed.


48FC**04-07 BASE UNIT DIMENSIONS
NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. CENTER OF GRAVITY
3. DIRECTION OF AIR FLOW
4. ALL VIEW DRAWN USING 3RD ANGLE
UNIT | J | K
48FC**04 | 33 3/8 [847] | 18 5/8 [472]
48FC**05 | 33 3/8 [847] | 14 7/8 [377]
48FC**06 | 33 3/8 [847] | 14 7/8 [377]
48FC**07 | 41 3/8 [1051] | 18 5/8 [472]
CONNECTION SIZES
A 1 3/8" [35] DIA FIELD POWER SUPPLY HOLE
B 2" [50] DIA POWER SUPPLY KNOCKOUT
C 1 3/4" [51] DIA GAUGE ACCESS PLUG
D 7/8" [22] DIA FIELD CONTROL WIRING HOLE
E 3/4"-14 NPT CONDENSATE DRAIN
F 1/2"-14 NPT GAS CONNECTION
G 2 1/2" [64] DIA POWER SUPPLY KNOCK-OUT
THRU-THE-BASE CHART
THESE HOLES REQUIRED FOR USE CRBTMPWR008A00, 009A00
THREADED CONDUIT SIZE | WIRE USE | REQ'D HOLE SIZES (MAX.)
W 1/2" | 115V | 7/8" [22.2]
X 1/2" | 24V | 7/8" [22.2]
Y 3/4" | POWER | 1-1/8" [28.6]
Z* (009A00) 1/2" FPT | GAS | 1-1/8" [28.6]
FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X, Y, & Z ARE PROVIDED
* (008A00) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING.
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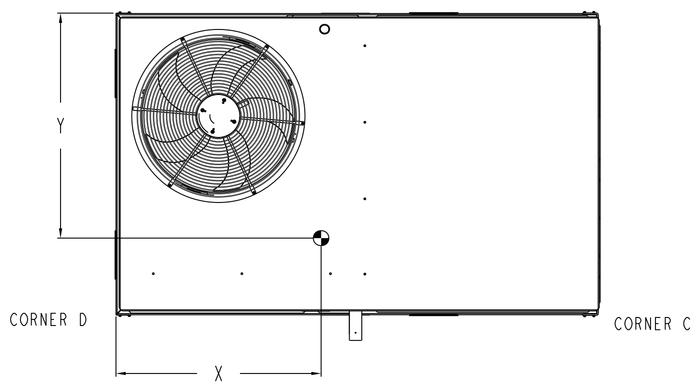
SUBMISSION OF THESE DRAWINGS OR DOCUMENTS DOES NOT CONSTITUTE PART PERFORMANCE OR ACCEPTANCE OF CONTRACT.
TOP
ECONOMIZER HOOD (OPTIONAL)
RETURN AIR
SUPPLY AIR
E ALT. CONDENSATE DRAIN OPENING IN BASEPAN
FLUE HOOD
SEE THRU THE BASE CHART
FRONT
INDOOR BLOWER ACCESS PANEL
CONTROL BOX ACCESS PANEL
HANDLE
OPTIONAL FACTORY INSTALLED DISCONNECT
RIGHT
E STD. CONDENSATE DRAIN
FILTER
OUTSIDE AIR
BAROMETRIC RELIEF FLOW
LEFT
CONDENSER COIL
ELECTRICAL DISCONNECT LOCATION
OPTIONAL FACTORY INSTALLED CONVENIENCE OUTLET
ITC CLASSIFICATION U.S. ECCN:NSR
SHEET 1 OF 3
DATE 04/02/19
SUPERCEDES 10/25/18
48FC 04-07 SINGLE PACKAGE ELECTRICAL COOLING WITH GAS HEAT
48TC003093
REV C

48FC**04-07 BASE UNIT DIMENSIONS (cont)

UNIT	STD. UNIT WEIGHT *		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		HEIGHT
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
48FC**04	482	219	113	51	116	53	128	58	125	57	37 5/8 [956]	24 9/16 [624]	18 1/4 [464]
48FC**05	543	246	138	63	133	60	133	60	138	63	36 1/2 [927]	23 3/8 [594]	18 [457]
48FC**06	556	252	142	64	136	62	136	62	142	64	36 1/2 [927]	23 3/8 [594]	18 [457]
48FC**07	607	275	162	73	152	69	141	64	151	68	36 [914]	22 1/2 [572]	19 3/8 [492]

* STANDARD UNIT WEIGHT IS WITH LOW GAS HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.



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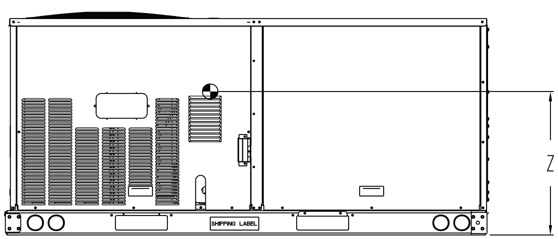

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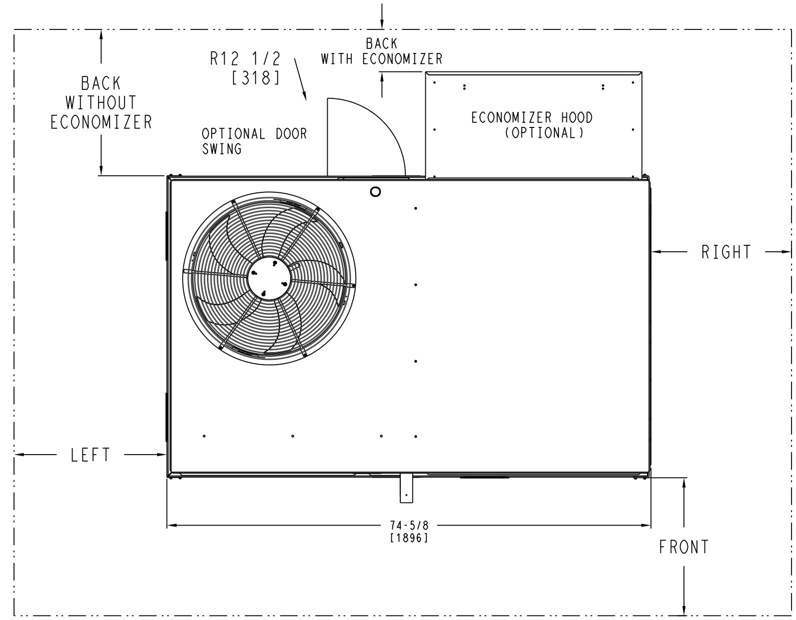


NOTES:

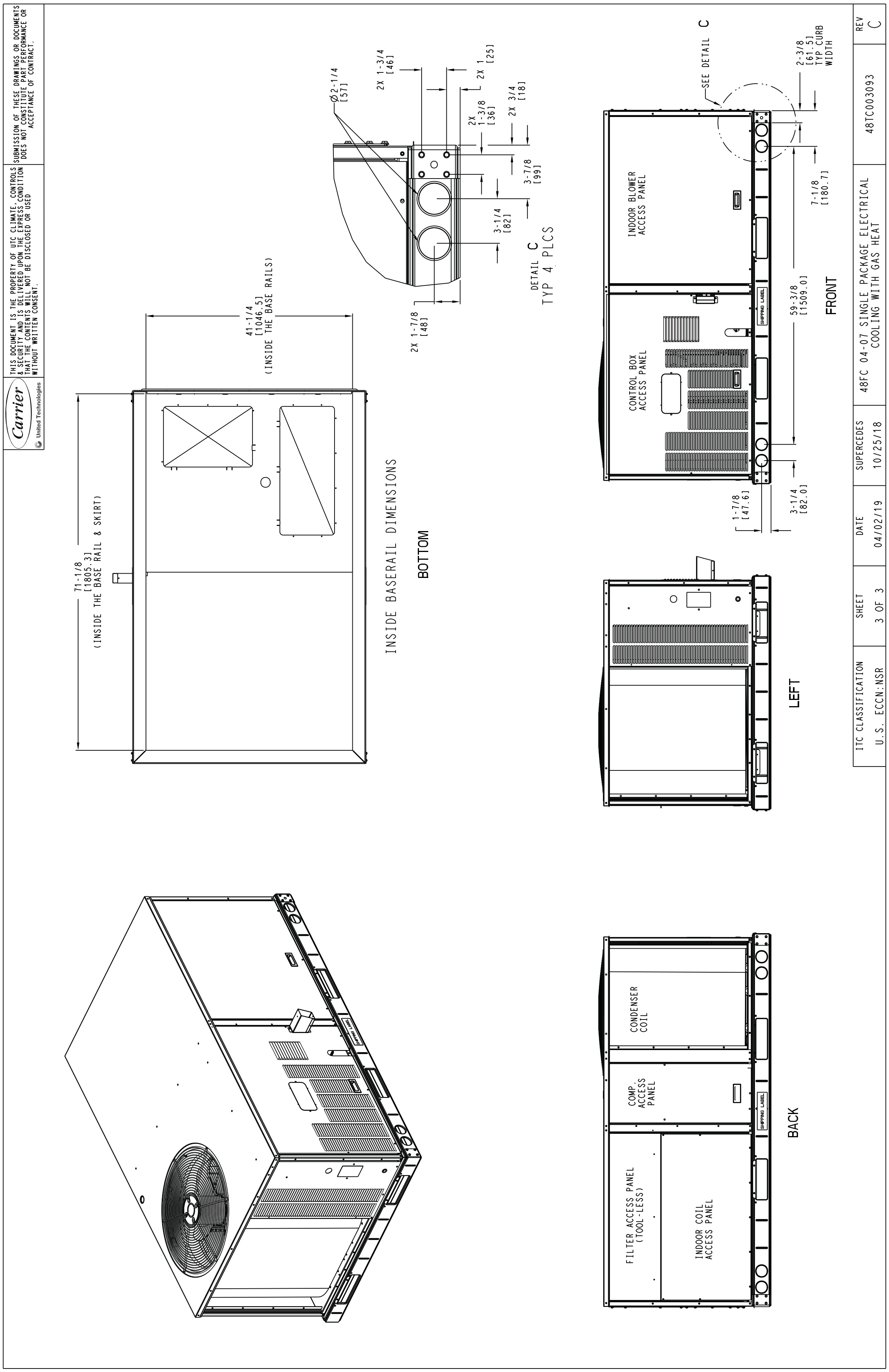
1. FOR ALL MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL.

CLEARANCE			
	SERVICE WITH:	SERVICE WITH:	OPERATING
SURFACE	CONDUCTIVE BARRIER	NONCONDUCTIVE BARRIER	CLEARANCE
FRONT	48 [1219mm]	36 [914mm]	18 [457mm]
LEFT	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK W/O HOOD	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK W/HOOD	36 [914mm]	36 [914mm]	18 [457mm]
RIGHT	36 [914mm]	36 [914mm]	18 [457mm]
TOP	72 [1829mm]	72 [1829mm]	72 [1829mm]

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:NSR	2 OF 3	04/02/19	10/25/18	48FC 04-07 SINGLE PACKAGE ELECTRICAL COOLING WITH GAS HEAT	48TC003093	C

Base unit dimensions (cont)

48FC**04-07 BASE UNIT DIMENSIONS (cont)



50FC**04-07 BASE UNIT DIMENSIONS

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. CENTER OF GRAVITY
3. DIRECTION OF AIR FLOW
4. ALL VIEW DRAWN USING 3RD ANGLE

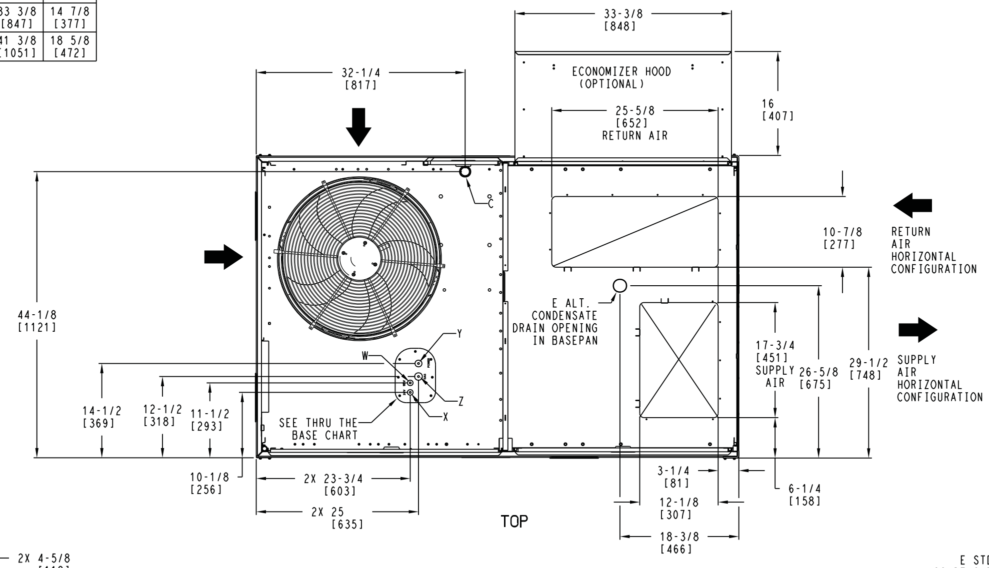
UNIT	J	K
50FC**04	33 3/8 [847]	18 5/8 [472]
50FC**05	33 3/8 [847]	14 7/8 [377]
50FC**06	33 3/8 [847]	14 7/8 [377]
50FC**07	41 3/8 [1051]	18 5/8 [472]

Carrier United Technologies

CONNECTION SIZES	
A	1 3/8" [35] DIA FIELD POWER SUPPLY HOLE
B	2" [51] DIA POWER SUPPLY KNOCKOUT
C	1 3/4" [44] DIA GAUGE ACCESS PLUG
D	7/8" [22] DIA FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
G	2 1/2 " [64] DIA POWER SUPPLY KNOCK-OUT

THRU-THE-BASE CHART
THESE HOLES REQUIRED FOR USE CRBTMPWR008A00, 009A00

	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
W	1/2"	115V	7/8" [22.2]
X	1/2"	24V	7/8" [22.2]
Y *	3/4"	POWER	1 1/8" [28.6]
Z**	(009A00) 1/2" FPT	GAS	1 1/8" [28.6]
	FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X,Y, & Z ARE PROVIDED		
*	SELECT EITHER 3/4" OR 1/2" FOR POWER, DEPENDING ON WIRE SIZE		
**	(008A00) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING.		



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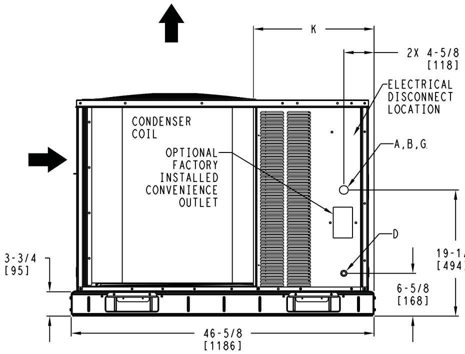

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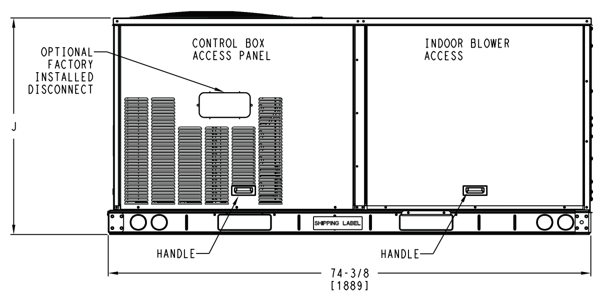

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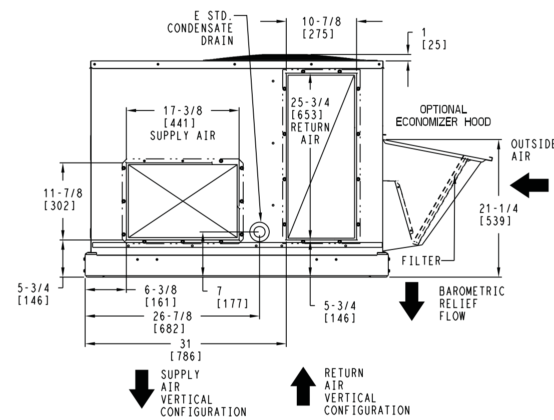


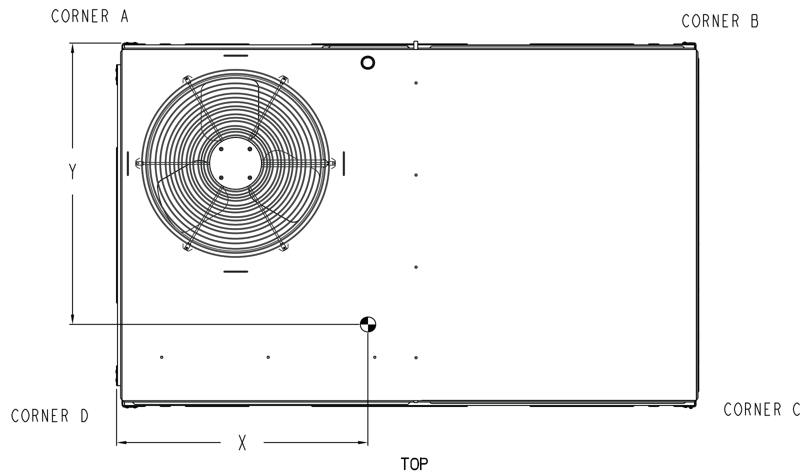
RIGHT

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:NSR	1 OF 3	04/02/19	10/25/18	50FC 04-07 SINGLE PACKAGE ELECTRICAL COOLING WITH ELECTRIC HEAT	48TC003094	C

50FC**04-07 BASE UNIT DIMENSIONS (cont)

UNIT	STD. UNIT WEIGHT*		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		HEIGHT
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
50FC**04	437	198	110	50	107	49	108	49	112	51	36 5/8 [930]	23 9/16 [598]	18 1/2 [470]
50FC**05	498	226	136	62	124	56	114	52	125	57	35 1/2 [902]	22 3/8 [568]	18 1/4 [464]
50FC**06	511	232	139	63	127	58	117	53	128	58	35 1/2 [902]	22 3/8 [568]	18 1/4 [464]
50FC**07	562	255	154	70	137	62	127	58	143	65	35 [889]	22 1/2 [572]	19 1/2 [495]

* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING. FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.



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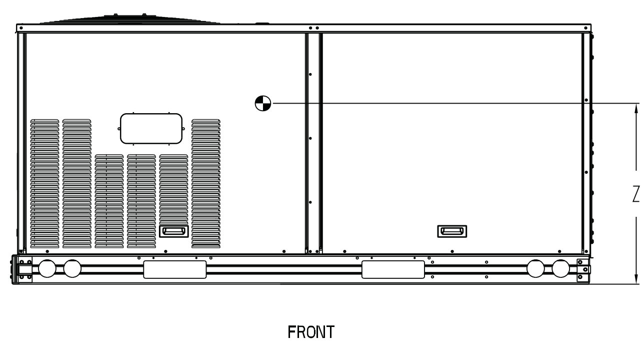

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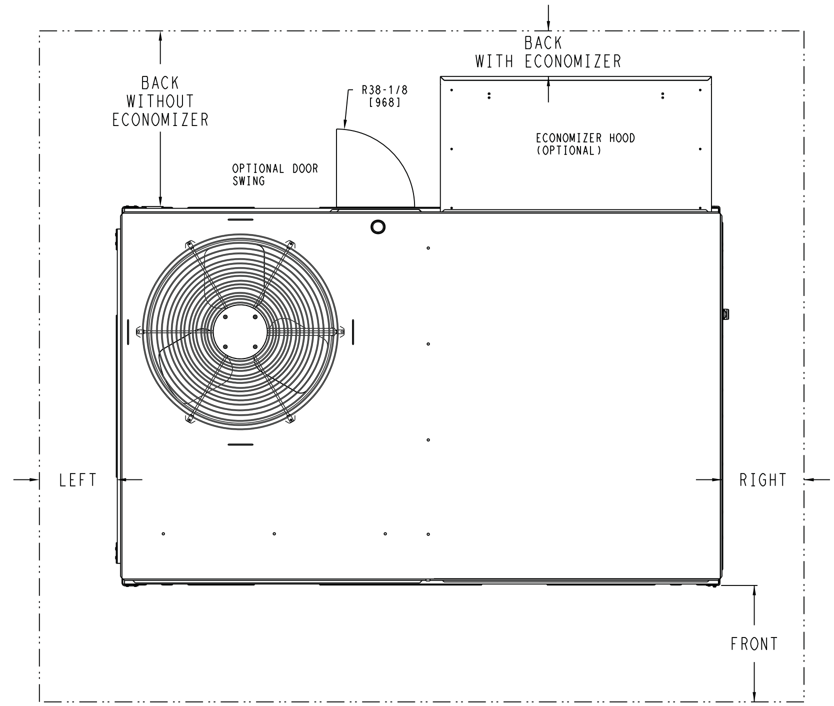

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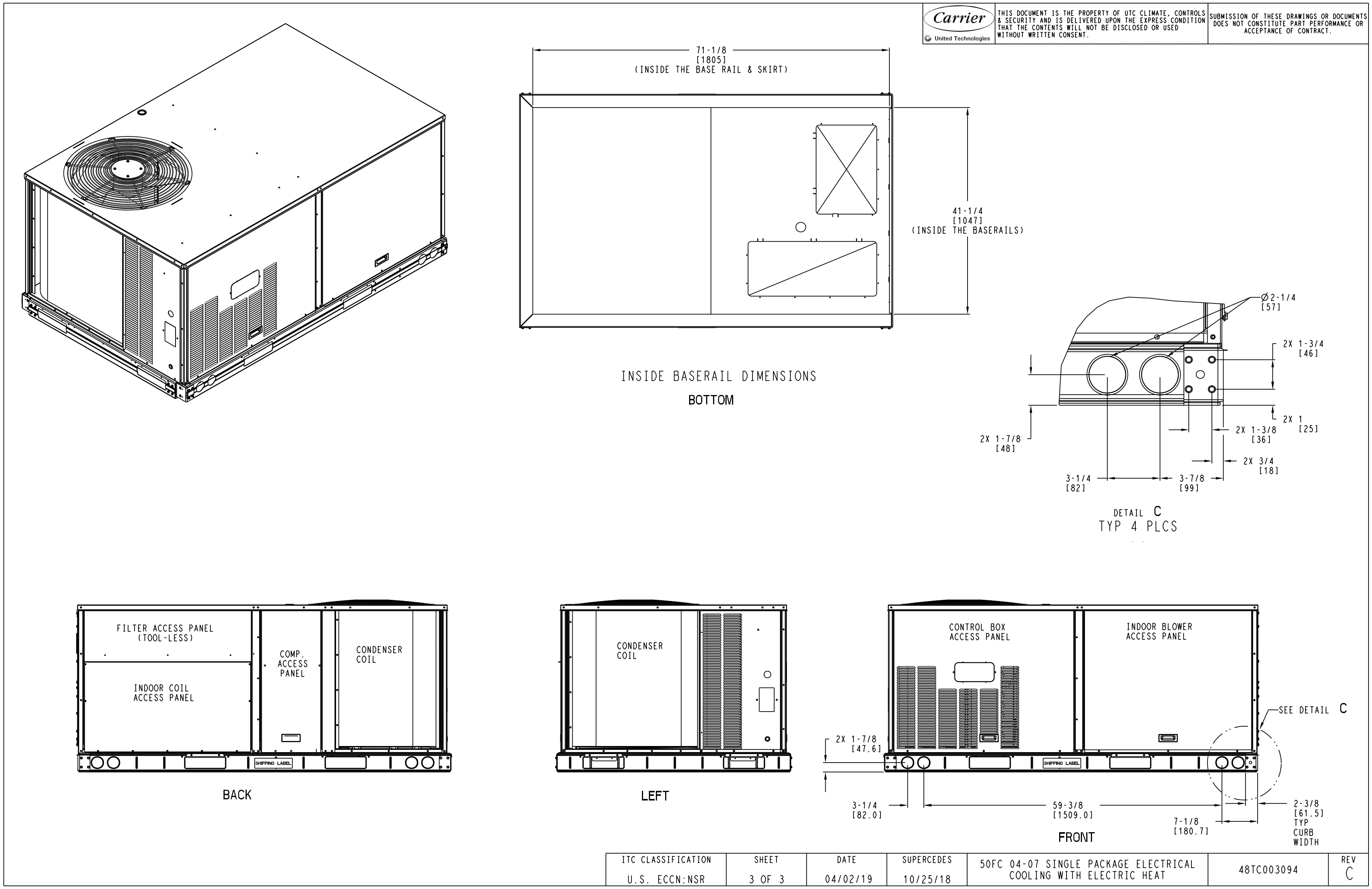
NOTE:

1. FOR ALL MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL.

	CLEARANCE		
	SERVICE WITH:	SERVICE WITH:	OPERATING
SURFACE	CONDUCTIVE BARRIER	NONCONDUCTIVE BARRIER	CLEARANCE
FRONT	48 [1219mm]	36 [914mm]	18 [457mm]
LEFT	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK W/O HOOD	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK W/ HOOD	36 [914mm]	36 [914mm]	18 [457mm]
RIGHT	36 [914mm]	36 [914mm]	18 [457mm]
TOP	72 [1829mm]	72 [1829mm]	72 [1829mm]

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:NSR	2 OF 3	04/02/19	10/25/18	50FC 04-07 SINGLE PACKAGE ELECTRICAL COOLING WITH ELECTRIC HEAT	48TC003094	C

50FC**04-07 BASE UNIT DIMENSIONS (cont)

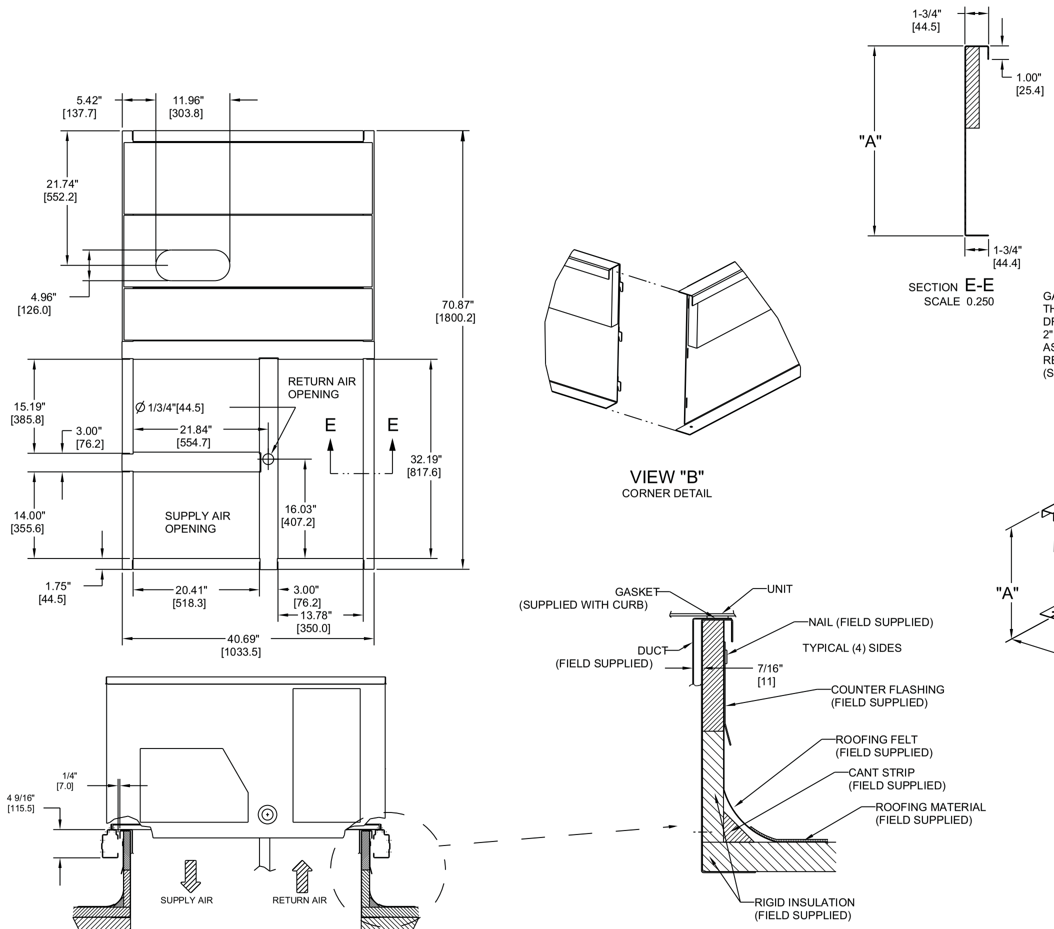


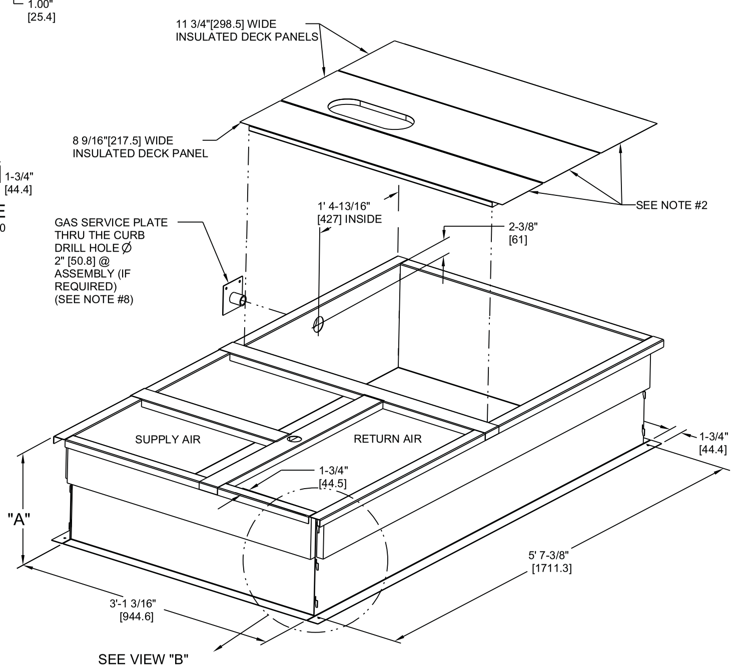
ROOF CURB DIMENSIONS — 48/50FC 04-07

ROOF CURB ACCESSORY #	A
CRRFCURB001A01	14" [356]
CRRFCURB002A01	24" [610]

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 25.4 [1"] THK. POLYURETHANE FOAM, 44.5 [1-3/4] # DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOFCURB: 18 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB. (FLANGES OF DUCT REST ON CURB).
6. SERVICE CLEARANCE 4 FEET ON EACH SIDE.
7. DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGE CRBTMPWR001A01 IS FOR THRU-THE-CURB GAS TYPE PACKAGE CRBTMPWR003A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

CONNECTOR PKG. ACC.	GAS CONNECTION TYPE	GAS FITTING	POWER WIRING FITTING	CONTROL WIRING FITTING	ACCESSORY CONVENIENCE OUTLET WIRING CONNECTOR
CRBTMPWR001A01	THRU THE CURB	3/4" [19] NPT	3/4" [19] NPT	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR003A01	THRU THE BOTTOM	1/2" [12.7] NPT			





CERTIFIED DRAWING

DRAWING RELEASE LEVEL:	PRODUCTION		
THIRD ANGLE PROJECTION	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: 1 DEC ± - 2 DEC ± - 3 DEC ± - ANG ± -	TITLE	CURB ASY, ROOF
MATERIAL - - -	AUTHORIZATION NUMBER 1041738	SIZE D	DRAWING NUMBER 48TC400427 SHEET 5 OF 5
ENGINEERING REQUIREMENTS T-005, Y-002	ENGINEERING - - MANUFACTURING - -	REV	B
WEIGHT: -	DRAFTER MMC 06/17/11 CHECKER -		
SURFACE FINISH -	MFG/PURCH PURCH	MODEL (INTERNAL USE ONLY)	NEXT DRAWING - / SCALE N/A / DISTRIBUTION MMC

REV	REVISION RECORD	DATE	BY	CHK'D	APP'D	ECN NO.
A	OVERALL DIM. 5'-7 3/8" WAS 5'-7 7/8; 18GA MATERIAL WA 16 GA.; NAIL FIELD SUPPLIED WAS WITH CURB	04/22/13	MMC	-	-	1067898

48/50FC**04 SINGLE STAGE COOLING CAPACITIES

48/50FC**04				AMBIENT TEMPERATURE (F) 85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
900 Cfm	EAT (wb)	58	TC	28.6	28.6	32.5	27.0	27.0	30.7	25.2	25.2	28.6	23.2	23.2	26.4
			SHC	24.7	28.6	32.5	23.3	27.0	30.7	21.7	25.2	28.6	20.0	23.2	26.4
		62	TC	31.1	31.1	31.1	28.9	28.9	29.8	26.3	26.3	28.6	23.6	23.6	27.2
			SHC	22.4	26.6	30.9	21.3	25.6	29.8	20.2	24.4	28.6	18.8	23.0	27.2
		67	TC	35.2	35.2	35.2	33.0	33.0	33.0	30.4	30.4	30.4	27.5	27.5	27.5
			SHC	18.7	23.0	27.2	17.8	22.0	26.3	16.7	20.9	25.2	15.5	19.8	24.0
		72	TC	38.9	38.9	38.9	37.2	37.2	37.2	34.8	34.8	34.8	31.9	31.9	31.9
			SHC	14.7	19.0	23.3	14.0	18.3	22.6	13.1	17.3	21.6	12.0	16.3	20.5
		76	TC	—	41.5	41.5	—	40.0	40.0	—	38.0	38.0	—	35.4	35.4
			SHC	—	15.6	20.5	—	15.1	20.0	—	14.3	19.1	—	13.3	17.8
1050 Cfm	EAT (wb)	58	TC	30.5	30.5	34.7	28.8	28.8	32.7	26.9	26.9	30.6	24.8	24.8	28.2
			SHC	26.4	30.5	34.7	24.8	28.8	32.7	23.2	26.9	30.6	21.4	24.8	28.2
		62	TC	32.4	32.4	33.9	30.0	30.0	32.7	27.4	27.4	31.3	24.8	24.8	29.3
			SHC	24.2	29.1	33.9	23.1	27.9	32.7	21.8	26.6	31.3	20.2	24.8	29.3
		67	TC	36.5	36.5	36.5	34.2	34.2	34.2	31.5	31.5	31.5	28.5	28.5	28.5
			SHC	19.8	24.6	29.4	19.0	23.8	28.7	17.9	22.7	27.6	16.7	21.5	26.4
		72	TC	40.0	40.0	40.0	38.3	38.3	38.3	35.9	35.9	35.9	33.0	33.0	33.0
			SHC	15.1	19.9	24.7	14.5	19.3	24.1	13.6	18.5	23.3	12.5	17.4	22.3
		76	TC	—	42.5	42.5	—	40.9	40.9	—	39.0	39.0	—	—	—
			SHC	—	16.3	22.0	—	15.7	21.4	—	14.9	20.2	—	—	—
1200 Cfm	EAT (wb)	58	TC	32.1	32.1	36.5	30.3	30.3	34.4	28.3	28.3	32.2	26.1	26.1	29.7
			SHC	27.8	32.1	36.5	26.2	30.3	34.4	24.4	28.3	32.2	22.5	26.1	29.7
		62	TC	33.3	33.3	36.6	30.9	30.9	35.3	28.4	28.4	33.5	26.1	26.1	30.9
			SHC	25.8	31.2	36.6	24.6	29.9	35.3	23.2	28.4	33.5	21.3	26.1	30.9
		67	TC	37.4	37.4	37.4	35.1	35.1	35.1	32.4	32.4	32.4	29.2	29.2	29.2
			SHC	20.7	25.9	31.2	20.0	25.4	30.8	18.9	24.4	29.8	17.7	23.1	28.6
		72	TC	40.7	40.7	40.7	39.0	39.0	39.0	36.7	36.7	36.7	33.8	33.8	33.8
			SHC	15.4	20.6	25.9	14.8	20.1	25.4	14.0	19.4	24.8	12.9	18.4	23.8
		76	TC	—	43.2	43.2	—	41.5	41.5	—	39.7	39.7	—	—	—
			SHC	—	16.7	23.0	—	16.0	22.1	—	15.3	21.2	—	—	—
1350 Cfm	EAT (wb)	58	TC	33.5	33.5	38.1	31.6	31.6	35.9	29.5	29.5	33.5	27.2	27.2	30.9
			SHC	28.9	33.5	38.1	27.3	31.6	35.9	25.4	29.5	33.5	23.4	27.2	30.9
		62	TC	34.1	34.1	38.9	31.7	31.7	37.5	29.5	29.5	34.9	27.2	27.2	32.2
			SHC	27.1	33.0	38.9	25.9	31.7	37.5	24.1	29.5	34.9	22.2	27.2	32.2
		67	TC	38.0	38.0	38.0	35.8	35.8	35.8	33.0	33.0	33.0	29.8	29.8	30.6
			SHC	21.4	27.1	32.8	20.8	26.8	32.7	19.8	25.9	31.9	18.6	24.6	30.6
		72	TC	41.2	41.2	41.2	39.5	39.5	39.5	37.3	37.3	37.3	34.3	34.3	34.3
			SHC	15.6	21.3	26.9	15.0	20.7	26.5	14.3	20.2	26.1	13.2	19.2	25.3
		76	TC	—	43.7	43.7	—	41.9	41.9	—	40.0	40.0	—	—	—
			SHC	—	17.0	23.6	—	16.3	22.7	—	15.6	21.9	—	—	—
1500 Cfm	EAT (wb)	58	TC	34.5	34.5	39.2	32.7	32.7	37.1	30.5	30.5	34.6	28.1	28.1	31.9
			SHC	29.8	34.5	39.2	28.2	32.7	37.1	26.3	30.5	34.6	24.2	28.1	31.9
		62	TC	35.1	35.1	39.1	32.7	32.7	38.7	30.5	30.5	36.1	28.1	28.1	33.3
			SHC	27.4	33.3	39.1	26.7	32.7	38.7	24.9	30.5	36.1	22.9	28.1	33.3
		67	TC	38.4	38.4	38.4	36.3	36.3	36.3	33.4	33.4	33.8	30.1	30.1	32.5
			SHC	22.1	28.2	34.3	21.6	28.0	34.4	20.6	27.2	33.8	19.4	26.0	32.5
		72	TC	41.6	41.6	41.6	39.8	39.8	39.8	37.7	37.7	37.7	34.7	34.7	34.7
			SHC	15.7	21.8	27.8	15.1	21.3	27.4	14.4	20.8	27.2	13.5	20.0	26.5
		76	TC	—	44.0	44.0	—	42.2	42.2	—	40.2	40.2	—	—	—
			SHC	—	17.2	24.1	—	16.5	23.3	—	15.8	22.5	—	—	—

LEGEND

— — Do Not Operate
Cfm — Cubic Feet Per Minute (Supply Air)
EAT (db) — Entering Air Temperature (dry bulb)
EAT (wb) — Entering Air Temperature (wet bulb)
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTE: See minimum-maximum airflow ratings on page 8.

Performance data (cont)

48/50FC*B04 — UNIT WITH HUMIDI-MIZER® SYSTEM IN SUBCOOLING MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — SCFM/BF								
		900 / 0.01			1200 / 0.02			1500 / 0.04		
		Air Entering Evaporator — Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	29.90	31.00	30.90	29.80	32.50	33.30	33.80	30.90	26.70
	SHC	14.70	19.40	25.50	24.30	19.80	14.90	13.60	17.70	21.20
	kW	2.51	2.49	2.42	2.82	2.74	2.68	3.09	3.01	2.88
85	TC	31.90	27.50	22.70	18.10	23.10	28.40	23.80	18.30	13.20
	SHC	10.70	14.20	17.40	13.00	10.00	6.90	2.60	5.50	8.40
	kW	3.36	3.23	3.06	3.62	3.41	3.24	3.79	3.58	3.39
95	TC	30.30	31.00	30.90	29.80	32.50	33.30	33.80	30.90	26.70
	SHC	14.80	19.40	25.50	24.30	19.80	14.90	13.60	17.70	21.20
	kW	2.53	2.49	2.41	2.82	2.74	2.68	3.09	3.01	2.88
105	TC	31.90	27.50	22.70	18.10	23.10	28.40	23.80	18.30	13.20
	SHC	10.70	14.20	17.40	13.00	10.00	6.90	2.60	5.50	8.40
	kW	3.36	3.23	3.06	3.62	3.41	3.24	3.79	3.58	3.39
115	TC	30.30	31.00	30.90	29.80	32.50	33.30	33.80	30.90	26.70
	SHC	14.80	19.40	25.50	24.30	19.80	14.90	13.60	17.70	21.20
	kW	2.53	2.49	2.41	2.82	2.74	2.68	3.09	3.01	2.88
125	TC	31.90	27.50	22.70	18.10	23.10	28.40	23.80	18.30	13.2
	SHC	10.70	14.20	17.40	0.00	10.00	6.90	2.60	5.50	8.40
	kW	3.36	3.23	3.06	3.62	3.41	3.24	3.79	3.58	3.39

48/50FC*B04 — UNIT WITH HUMIDI-MIZER SYSTEM IN HOT GAS REHEAT MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator — Cfm								
		900	1200	1500	900	1200	1500	900	1200	1500
80	TC	9.81	10.50	10.92	10.83	11.58	12.00	11.78	12.50	12.96
	SHC	1.41	3.09	4.87	0.60	1.98	3.47	-0.05	1.04	2.25
	kW	1.92	1.93	1.94	1.96	1.98	2.00	2.00	2.01	2.02
75	TC	11.71	12.51	13.04	12.67	13.38	13.86	13.44	13.91	14.32
	SHC	3.10	4.87	6.70	2.30	3.67	5.03	1.62	2.51	3.51
	kW	1.87	1.88	1.88	1.89	1.90	1.91	1.91	1.92	1.93
70	TC	13.37	14.10	14.41	13.94	14.53	14.90	14.42	14.95	15.10
	SHC	4.71	6.28	7.52	3.72	4.86	5.88	2.97	4.07	4.47
	kW	1.78	1.80	1.82	1.81	1.83	1.84	1.82	1.82	1.86
60	TC	13.95	14.80	14.62	14.47	15.22	15.53	14.66	14.63	15.46
	SHC	6.20	8.05	7.61	5.67	6.67	7.68	5.03	5.55	6.30
	kW	1.66	1.62	1.70	1.67	1.69	1.68	1.69	1.70	1.71
50	TC	14.26	14.87	15.78	14.65	15.78	16.21	15.01	16.16	16.58
	SHC	5.12	6.39	8.04	3.83	5.37	6.38	2.72	4.09	4.93
	kW	1.98	2.03	1.94	2.01	1.94	1.97	2.03	1.96	1.99
40	TC	14.16	15.50	15.88	15.28	16.24	16.28	15.62	16.60	17.01
	SHC	5.04	6.99	8.14	4.43	5.81	6.44	3.31	4.51	5.34
	kW	2.07	1.95	1.99	1.93	1.91	2.02	1.96	1.94	1.97

LEGEND

Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Power Input
SCFM/BF — Standard Cubic Feet per Minute/Bypass Factor
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

48/50FC**05 SINGLE STAGE COOLING CAPACITIES

48/50FC**05				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
1200 Cfm	EAT (wb)	58	TC	40.5	40.5	44.8	37.5	37.5	43.0	34.5	34.5	39.6	30.9	30.9	35.7
			SHC	34.0	39.4	44.8	32.1	37.5	43.0	29.4	34.5	39.6	26.2	30.9	35.7
		62	TC	43.9	43.9	43.9	40.4	40.4	41.0	36.4	36.4	38.7	31.9	31.9	36.2
			SHC	31.1	37.1	43.1	29.0	35.0	41.0	26.7	32.7	38.7	24.2	30.2	36.2
		67	TC	49.3	49.3	49.3	46.1	46.1	46.1	42.3	42.3	42.3	37.8	37.8	37.8
			SHC	25.7	31.5	37.4	23.9	29.8	35.6	21.8	27.7	33.6	19.4	25.4	31.4
		72	TC	54.7	54.7	54.7	51.5	51.5	51.5	48.0	48.0	48.0	44.0	44.0	44.0
			SHC	20.3	25.8	31.2	18.5	24.1	29.7	16.6	22.2	27.9	14.5	20.2	25.9
		76	TC	—	58.5	58.5	—	55.7	55.7	—	52.3	52.3	—	48.4	48.4
			SHC	—	21.2	27.8	—	19.4	26.0	—	17.5	24.1	—	15.8	22.4
1400 Cfm	EAT (wb)	58	TC	43.0	43.0	49.0	40.1	40.1	45.9	37.0	37.0	42.4	33.3	33.3	38.4
			SHC	37.0	43.0	49.0	34.4	40.1	45.9	31.5	37.0	42.4	28.2	33.3	38.4
		62	TC	45.3	45.3	47.5	41.8	41.8	45.3	37.9	37.9	43.0	33.5	33.5	39.7
			SHC	33.6	40.6	47.5	31.5	38.4	45.3	29.2	36.1	43.0	26.4	33.0	39.7
		67	TC	50.9	50.9	50.9	47.5	47.5	47.5	43.7	43.7	43.7	39.2	39.2	39.2
			SHC	27.2	34.0	40.7	25.4	32.2	39.0	23.3	30.2	37.1	21.1	28.0	34.9
		72	TC	56.0	56.0	56.0	52.9	52.9	52.9	49.2	49.2	49.2	45.2	45.2	45.2
			SHC	20.8	27.1	33.5	19.0	25.5	32.1	17.1	23.7	30.3	15.0	21.7	28.4
		76	TC	—	59.8	59.8	—	56.8	56.8	—	53.3	53.3	—	49.3	49.3
			SHC	—	21.5	29.2	—	20.0	27.7	—	18.3	24.3	—	16.5	22.7
1600 Cfm	EAT (wb)	58	TC	45.2	45.2	51.5	42.2	42.2	48.3	39.0	39.0	44.7	35.2	35.2	40.6
			SHC	38.8	45.2	51.5	36.2	42.2	48.3	33.2	39.0	44.7	29.9	35.2	40.6
		62	TC	46.4	46.4	51.4	42.8	42.8	49.0	39.2	39.2	46.0	35.3	35.3	42.4
			SHC	35.8	43.6	51.4	33.6	41.3	49.0	31.0	38.5	46.0	28.1	35.3	42.4
		67	TC	51.9	51.9	51.9	48.4	48.4	48.4	44.6	44.6	44.6	40.0	40.0	40.0
			SHC	28.5	36.1	43.6	26.6	34.3	42.0	24.7	32.5	40.2	22.4	30.2	38.0
		72	TC	56.8	56.8	56.8	53.7	53.7	53.7	50.0	50.0	50.0	45.8	45.8	45.8
			SHC	21.0	28.2	35.3	19.3	26.7	34.0	17.4	24.9	32.4	15.4	22.9	30.5
		76	TC	—	60.4	60.4	—	57.4	57.4	—	53.9	53.9	—	—	—
			SHC	—	22.0	27.8	—	20.5	27.1	—	18.8	25.8	—	—	—
1800 Cfm	EAT (wb)	58	TC	46.8	46.8	53.4	43.9	43.9	50.2	40.5	40.5	46.5	36.8	36.8	42.4
			SHC	40.2	46.8	53.4	37.6	43.9	50.2	34.6	40.5	46.5	31.2	36.8	42.4
		62	TC	47.3	47.3	54.6	45.5	45.5	48.6	41.0	41.0	47.7	36.8	36.8	44.3
			SHC	37.6	46.1	54.6	33.9	41.3	48.6	32.2	39.9	47.7	29.3	36.8	44.3
		67	TC	52.5	52.5	52.5	49.0	49.0	49.0	45.1	45.1	45.1	40.5	40.5	40.9
			SHC	29.5	37.8	46.2	27.7	36.2	44.7	25.8	34.4	43.0	23.5	32.2	40.9
		72	TC	57.3	57.3	57.3	54.1	54.1	54.1	50.4	50.4	50.4	46.2	46.2	46.2
			SHC	21.2	29.0	36.9	19.5	27.6	35.7	17.6	25.8	34.1	15.5	23.9	32.3
		76	TC	—	60.7	60.7	—	57.8	57.8	—	54.2	54.2	—	—	—
			SHC	—	22.2	29.5	—	20.7	28.2	—	19.0	26.9	—	—	—
2000 Cfm	EAT (wb)	58	TC	48.0	48.0	54.8	45.1	45.1	51.6	41.8	41.8	47.9	38.0	38.0	43.7
			SHC	41.3	48.0	54.8	38.6	45.1	51.6	35.6	41.8	47.9	32.2	38.0	43.7
		62	TC	48.5	48.5	56.1	46.6	46.6	49.4	41.8	41.8	50.0	38.0	38.0	45.7
			SHC	38.6	47.3	56.1	34.5	42.0	49.4	33.5	41.8	50.0	30.2	38.0	45.7
		67	TC	52.7	52.7	52.7	49.2	49.2	49.2	45.3	45.3	45.6	40.7	40.7	43.7
			SHC	30.3	39.4	48.5	28.6	37.9	47.2	26.7	36.1	45.6	24.5	34.1	43.7
		72	TC	57.5	57.5	57.5	54.3	54.3	54.3	50.6	50.6	50.6	46.3	46.3	46.3
			SHC	21.1	29.6	38.2	19.4	28.3	37.1	17.6	26.6	35.6	15.6	24.8	33.9
		76	TC	—	60.7	60.7	—	57.8	57.8	—	—	—	—	—	—
			SHC	—	22.3	30.4	—	20.8	29.1	—	—	—	—	—	—

LEGEND

— — Do Not Operate
Cfm — Cubic Feet Per Minute (Supply Air)
EAT (db) — Entering Air Temperature (dry bulb)
EAT (wb) — Entering Air Temperature (wet bulb)
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTE: See minimum-maximum airflow ratings on page 8.

48/50FC*B05 — UNIT WITH HUMIDI-MIZER® SYSTEM IN SUBCOOLING MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — SCFM/BF								
		1200 / 0.04			1600 / 0.07			2000 / 0.10		
		Air Entering Evaporator — Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	49.7	44.9	40.6	52.9	47.8	43.5	54.8	49.8	0.0
	SHC	20.8	26.2	31.6	24.0	30.9	37.9	26.8	35.2	0.0
	kW	2.50	2.47	2.44	2.46	2.48	2.51	2.53	2.50	0.00
85	TC	46.5	42.0	37.9	49.1	44.7	40.6	51.2	46.5	42.6
	SHC	17.8	23.5	29.2	20.5	28.0	35.2	23.5	32.1	40.5
	kW	2.81	2.78	2.76	2.78	2.80	2.82	2.84	2.81	2.79
95	TC	43.1	38.9	35.1	45.8	41.5	37.6	47.5	43.1	39.4
	SHC	14.6	20.6	26.5	17.5	25.0	32.4	20.1	28.9	37.5
	kW	3.16	3.14	3.12	3.13	3.15	3.18	3.19	3.16	3.14
105	TC	39.3	35.3	32.0	41.8	37.7	34.2	43.4	39.1	35.9
	SHC	11.1	17.3	23.7	13.8	21.5	29.3	16.3	25.3	34.3
	kW	3.56	3.54	3.52	3.54	3.55	3.58	3.59	3.56	3.55
115	TC	35.3	31.8	28.6	37.4	33.7	30.5	39.1	35.3	32.2
	SHC	7.5	14.1	20.6	9.7	17.8	25.9	12.3	21.8	30.8
	kW	4.02	4.01	4.00	4.00	4.01	4.03	4.04	4.03	4.01
125	TC	31.2	27.9	24.9	33.2	29.8	26.8	34.5	31.0	28.3
	SHC	3.7	10.5	17.3	5.9	14.3	22.5	8.1	17.9	27.1
	kW	4.54	4.53	4.53	4.53	4.54	4.54	4.55	4.54	4.54

48/50FC*B05 — UNIT WITH HUMIDI-MIZER SYSTEM IN HOT GAS REHEAT MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator — Cfm								
		1200	1600	2000	1200	1600	2000	1200	1600	2000
80	TC	10.55	10.36	10.16	11.65	11.44	11.20	12.56	12.35	12.04
	SHC	-1.90	-1.24	-0.52	-3.80	-3.40	-2.95	-5.39	-5.19	-4.97
	kW	3.15	3.16	3.16	3.19	3.20	3.20	3.22	3.23	3.23
75	TC	12.91	12.76	12.57	13.89	13.76	13.47	14.64	14.56	14.25
	SHC	0.35	0.98	1.63	-1.54	-1.09	-0.76	-3.12	-2.80	-2.65
	kW	3.04	3.05	3.06	3.07	3.08	3.09	3.10	3.12	3.12
70	TC	15.12	14.94	14.82	15.98	15.88	15.60	16.69	16.50	16.13
	SHC	2.51	3.04	3.60	0.68	1.11	1.36	-0.78	-0.55	-0.50
	kW	2.92	2.93	2.95	2.96	2.97	2.98	2.98	2.99	3.00
60	TC	18.97	18.79	18.53	19.24	19.18	18.82	19.83	19.58	21.59
	SHC	6.49	6.91	7.10	4.77	5.17	5.26	3.72	3.89	4.75
	kW	3.17	3.23	3.15	3.21	3.26	3.18	3.23	3.12	3.10
50	TC	17.53	13.35	13.30	13.45	13.58	13.53	13.67	13.79	13.74
	SHC	9.21	8.03	7.71	7.82	7.54	7.16	7.44	7.10	6.68
	kW	3.01	3.07	3.11	3.04	3.10	3.15	3.07	3.14	3.18
40	TC	17.53	13.35	13.30	13.45	13.58	13.53	13.67	13.79	13.74
	SHC	9.21	8.03	7.71	7.82	7.54	7.16	7.44	7.10	6.68
	kW	3.39	3.32	3.24	3.14	3.23	3.15	3.18	3.27	3.08

LEGEND

Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Power Input
SCFM/BF — Standard Cubic Feet per Minute/Bypass Factor
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

48/50FC**06 SINGLE STAGE COOLING CAPACITIES

48/50FC**06				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
1500 Cfm	EAT (wb)	58	TC	52.2	52.2	58.7	49.3	49.3	55.4	46.0	46.0	51.7	42.5	42.5	47.7
			SHC	45.7	52.2	58.7	43.2	49.3	55.4	40.3	46.0	51.7	37.2	42.5	47.7
		62	TC	55.2	55.2	56.6	51.3	51.3	54.6	47.1	47.1	52.4	42.6	42.6	49.7
			SHC	41.9	49.2	56.6	40.0	47.3	54.6	37.9	45.2	52.4	35.5	42.6	49.7
		67	TC	61.0	61.0	61.0	57.5	57.5	57.5	53.2	53.2	53.2	48.4	48.4	48.4
			SHC	34.7	41.9	49.1	33.3	40.6	48.0	31.5	38.9	46.2	29.5	36.8	44.2
		72	TC	64.4	64.4	64.4	62.9	62.9	62.9	59.4	59.4	59.4	55.1	55.1	55.1
			SHC	26.4	33.4	40.5	25.8	33.1	40.3	24.5	31.8	39.1	22.8	30.2	37.6
		76	TC	—	66.0	66.0	—	65.1	65.1	—	63.0	63.0	—	59.5	59.5
			SHC	—	26.9	35.1	—	26.5	34.8	—	25.8	34.0	—	24.4	32.4
1750 Cfm	EAT (wb)	58	TC	54.8	54.8	61.7	51.6	51.6	58.1	48.2	48.2	54.3	44.5	44.5	50.1
			SHC	47.9	54.8	61.7	45.1	51.6	58.1	42.1	48.2	54.3	38.9	44.5	50.1
		62	TC	56.5	56.5	60.9	52.7	52.7	59.0	48.4	48.4	56.5	44.6	44.6	52.1
			SHC	44.3	52.6	60.9	42.4	50.7	59.0	40.2	48.4	56.5	37.0	44.6	52.1
		67	TC	62.0	62.0	62.0	58.7	58.7	58.7	54.4	54.4	54.4	49.4	49.4	49.4
			SHC	35.7	43.7	51.7	34.6	42.9	51.2	32.9	41.3	49.7	30.9	39.3	47.8
		72	TC	64.6	64.6	64.6	63.4	63.4	63.4	60.3	60.3	60.3	56.1	56.1	56.1
			SHC	26.2	33.8	41.5	25.8	33.8	41.8	24.6	32.9	41.1	23.1	31.4	39.8
		76	TC	—	65.9	65.9	—	64.8	64.8	—	63.3	63.3	—	59.9	59.9
			SHC	—	27.2	36.8	—	26.7	36.3	—	26.0	35.1	—	24.7	33.5
2000 Cfm	EAT (wb)	58	TC	56.6	56.6	63.8	53.5	53.5	60.3	49.9	49.9	56.3	46.1	46.1	52.0
			SHC	49.4	56.6	63.8	46.7	53.5	60.3	43.6	49.9	56.3	40.2	46.1	52.0
		62	TC	57.5	57.5	64.5	53.7	53.7	62.9	50.0	50.0	58.5	46.1	46.1	54.0
			SHC	46.2	55.3	64.5	44.5	53.7	62.9	41.4	50.0	58.5	38.2	46.1	54.0
		67	TC	62.1	62.1	62.1	59.3	59.3	59.3	55.0	55.0	55.0	50.0	50.0	51.0
			SHC	36.0	44.6	53.3	35.5	44.7	53.9	34.0	43.4	52.8	32.1	41.6	51.0
		72	TC	64.3	64.3	64.3	63.4	63.4	63.4	60.6	60.6	60.6	56.5	56.5	56.5
			SHC	25.7	34.0	42.2	25.4	34.1	42.7	24.5	33.6	42.6	23.1	32.3	41.6
		76	TC	—	65.6	65.6	—	64.1	64.1	—	63.1	63.1	—	59.9	59.9
			SHC	—	27.0	37.5	—	26.4	36.5	—	25.8	35.6	—	24.6	34.3
2250 Cfm	EAT (wb)	58	TC	57.7	57.7	65.2	54.7	54.7	61.8	51.2	51.2	57.8	47.2	47.2	53.3
			SHC	50.2	57.7	65.2	47.6	54.7	61.8	44.5	51.2	57.8	41.0	47.2	53.3
		62	TC	57.9	57.9	67.9	54.8	54.8	64.3	51.2	51.2	60.1	47.2	47.2	55.4
			SHC	47.9	57.9	67.9	45.3	54.8	64.3	42.3	51.2	60.1	39.0	47.2	55.4
		67	TC	61.7	61.7	61.7	59.5	59.5	59.5	55.2	55.2	55.5	50.2	50.2	53.9
			SHC	36.0	45.1	54.3	36.1	46.2	56.2	34.8	45.1	55.5	33.0	43.5	53.9
		72	TC	63.9	63.9	63.9	62.9	62.9	62.9	60.5	60.5	60.5	56.5	56.5	56.5
			SHC	25.1	33.8	42.5	24.9	34.0	43.2	24.2	33.9	43.6	22.8	32.9	43.0
		76	TC	—	65.0	65.0	—	63.5	63.5	—	62.6	62.6	—	59.5	59.5
			SHC	—	26.5	37.3	—	25.9	36.4	—	25.4	35.8	—	24.4	34.6
2500 Cfm	EAT (wb)	58	TC	58.2	58.2	65.9	55.4	55.4	62.7	51.9	51.9	58.8	47.9	47.9	54.3
			SHC	50.6	58.2	65.9	48.1	55.4	62.7	45.1	51.9	58.8	41.6	47.9	54.3
		62	TC	58.2	58.2	68.5	56.4	56.4	59.5	51.9	51.9	61.1	47.9	47.9	56.4
			SHC	48.0	58.2	68.5	42.8	51.1	59.5	42.8	51.9	61.1	39.4	47.9	56.4
		67	TC	61.1	61.1	61.1	59.2	59.2	59.2	55.1	55.1	57.7	50.1	50.1	56.3
			SHC	35.8	45.5	55.2	36.4	47.2	57.9	35.3	46.5	57.7	33.6	44.9	56.3
		72	TC	63.1	63.1	63.1	62.0	62.0	62.0	60.0	60.0	60.0	56.1	56.1	56.1
			SHC	24.3	33.4	42.5	24.0	33.6	43.2	23.5	33.9	44.3	22.3	33.1	43.9
		76	TC	—	64.1	64.1	—	62.7	62.7	—	61.8	61.8	—	58.8	58.8
			SHC	—	25.8	36.9	—	25.2	36.1	—	24.8	35.7	—	23.8	34.7

LEGEND

— — Do Not Operate
Cfm — Cubic Feet Per Minute (Supply Air)
EAT (db) — Entering Air Temperature (dry bulb)
EAT (wb) — Entering Air Temperature (wet bulb)
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTE: See minimum-maximum airflow ratings on page 8.

48/50FC*B06 — UNIT WITH HUMIDI-MIZER® SYSTEM IN SUBCOOLING MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — SCFM/BF								
		1500 / 0.01			2000 / 0.02			2500 / 0.03		
		Air Entering Evaporator — Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	65.6	59.0	53.7	69.6	63.1	57.4	72.0	65.6	60.4
	SHC	25.3	33.5	42.2	29.9	40.9	51.6	34.3	47.6	60.0
	kW	3.11	3.06	3.03	3.05	3.09	3.16	3.16	3.11	3.07
85	TC	61.1	55.4	50.2	65.0	58.9	53.7	66.8	61.0	56.4
	SHC	21.1	30.0	38.8	25.6	36.9	48.0	29.3	43.3	56.0
	kW	3.47	3.43	3.39	3.42	3.46	3.51	3.52	3.48	3.44
95	TC	56.7	51.2	46.4	60.1	54.5	49.6	62.2	56.5	52.1
	SHC	16.9	26.1	35.2	21.0	32.7	44.2	25.0	39.1	52.1
	kW	3.89	3.85	3.80	3.83	3.88	3.93	3.95	3.90	3.86
105	TC	51.8	46.6	42.0	54.3	49.0	44.4	56.9	51.1	46.9
	SHC	12.3	21.7	31.1	15.5	27.5	39.3	20.0	34.0	46.9
	kW	4.36	4.31	4.26	4.29	4.33	4.38	4.42	4.36	4.32
115	TC	46.5	41.9	37.8	49.1	44.3	40.2	50.8	46.2	42.5
	SHC	7.3	17.3	27.2	10.7	23.2	35.4	14.4	29.4	42.5
	kW	4.88	4.83	4.78	4.81	4.86	4.91	4.93	4.88	4.84
125	TC	40.8	36.7	33.1	43.1	38.9	35.1	44.9	40.5	37.3
	SHC	2.0	12.5	22.8	5.2	18.2	30.5	8.9	24.2	37.3
	kW	5.44	5.39	5.35	5.37	5.42	5.47	5.49	5.44	5.40

48/50FC*B06 — UNIT WITH HUMIDI-MIZER SYSTEM IN HOT GAS REHEAT MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator — Cfm								
		1500	2000	2500	1500	2000	2500	1500	2000	2500
80	TC	13.19	12.95	12.70	14.56	14.30	14.00	15.70	15.44	15.05
	SHC	-2.38	-1.55	-0.65	-4.75	-4.25	-3.69	-6.74	-6.49	-6.21
	kW	3.15	3.16	3.16	3.19	3.20	3.20	3.22	3.23	3.23
75	TC	16.14	15.95	15.71	17.36	17.20	16.84	18.30	18.20	17.81
	SHC	0.44	1.23	2.03	-1.92	-1.36	-0.96	-3.90	-3.50	-3.31
	kW	3.04	3.05	3.06	3.07	3.08	3.09	3.10	3.12	3.12
70	TC	18.90	18.68	18.52	19.97	19.85	19.50	20.86	20.62	20.17
	SHC	3.13	3.80	4.51	0.85	1.39	1.70	-0.97	-0.69	-0.63
	kW	2.92	2.93	2.95	2.96	2.97	2.98	2.98	2.99	3.00
60	TC	23.71	23.48	23.16	24.05	23.98	23.52	24.79	24.47	26.99
	SHC	8.11	8.63	8.88	5.97	6.46	6.58	4.65	4.87	5.94
	kW	3.17	3.23	3.15	3.21	3.26	3.18	3.23	3.12	3.10
50	TC	21.91	16.69	16.62	16.81	16.98	16.92	17.08	17.24	17.17
	SHC	11.51	10.04	9.64	9.77	9.43	8.95	9.30	8.88	8.35
	kW	3.01	3.07	3.11	3.04	3.10	3.15	3.07	3.14	3.18
40	TC	21.91	16.69	16.62	16.81	16.98	16.92	17.08	17.24	17.17
	SHC	11.51	10.04	9.64	9.77	9.43	8.95	9.30	8.88	8.35
	kW	3.39	3.32	3.24	3.14	3.23	3.15	3.18	3.27	3.08

LEGEND

Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Power Input
SCFM/BF — Standard Cubic Feet per Minute/Bypass Factor
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

48/50FC**07 HIGH STAGE COOLING CAPACITIES

48/50FC**07				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
1800 Cfm	EAT (wb)	58	TC	63.8	63.8	72.2	61.1	61.1	69.1	58.1	58.1	65.8	54.9	54.9	62.3
			SHC	55.5	63.8	72.2	53.0	61.1	69.1	50.4	58.1	65.8	47.6	54.9	62.3
		62	TC	67.2	67.2	68.3	63.7	63.7	66.4	60.0	60.0	64.4	56.2	56.2	62.3
			SHC	49.9	59.1	68.3	48.1	57.3	66.4	46.1	55.3	64.4	44.1	53.2	62.3
		67	TC	73.2	73.2	73.2	69.5	69.5	69.5	65.5	65.5	65.5	61.4	61.4	61.4
			SHC	40.8	50.0	59.2	39.0	48.2	57.4	37.1	46.3	55.6	35.2	44.4	53.6
		72	TC	79.7	79.7	79.7	75.7	75.7	75.7	71.5	71.5	71.5	67.1	67.1	67.1
			SHC	31.4	40.7	50.0	29.7	39.0	48.3	27.9	37.2	46.4	26.1	35.3	44.5
		76	TC	—	85.3	85.3	—	81.0	81.0	—	76.6	76.6	—	72.0	72.0
			SHC	—	33.3	43.1	—	31.6	41.3	—	29.8	39.5	—	28	37.6
2100 Cfm	EAT (wb)	58	TC	67.1	67.1	75.9	64.1	64.1	72.5	60.9	60.9	69.0	57.6	57.6	65.2
			SHC	58.3	67.1	75.9	55.7	64.1	72.5	52.8	60.9	69.0	49.9	57.6	65.2
		62	TC	69.0	69.0	74.7	65.4	65.4	72.6	61.6	61.6	70.4	57.7	57.7	68
			SHC	53.6	64.1	74.7	51.7	62.2	72.6	49.6	60.0	70.4	47.4	57.7	68
		67	TC	75.0	75.0	75.0	71.2	71.2	71.2	67.0	67.0	67.0	62.7	62.7	62.7
			SHC	43.2	53.8	64.4	41.4	52.0	62.6	39.5	50.1	60.7	37.6	48.2	58.7
		72	TC	81.6	81.6	81.6	77.5	77.5	77.5	73.1	73.1	73.1	68.5	68.5	68.5
			SHC	32.5	43.2	53.8	30.7	41.4	52.0	28.9	39.5	50.1	27.1	37.6	48.2
		76	TC	—	87.2	87.2	—	82.8	82.8	—	78.2	78.2	—	73.5	73.5
			SHC	—	34.6	45.7	—	32.9	43.9	—	31.1	42.0	—	29.2	40.1
2400 Cfm	EAT (wb)	58	TC	69.7	69.7	78.8	66.6	66.6	75.3	63.2	63.2	71.6	59.7	59.7	67.6
			SHC	60.6	69.7	78.8	57.8	66.6	75.3	54.9	63.2	71.6	51.7	59.7	67.6
		62	TC	70.5	70.5	80.4	66.9	66.9	78.0	63.3	63.3	74.4	59.7	59.7	70.3
			SHC	57.0	68.7	80.4	54.9	66.5	78.0	52.1	63.3	74.4	49.1	59.7	70.3
		67	TC	76.4	76.4	76.4	72.4	72.4	72.4	68.2	68.2	68.2	63.8	63.8	63.8
			SHC	45.5	57.5	69.4	43.7	55.6	67.5	41.8	53.7	65.6	39.8	51.7	63.6
		72	TC	83.1	83.1	83.1	78.8	78.8	78.8	74.2	74.2	74.2	69.6	69.6	69.6
			SHC	33.5	45.5	57.4	31.7	43.6	55.6	29.8	41.8	53.7	28.0	39.9	51.7
		76	TC	—	88.8	88.8	—	84.2	84.2	—	79.5	79.5	—	74.6	74.6
			SHC	—	35.9	48.2	—	34.1	46.4	—	32.3	44.5	—	30.4	42.5
2700 Cfm	EAT (wb)	58	TC	71.9	71.9	81.3	68.7	68.7	77.7	65.1	65.1	73.7	61.5	61.5	69.7
			SHC	62.5	71.9	81.3	59.6	68.7	77.7	56.5	65.1	73.7	53.3	61.5	69.7
		62	TC	72.0	72.0	84.5	68.7	68.7	80.7	65.2	65.2	76.6	61.5	61.5	72.4
			SHC	59.5	72.0	84.5	56.7	68.7	80.7	53.7	65.2	76.6	50.6	61.5	72.4
		67	TC	77.5	77.5	77.5	73.4	73.4	73.4	69.0	69.0	70.3	64.5	64.5	68.3
			SHC	47.7	61.0	74.2	45.9	59.1	72.3	43.9	57.1	70.3	41.9	55.1	68.3
		72	TC	84.2	84.2	84.2	79.8	79.8	79.8	75.2	75.2	75.2	70.4	70.4	70.4
			SHC	34.4	47.6	60.9	32.6	45.8	59.0	30.7	43.9	57.1	28.8	42.0	55.1
		76	TC	—	90.0	90.0	—	85.3	85.3	—	80.5	80.5	—	75.5	75.5
			SHC	—	37.0	50.6	—	35.2	48.7	—	33.4	46.8	—	31.5	44.8
3000 Cfm	EAT (wb)	58	TC	73.8	73.8	83.4	70.4	70.4	79.6	66.8	66.8	75.6	63.0	63.0	71.3
			SHC	64.2	73.8	83.4	61.2	70.4	79.6	58.0	66.8	75.6	54.6	63.0	71.3
		62	TC	73.8	73.8	86.6	70.4	70.4	82.7	66.8	66.8	78.5	63.0	63.0	74.1
			SHC	61.0	73.8	86.6	58.2	70.4	82.7	55.1	66.8	78.5	51.9	63.0	74.1
		67	TC	78.4	78.4	78.9	74.2	74.2	76.9	69.7	69.7	74.8	65.2	65.2	72.6
			SHC	49.8	64.3	78.9	47.9	62.4	76.9	46.0	60.4	74.8	43.9	58.3	72.6
		72	TC	85.1	85.1	85.1	80.6	80.6	80.6	75.9	75.9	75.9	71.1	71.1	71.1
			SHC	35.2	49.7	64.3	33.4	47.9	62.4	31.5	46.0	60.4	29.7	44.0	58.4
		76	TC	—	91.0	91.0	—	86.2	86.2	—	81.3	81.3	—	76.3	76.3
			SHC	—	38.1	52.9	—	36.3	51.0	—	34.5	49.0	—	32.5	47.0

LEGEND

— — Do Not Operate
Cfm — Cubic Feet Per Minute (Supply Air)
EAT (db) — Entering Air Temperature (dry bulb)
EAT (wb) — Entering Air Temperature (wet bulb)
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTE: See minimum-maximum airflow ratings on page 8.

48/50FC**07 LOW STAGE COOLING CAPACITIES

48/50FC**07				AMBIENT TEMPERATURE (F)											
				85			95			105			115		
				EAT (db)			EAT (db)			EAT (db)			EAT (db)		
				75	80	85	75	80	85	75	80	85	75	80	85
1200 Cfm	EAT (wb)	58	TC	44.2	44.2	50.4	41.6	41.6	47.5	38.8	38.8	44.4	35.7	35.7	41.0
			SHC	38.0	44.2	50.4	35.7	41.6	47.5	33.1	38.8	44.4	30.3	35.7	41.0
		62	TC	47.6	47.6	47.6	44.3	44.3	45.1	40.8	40.8	43.0	37.0	37.0	40.7
			SHC	34.0	40.5	47.0	32.0	38.5	45.1	29.9	36.5	43.0	27.7	34.2	40.7
		67	TC	53.1	53.1	53.1	49.7	49.7	49.7	45.9	45.9	45.9	41.9	41.9	41.9
			SHC	28.1	34.7	41.2	26.2	32.7	39.2	24.1	30.6	37.2	21.9	28.5	35.0
		72	TC	59.0	59.0	59.0	55.4	55.4	55.4	51.5	51.5	51.5	47.2	47.2	47.2
			SHC	22.1	28.6	35.2	20.2	26.7	33.3	18.1	24.7	31.2	16.0	22.6	29.1
		76	TC	—	64.2	64.2	—	60.4	60.4	—	56.3	56.3	—	51.8	51.8
			SHC	—	23.7	30.3	—	21.8	28.4	—	19.8	26.4	—	17.8	24.4
1400 Cfm	EAT (wb)	58	TC	47.4	47.4	53.9	44.6	44.6	50.9	41.6	41.6	47.6	38.3	38.3	43.9
			SHC	40.8	47.4	53.9	38.3	44.6	50.9	35.6	41.6	47.6	32.6	38.3	43.9
		62	TC	49.5	49.5	52.3	46.1	46.1	50.3	42.4	42.4	48.1	38.5	38.5	45.7
			SHC	37.2	44.8	52.3	35.2	42.7	50.3	33.0	40.6	48.1	30.7	38.2	45.7
		67	TC	55.0	55.0	55.0	51.5	51.5	51.5	47.5	47.5	47.5	43.3	43.3	43.3
			SHC	30.2	37.8	45.4	28.3	35.8	43.4	26.1	33.7	41.3	23.9	31.5	39.1
		72	TC	61.1	61.1	61.1	57.3	57.3	57.3	53.1	53.1	53.1	48.7	48.7	48.7
			SHC	23.1	30.8	38.4	21.2	28.8	36.4	19.1	26.7	34.3	16.9	24.6	32.2
		76	TC	—	66.4	66.4	—	62.4	62.4	—	58.1	58.1	—	53.4	53.4
			SHC	—	25.0	32.7	—	23.1	30.8	—	21.1	28.8	—	18.9	26.6
1600 Cfm	EAT (wb)	58	TC	50.0	50.0	56.8	47.1	47.1	53.6	43.9	43.9	50.1	40.4	40.4	46.3
			SHC	43.1	50.0	56.8	40.5	47.1	53.6	37.6	43.9	50.1	34.5	40.4	46.3
		62	TC	51.0	51.0	57.3	47.5	47.5	55.2	43.9	43.9	52.3	40.5	40.5	48.4
			SHC	40.2	48.8	57.3	38.1	46.6	55.2	35.6	43.9	52.3	32.6	40.5	48.4
		67	TC	56.5	56.5	56.5	52.8	52.8	52.8	48.7	48.7	48.7	44.3	44.3	44.3
			SHC	32.2	40.9	49.5	30.2	38.8	47.5	28.1	36.7	45.3	25.8	34.5	43.1
		72	TC	62.6	62.6	62.6	58.7	58.7	58.7	54.4	54.4	54.4	49.8	49.8	49.8
			SHC	24.1	32.7	41.4	22.1	30.7	39.4	20.0	28.6	37.3	17.8	26.5	35.1
		76	TC	—	68.0	68.0	—	63.9	63.9	—	59.5	59.5	—	54.7	54.7
			SHC	—	26.2	35	—	24.2	33.0	—	22.2	30.9	—	20.0	28.8
1800 Cfm	EAT (wb)	58	TC	52.2	52.2	59.3	49.2	49.2	56.0	45.8	45.8	52.3	42.2	42.2	48.4
			SHC	45.1	52.2	59.3	42.4	49.2	56.0	39.3	45.8	52.3	36.1	42.2	48.4
		62	TC	52.3	52.3	61.8	49.2	49.2	58.3	45.9	45.9	54.5	42.3	42.3	50.4
			SHC	42.8	52.3	61.8	40.2	49.2	58.3	37.2	45.9	54.5	34.1	42.3	50.4
		67	TC	57.6	57.6	57.6	53.8	53.8	53.8	49.6	49.6	49.6	45.2	45.2	47.0
			SHC	34.1	43.8	53.5	32.1	41.8	51.4	29.9	39.6	49.3	27.6	37.3	47.0
		72	TC	63.8	63.8	63.8	59.8	59.8	59.8	55.4	55.4	55.4	50.7	50.7	50.7
			SHC	24.9	34.6	44.4	22.9	32.6	42.3	20.8	30.5	40.2	18.6	28.3	38.0
		76	TC	—	69.4	69.4	—	65.2	65.2	—	60.6	60.6	—	—	—
			SHC	—	27.3	37.1	—	25.3	35.1	—	23.2	33.0	—	—	—
2000 Cfm	EAT (wb)	58	TC	54.1	54.1	61.5	51.0	51.0	58.0	47.5	47.5	54.2	43.8	43.8	50.1
			SHC	46.8	54.1	61.5	43.9	51.0	58.0	40.8	47.5	54.2	37.4	43.8	50.1
		62	TC	54.2	54.2	64.0	51.0	51.0	60.4	47.6	47.6	56.5	43.8	43.8	52.2
			SHC	44.4	54.2	64.0	41.7	51.0	60.4	38.6	47.6	56.5	35.4	43.8	52.2
		67	TC	58.6	58.6	58.6	54.7	54.7	55.3	50.4	50.4	53.0	45.9	45.9	50.7
			SHC	35.9	46.6	57.3	33.8	44.6	55.3	31.7	42.3	53.0	29.4	40.0	50.7
		72	TC	64.8	64.8	64.8	60.7	60.7	60.7	56.1	56.1	56.1	51.4	51.4	51.4
			SHC	25.7	36.5	47.2	23.7	34.4	45.2	21.5	32.3	43.0	19.3	30.0	40.8
		76	TC	—	70.5	70.5	—	66.2	66.2	—	—	—	—	—	—
			SHC	—	28.3	39.2	—	26.3	37.1	—	—	—	—	—	—

LEGEND

— — Do Not Operate
Cfm — Cubic Feet Per Minute (Supply Air)
EAT (db) — Entering Air Temperature (dry bulb)
EAT (wb) — Entering Air Temperature (wet bulb)
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTE: See minimum-maximum airflow ratings on page 8.

Carrier
United Technologies

48/50FC*N07 — UNIT WITH HUMIDI-MIZER® SYSTEM IN SUBCOOLING MODE — COOLING CAPACITIES

TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — SCFM/BF								
		1800 / 0.06			2400 / 0.08			3000 / 0.10		
		Air Entering Evaporator — Ewb (F)								
		72	67	62	72	67	62	72	67	62
75	TC	73.7	66.6	60.2	78.4	71.0	64.4	81.3	73.7	67.4
	SHC	32.8	40.5	48.3	37.8	47.8	57.7	42.1	54.3	65.7
	kW	4.05	4.01	3.97	4.00	4.04	4.08	4.09	4.05	4.02
85	TC	69.5	62.8	56.8	73.8	67.0	60.7	76.8	69.6	63.6
	SHC	28.8	36.9	45.0	33.4	43.9	54.2	37.7	50.4	62.0
	kW	4.46	4.43	4.39	4.42	4.45	4.48	4.51	4.47	4.43
95	TC	65.1	58.8	53.0	69.3	62.7	56.8	71.9	65.1	59.5
	SHC	24.7	33.1	41.5	29.1	39.9	50.5	33.2	46.1	58.1
	kW	4.92	4.89	4.86	4.88	4.91	4.95	4.96	4.92	4.90
105	TC	60.4	54.4	49.0	64.2	58.0	52.5	66.7	60.3	55.0
	SHC	20.3	29.1	37.9	24.4	35.6	46.6	28.3	41.8	53.9
	kW	5.43	5.40	5.37	5.39	5.42	5.45	5.47	5.43	5.41
115	TC	55.3	49.7	44.7	58.8	53.1	47.9	61.0	55.1	50.1
	SHC	15.7	24.9	34.0	19.5	31.2	42.5	23.2	37.1	50.0
	kW	5.99	5.96	5.93	5.95	5.98	6.01	6.02	5.99	5.97
125	TC	49.8	44.7	40.1	53.0	47.6	43.0	55.0	49.5	45.0
	SHC	10.7	20.5	30.0	14.3	26.4	38.1	17.8	32.1	45.0
	kW	6.59	6.57	6.55	6.56	6.59	6.61	6.62	6.60	6.58

48/50FC*N07 — UNIT WITH HUMIDI-MIZER SYSTEM IN HOT GAS REHEAT MODE — COOLING CAPACITIES

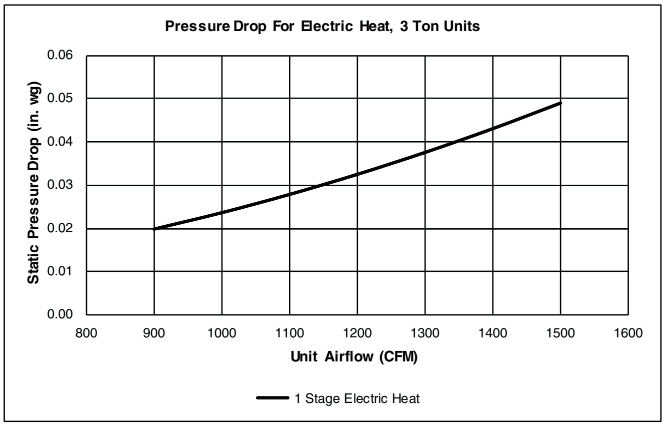
TEMP (F) AIR ENTERING CONDENSER (Edb)		AIR ENTERING EVAPORATOR — Ewb (F)								
		75 Dry Bulb 62.5 Wet Bulb (50% Relative)			75 Dry Bulb 64 Wet Bulb (56% Relative)			75 Dry Bulb 65.3 Wet Bulb (60% Relative)		
		Air Entering Evaporator — Cfm								
		1800	2400	3000	1800	2400	3000	1800	2400	3000
80	TC	14.02	15.01	15.61	14.70	15.71	16.33	15.30	16.34	16.97
	SHC	-0.84	1.73	4.56	-2.95	-0.90	1.45	-4.78	-3.17	-1.24
	kW	4.15	4.16	4.17	4.17	4.18	4.18	4.18	4.19	4.20
75	TC	15.10	16.17	16.79	15.82	16.89	17.52	16.45	17.54	18.19
	SHC	0.25	2.88	5.72	-1.81	0.29	2.64	-3.59	-1.95	-0.02
	kW	3.96	3.97	3.98	3.98	3.99	4.00	4.00	4.01	4.01
70	TC	15.37	16.68	17.44	16.19	17.39	18.18	17.08	18.37	19.28
	SHC	0.50	3.39	6.36	-1.44	0.78	3.30	-2.94	-1.07	1.12
	kW	3.97	3.93	3.91	3.96	3.95	3.93	3.92	3.89	3.87
60	TC	16.00	16.95	17.50	16.64	17.59	18.16	18.27	18.17	19.09
	SHC	1.11	3.63	6.39	-1.04	0.94	3.23	-1.92	-1.39	0.84
	kW	3.95	3.99	4.01	3.99	4.02	4.04	4.09	4.05	4.01
50	TC	16.10	16.93	17.42	16.68	17.50	18.57	17.19	18.60	19.12
	SHC	1.18	3.58	6.29	-1.05	0.83	3.63	-2.98	-0.98	0.84
	kW	4.03	4.08	4.11	4.07	4.12	4.05	4.12	4.06	4.09
40	TC	16.83	17.62	18.25	17.38	18.17	18.61	17.86	19.42	19.92
	SHC	1.89	4.25	5.84	-0.36	1.47	3.65	-2.32	-0.17	1.62
	kW	3.96	4.02	4.08	4.01	4.08	4.11	4.06	4.00	4.03

LEGEND

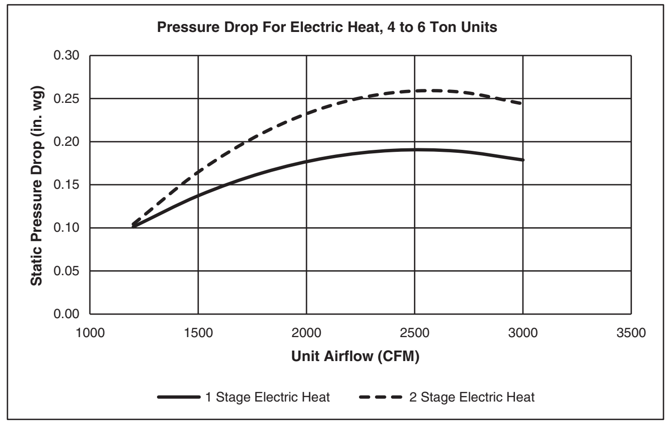
Ewb — Entering wet bulb
kW — compressor Power Input
SCFM/BF — Standard Cubic Feet per Minute/Bypass Factor
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

PRESSURE DROPS FOR ELECTRIC AND GAS HEATING UNITS

PRESSURE DROP FOR ELECTRIC HEAT 3 TO 5 TON UNITS - 1 STAGE HEAT



PRESSURE DROP FOR ELECTRIC HEAT 4 TO 6 TON UNITS - 1 AND 2 STAGE HEAT



SINGLE PHASE GAS HEAT STAGES

UNIT SIZE	HEAT SIZE		
1 Phase	Low	Med	High
04	1	1	—
05	1	1	1
06	1	1	1

THREE PHASE GAS HEAT STAGES

UNIT SIZE	HEAT SIZE		
3 Phase	Low	Med	High
04	1	2	—
05	1	1	2
06	1	1	2
07	1	1	2

GAS HEAT STATIC PRESSURE DEDUCTIONS – 3 TON UNITS

CFM	900	1000	1100	1200	1300	1400	1500
Low Gas Heat Deduction	0.01	0.01	0.02	0.03	0.03	0.04	0.04

GAS HEAT STATIC PRESSURE DEDUCTIONS – 4 TO 6 TON UNITS

CFM	1200	1500	1800	2100	2400	2700	3000
Medium Gas Heat Deduction	0.01	0.05	0.08	0.12	0.15	0.18	0.20
Low Gas Heat Deduction	0.03	0.10	0.17	0.23	0.29	0.36	0.42

FIELD-INSTALLED ACCESSORY ELECTRIC HEATER DATA

50FC UNIT SIZE	VOLTAGE	HEATER MODEL NUMBER*	NUMBER OF STAGES
04	208/230	CRHEATER323A00	1
		CRHEATER324A00	1
		CRHEATER325A00	1
		CRHEATER326A00	1
		CRHEATER327A00	2
		CRHEATER328A00	1
	460	CRHEATER333A00	1
		CRHEATER334A00	1
		CRHEATER335A00	1
		CRHEATER336A00	1
	575	CRHEATER339A00	1
		CRHEATER340A00	1
05	208/230	CRHEATER323A00	1
		CRHEATER324A00	1
		CRHEATER325A00	1
		CRHEATER326A00	1
		CRHEATER327A00	2
		CRHEATER328A00	1
		CRHEATER329A00	2
		CRHEATER330A00†	2
		CRHEATER331A00**	2
	460	CRHEATER333A00	1
		CRHEATER335A00	1
		CRHEATER336A00	1
		CRHEATER337A00	2
	575	CRHEATER339A00	1
		CRHEATER340A00	1
06, 07	208/230	CRHEATER324A00	1
		CRHEATER325A00	1
		CRHEATER326A00	1
		CRHEATER327A00	2
		CRHEATER328A00	1
		CRHEATER329A00	2
		CRHEATER331A00	2
		CRHEATER332A00	2
	460	CRHEATER333A00	1
		CRHEATER335A00	1
		CRHEATER336A00	1
		CRHEATER337A00	2
		CRHEATER338A00	2
	575	CRHEATER340A00	1
		CRHEATER341A00	2

*Check heater nameplate for model number.
†Do not use with size 05 horizontal supply duct configuration units.
**Do not use with size 05 vertical supply duct configuration units.

USE OF CRHEATER330A00 FOR 50FC UNITS (WITH OR WITHOUT NON-FUSED DISCONNECT)

DUCT CONFIGURATION	50FC UNIT SIZE			
	04	05	06	07
Vertical Supply	Not available	Available	Not available	Not available
Horizontal Supply	Not available	Not available	Not available	Not available

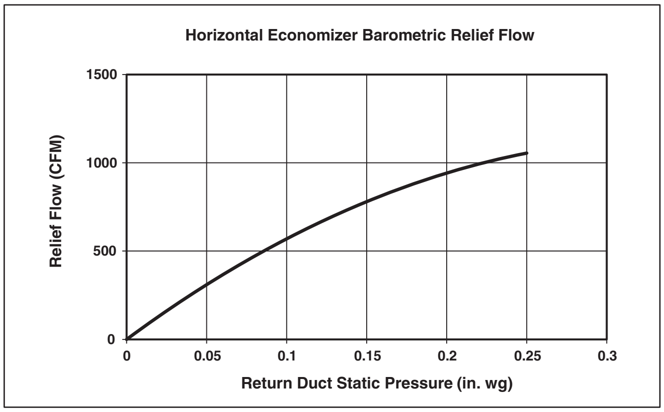
USE OF CRHEATER331A00 FOR 50FC UNITS (WITH OR WITHOUT NON-FUSED DISCONNECT)

DUCT CONFIGURATION	50FC UNIT SIZE			
	04	05	06	07
Vertical Supply	Not available	Not available	Available	Available
Horizontal Supply	Not available	Available	Available	Available

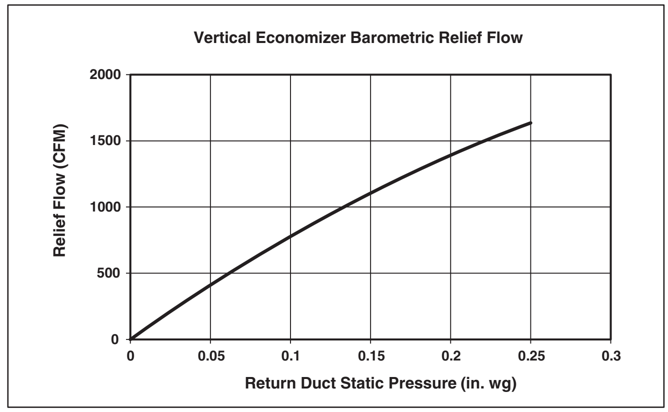
Performance data (cont)

ECONOMIZER BAROMETRIC RELIEF AND STATIC PRESSURE

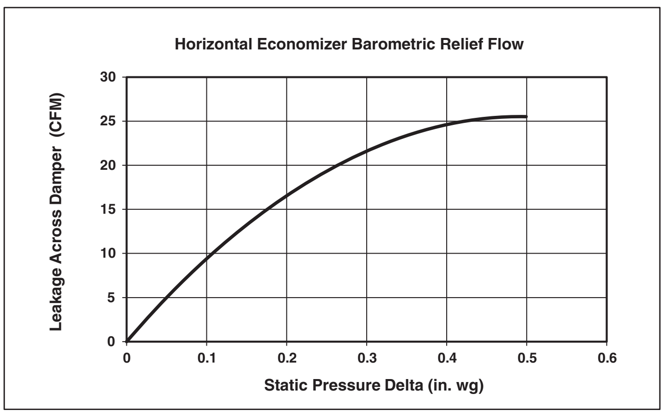
HORIZONTAL ECONOMIZER BAROMETRIC RELIEF



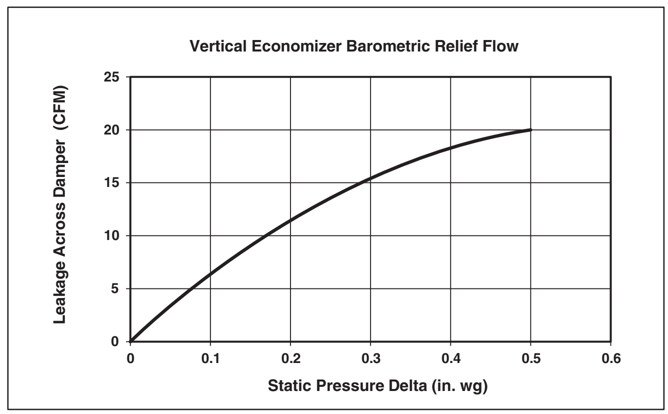
VERTICAL ECONOMIZER BAROMETRIC RELIEF



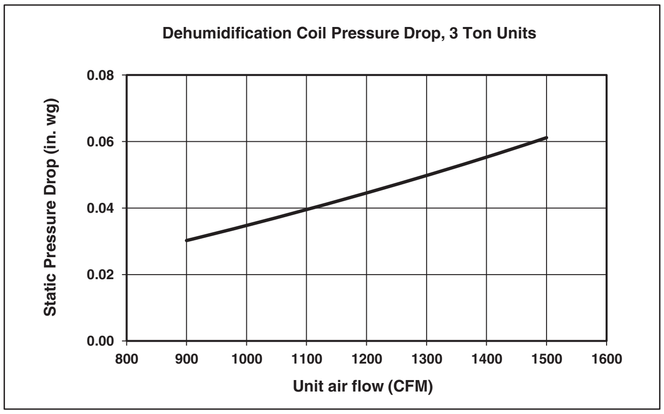
HORIZONTAL ECONOMIZER DAMPER LEAKAGE

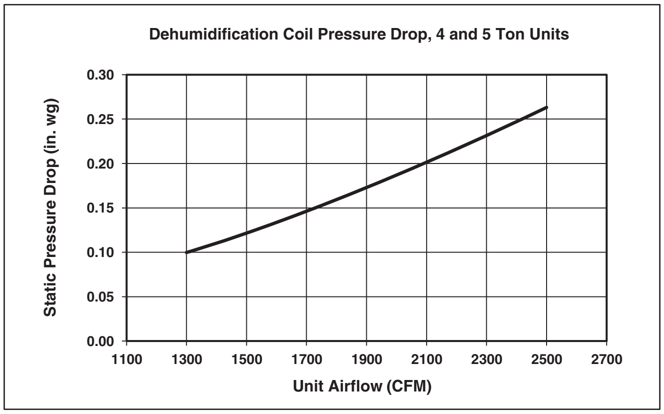


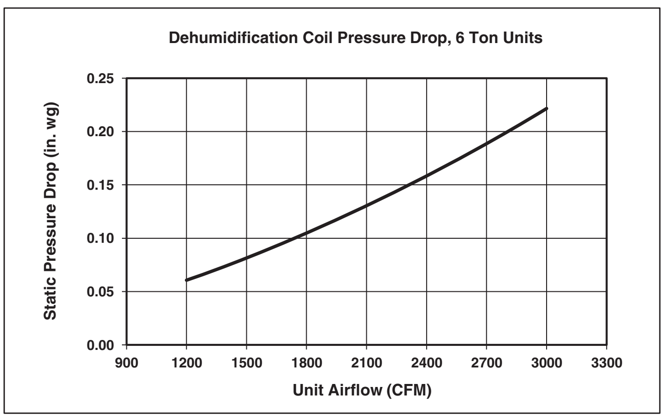
VERTICAL ECONOMIZER DAMPER LEAKAGE



HUMIDI-MIZER® COIL PRESSURE DROPS







MERV-8 filters pressure drop

NOTE: For factory-installed MERV-8 filters, no additional pressure drop adjustments are necessary. The standard fan tables accommodate usage.

GENERAL FAN PERFORMANCE NOTES

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, wet coils, and highest gas heat exchanger (when gas heat unit).
4. Factory options and accessories may effect static pressure losses. Gas heat unit fan tables assume highest gas heat models; for fan selections with low or medium heat models, the user must deduct low and medium heat static pressures. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
5. The fan performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommends the lower horsepower option.
6. For information on the electrical properties of Carrier motors, please see the Electrical information section of this book.
7. For more information on the performance limits of Carrier motors, see the application data section of this book.
8. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements.

48FCEA04 SINGLE PHASE — 3 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1112	0.10	1341	0.17	1530	0.25	1696	0.34	1845	0.44
975	1162	0.11	1385	0.19	1571	0.27	1733	0.36	1881	0.46
1050	1213	0.12	1431	0.20	1613	0.29	1772	0.39	1917	0.49
1125	1265	0.14	1477	0.22	1656	0.32	1813	0.41	1956	0.52
1200	1319	0.16	1525	0.25	1700	0.34	1855	0.44	1996	0.55
1275	1374	0.18	1573	0.27	1746	0.37	1898	0.48	2037	0.59
1350	1430	0.20	1623	0.30	1792	0.40	1942	0.51	2079	0.63
1425	1487	0.23	1674	0.33	1839	0.43	1987	0.55	2122	0.67
1500	1545	0.26	1725	0.36	1887	0.47	2032	0.58	2165	0.71

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1983	0.54	2111	0.66	2231	0.77	2344	0.90	2452	1.03
975	2016	0.57	2143	0.69	2262	0.81	2375	0.93	2482	1.06
1050	2051	0.60	2177	0.72	2294	0.84	2406	0.97	–	–
1125	2088	0.63	2211	0.75	2328	0.88	2438	1.01	–	–
1200	2126	0.67	2248	0.79	2363	0.92	2472	1.05	–	–
1275	2165	0.71	2285	0.83	2399	0.96	–	–	–	–
1350	2205	0.75	2324	0.87	2437	1.01	–	–	–	–
1425	2247	0.79	2364	0.92	2475	1.06	–	–	–	–
1500	2289	0.84	2405	0.97	–	–	–	–	–	–

Standard Static 1112-1890 RPM, 0.44 Max BHP

Medium Static 1112-2190 RPM, 0.71 Max BHP

High Static 1112-2490 RPM, 1.07 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE – STANDARD STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	5.9	1341	7.1	1530	8.1	1696	9.0	1845	9.8
975	1162	6.1	1385	7.3	1571	8.3	1733	9.2	—	—
1050	1213	6.4	1431	7.6	1613	8.5	1772	9.4	—	—
1125	1265	6.7	1477	7.8	1656	8.8	1813	9.6	—	—
1200	1319	7.0	1525	8.1	1700	9.0	1855	9.8	—	—
1275	1374	7.3	1573	8.3	1746	9.2	—	—	—	—
1350	1430	7.6	1623	8.6	1792	9.5	—	—	—	—
1425	1487	7.9	1674	8.9	1839	9.7	—	—	—	—
1500	1545	8.2	1725	9.1	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1112-1890 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE – MEDIUM STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	5.1	1341	6.1	1530	7.0	1696	7.7	1845	8.4
975	1162	5.3	1385	6.3	1571	7.2	1733	7.9	1881	8.6
1050	1213	5.5	1431	6.5	1613	7.4	1772	8.1	1917	8.8
1125	1265	5.8	1477	6.7	1656	7.6	1813	8.3	1956	8.9
1200	1319	6.0	1525	7.0	1700	7.8	1855	8.5	1996	9.1
1275	1374	6.3	1573	7.2	1746	8.0	1898	8.7	2037	9.3
1350	1430	6.5	1623	7.4	1792	8.2	1942	8.9	2079	9.5
1425	1487	6.8	1674	7.6	1839	8.4	1987	9.1	2122	9.7
1500	1545	7.1	1725	7.9	1887	8.6	2032	9.3	2165	9.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1983	9.1	2111	9.6	—	—	—	—	—	—
975	2016	9.2	2143	9.8	—	—	—	—	—	—
1050	2051	9.4	—	—	—	—	—	—	—	—
1125	2088	9.5	—	—	—	—	—	—	—	—
1200	2126	9.7	—	—	—	—	—	—	—	—
1275	2165	9.9	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1112-2190 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE – HIGH STATIC — 3 TON VERTICAL SUPPLY (PRM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	4.5	1341	5.4	1530	6.1	1696	6.8	1845	7.4
975	1162	4.7	1385	5.6	1571	6.3	1733	7.0	1881	7.6
1050	1213	4.9	1431	5.7	1613	6.5	1772	7.1	1917	7.7
1125	1265	5.1	1477	5.9	1656	6.7	1813	7.3	1956	7.9
1200	1319	5.3	1525	6.1	1700	6.8	1855	7.4	1996	8.0
1275	1374	5.5	1573	6.3	1746	7.0	1898	7.6	2037	8.2
1350	1430	5.7	1623	6.5	1792	7.2	1942	7.8	2079	8.3
1425	1487	6.0	1674	6.7	1839	7.4	1987	8.0	2122	8.5
1500	1545	6.2	1725	6.9	1887	7.6	2032	8.2	2165	8.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1983	8.0	2111	8.5	2231	9.0	2344	9.4	2452	9.8
975	2016	8.1	2143	8.6	2262	9.1	2375	9.5	2482	10.0
1050	2051	8.2	2177	8.7	2294	9.2	2406	9.7	—	—
1125	2088	8.4	2211	8.9	2328	9.3	2438	9.8	—	—
1200	2126	8.5	2248	9.0	2363	9.5	2472	9.9	—	—
1275	2165	8.7	2285	9.2	2399	9.6	—	—	—	—
1350	2205	8.9	2324	9.3	2437	9.8	—	—	—	—
1425	2247	9.0	2364	9.5	2475	9.9	—	—	—	—
1500	2289	9.2	2405	9.7	—	—	—	—	—	—

High Static 1112-2490 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE — 3 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1112	0.10	1341	0.17	1530	0.25	1696	0.34	1845	0.44
975	1162	0.11	1385	0.19	1571	0.27	1733	0.36	1881	0.46
1050	1213	0.12	1431	0.20	1613	0.29	1772	0.39	1917	0.49
1125	1265	0.14	1477	0.22	1656	0.32	1813	0.41	1956	0.52
1200	1319	0.16	1525	0.25	1700	0.34	1855	0.44	1996	0.55
1275	1374	0.18	1573	0.27	1746	0.37	1898	0.48	2037	0.59
1350	1430	0.20	1623	0.30	1792	0.40	1942	0.51	2079	0.63
1425	1487	0.23	1674	0.33	1839	0.43	1987	0.55	2122	0.67
1500	1545	0.26	1725	0.36	1887	0.47	2032	0.58	2165	0.71

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1983	0.54	2111	0.66	2231	0.77	2344	0.90	2452	1.03
975	2016	0.57	2143	0.69	2262	0.81	2375	0.93	2482	1.06
1050	2051	0.60	2177	0.72	2294	0.84	2406	0.97	—	—
1125	2088	0.63	2211	0.75	2328	0.88	2438	1.01	—	—
1200	2126	0.67	2248	0.79	2363	0.92	2472	1.05	—	—
1275	2165	0.71	2285	0.83	2399	0.96	—	—	—	—
1350	2205	0.75	2324	0.87	2437	1.01	—	—	—	—
1425	2247	0.79	2364	0.92	2475	1.06	—	—	—	—
1500	2289	0.84	2405	0.97	—	—	—	—	—	—

Standard Static 1112-1890 RPM, 0.44 Max BHP

Medium Static 1112-2190 RPM, 0.71 Max BHP

High Static 1112-2490 RPM, 1.07 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE – STANDARD STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	5.9	1341	7.1	1530	8.1	1696	9.0	1845	9.8
975	1162	6.1	1385	7.3	1571	8.3	1733	9.2	—	—
1050	1213	6.4	1431	7.6	1613	8.5	1772	9.4	—	—
1125	1265	6.7	1477	7.8	1656	8.8	1813	9.6	—	—
1200	1319	7.0	1525	8.1	1700	9.0	1855	9.8	—	—
1275	1374	7.3	1573	8.3	1746	9.2	—	—	—	—
1350	1430	7.6	1623	8.6	1792	9.5	—	—	—	—
1425	1487	7.9	1674	8.9	1839	9.7	—	—	—	—
1500	1545	8.2	1725	9.1	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1112-1890 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCEA04 THREE PHASE – MEDIUM STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	5.1	1341	6.1	1530	7.0	1696	7.7	1845	8.4
975	1162	5.3	1385	6.3	1571	7.2	1733	7.9	1881	8.6
1050	1213	5.5	1431	6.5	1613	7.4	1772	8.1	1917	8.8
1125	1265	5.8	1477	6.7	1656	7.6	1813	8.3	1956	8.9
1200	1319	6.0	1525	7.0	1700	7.8	1855	8.5	1996	9.1
1275	1374	6.3	1573	7.2	1746	8.0	1898	8.7	2037	9.3
1350	1430	6.5	1623	7.4	1792	8.2	1942	8.9	2079	9.5
1425	1487	6.8	1674	7.6	1839	8.4	1987	9.1	2122	9.7
1500	1545	7.1	1725	7.9	1887	8.6	2032	9.3	2165	9.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1983	9.1	2111	9.6	—	—	—	—	—	—
975	2016	9.2	2143	9.8	—	—	—	—	—	—
1050	2051	9.4	—	—	—	—	—	—	—	—
1125	2088	9.5	—	—	—	—	—	—	—	—
1200	2126	9.7	—	—	—	—	—	—	—	—
1275	2165	9.9	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1112-2190 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE – HIGH STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1112	4.5	1341	5.4	1530	6.1	1696	6.8	1845	7.4
975	1162	4.7	1385	5.6	1571	6.3	1733	7.0	1881	7.6
1050	1213	4.9	1431	5.7	1613	6.5	1772	7.1	1917	7.7
1125	1265	5.1	1477	5.9	1656	6.7	1813	7.3	1956	7.9
1200	1319	5.3	1525	6.1	1700	6.8	1855	7.4	1996	8.0
1275	1374	5.5	1573	6.3	1746	7.0	1898	7.6	2037	8.2
1350	1430	5.7	1623	6.5	1792	7.2	1942	7.8	2079	8.3
1425	1487	6.0	1674	6.7	1839	7.4	1987	8.0	2122	8.5
1500	1545	6.2	1725	6.9	1887	7.6	2032	8.2	2165	8.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1983	8.0	2111	8.5	2231	9.0	2344	9.4	2452	9.8
975	2016	8.1	2143	8.6	2262	9.1	2375	9.5	2482	10.0
1050	2051	8.2	2177	8.7	2294	9.2	2406	9.7	—	—
1125	2088	8.4	2211	8.9	2328	9.3	2438	9.8	—	—
1200	2126	8.5	2248	9.0	2363	9.5	2472	9.9	—	—
1275	2165	8.7	2285	9.2	2399	9.6	—	—	—	—
1350	2205	8.9	2324	9.3	2437	9.8	—	—	—	—
1425	2247	9.0	2364	9.5	2475	9.9	—	—	—	—
1500	2289	9.2	2405	9.7	—	—	—	—	—	—

High Static 1112-2490 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE — 4 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1262	0.21	1452	0.33	1614	0.45	1757	0.58	1888	0.72
1300	1333	0.25	1516	0.37	1674	0.50	1813	0.63	1942	0.78
1400	1405	0.29	1583	0.42	1735	0.55	1872	0.70	1997	0.84
1500	1478	0.34	1650	0.48	1798	0.62	1932	0.76	2054	0.92
1600	1552	0.40	1718	0.54	1863	0.68	1993	0.84	2114	1.00
1700	1627	0.46	1787	0.60	1928	0.76	2057	0.92	2174	1.09
1800	1704	0.52	1857	0.68	1995	0.84	2121	1.01	2236	1.18
1900	1781	0.60	1929	0.76	2063	0.93	2185	1.10	2299	1.28
2000	1859	0.68	2001	0.85	2132	1.02	2252	1.21	2363	1.39

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	2011	0.87	2126	1.02	2236	1.19	2341	1.37	2442	1.55
1300	2061	0.93	2174	1.09	2281	1.26	2384	1.44	—	—
1400	2114	1.00	2224	1.17	2329	1.34	2429	1.52	—	—
1500	2169	1.08	2277	1.25	2379	1.43	—	—	—	—
1600	2226	1.17	2331	1.34	2432	1.52	—	—	—	—
1700	2284	1.26	2388	1.44	—	—	—	—	—	—
1800	2344	1.36	2446	1.55	—	—	—	—	—	—
1900	2405	1.47	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1262-1900 RPM, 0.72 Max BHP

Medium Static 1262-2170 RPM, 1.06 Max BHP

High Static 1262-2460 RPM, 1.53 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE – STANDARD STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	6.6	1452	7.6	1614	8.5	1757	9.2	1888	9.9
1300	1333	7.0	1516	8.0	1674	8.8	1813	9.5	—	—
1400	1405	7.4	1583	8.3	1735	9.1	1872	9.9	—	—
1500	1478	7.8	1650	8.7	1798	9.5	—	—	—	—
1600	1552	8.2	1718	9.0	1863	9.8	—	—	—	—
1700	1627	8.6	1787	9.4	—	—	—	—	—	—
1800	1704	9.0	1857	9.8	—	—	—	—	—	—
1900	1781	9.4	—	—	—	—	—	—	—	—
2000	1859	9.8	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1262-1900 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFA05 SINGLE PHASE – MEDIUM STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	5.8	1452	6.7	1614	7.4	1757	8.1	1888	8.7
1300	1333	6.1	1516	7.0	1674	7.7	1813	8.4	1942	8.9
1400	1405	6.5	1583	7.3	1735	8.0	1872	8.6	1997	9.2
1500	1478	6.8	1650	7.6	1798	8.3	1932	8.9	2054	9.5
1600	1552	7.2	1718	7.9	1863	8.6	1993	9.2	2114	9.7
1700	1627	7.5	1787	8.2	1928	8.9	2057	9.5	—	—
1800	1704	7.9	1857	8.6	1995	9.2	2121	9.8	—	—
1900	1781	8.2	1929	8.9	2063	9.5	—	—	—	—
2000	1859	8.6	2001	9.2	2132	9.8	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	2011	9.3	2126	9.8	—	—	—	—	—	—
1300	2061	9.5	—	—	—	—	—	—	—	—
1400	2114	9.7	—	—	—	—	—	—	—	—
1500	2169	10.0	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1262-2170 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE – HIGH STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	5.1	1452	5.9	1614	6.6	1757	7.1	1888	7.7
1300	1333	5.4	1516	6.2	1674	6.8	1813	7.4	1942	7.9
1400	1405	5.7	1583	6.4	1735	7.1	1872	7.6	1997	8.1
1500	1478	6.0	1650	6.7	1798	7.3	1932	7.9	2054	8.3
1600	1552	6.3	1718	7.0	1863	7.6	1993	8.1	2114	8.6
1700	1627	6.6	1787	7.3	1928	7.8	2057	8.4	2174	8.8
1800	1704	6.9	1857	7.5	1995	8.1	2121	8.6	2236	9.1
1900	1781	7.2	1929	7.8	2063	8.4	2185	8.9	2299	9.3
2000	1859	7.6	2001	8.1	2132	8.7	2252	9.2	2363	9.6

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	2011	8.2	2126	8.6	2236	9.1	2341	9.5	2442	9.9
1300	2061	8.4	2174	8.8	2281	9.3	2384	9.7	—	—
1400	2114	8.6	2224	9.0	2329	9.5	2429	9.9	—	—
1500	2169	8.8	2277	9.3	2379	9.7	—	—	—	—
1600	2226	9.0	2331	9.5	2432	9.9	—	—	—	—
1700	2284	9.3	2388	9.7	—	—	—	—	—	—
1800	2344	9.5	2446	9.9	—	—	—	—	—	—
1900	2405	9.8	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

High Static 1262-2460 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE — 4 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1262	0.21	1453	0.33	1614	0.45	1757	0.58	1888	0.72
1300	1333	0.25	1517	0.37	1674	0.50	1814	0.63	1942	0.78
1400	1405	0.29	1583	0.42	1736	0.56	1872	0.70	1998	0.85
1500	1478	0.34	1650	0.48	1799	0.62	1932	0.76	2055	0.92
1600	1553	0.40	1718	0.54	1863	0.68	1994	0.84	2114	1.00
1700	1628	0.46	1787	0.60	1929	0.76	2057	0.92	2174	1.09
1800	1704	0.52	1858	0.68	1995	0.84	2121	1.01	2236	1.18
1900	1781	0.60	1929	0.76	2063	0.93	2186	1.10	2299	1.28
2000	1859	0.68	2001	0.85	2132	1.02	2252	1.21	2363	1.39

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	2011	0.87	2126	1.02	2236	1.19	2341	1.37	2442	1.55
1300	2061	0.93	2174	1.09	2281	1.26	2383	1.44	2482	1.62
1400	2114	1.00	2224	1.17	2329	1.34	2429	1.52	2526	1.71
1500	2169	1.08	2277	1.25	2379	1.43	2478	1.61	2572	1.80
1600	2226	1.17	2332	1.34	2432	1.52	2528	1.71	2621	1.91
1700	2284	1.26	2388	1.44	2487	1.63	2581	1.82	—	—
1800	2344	1.36	2446	1.55	2543	1.74	2636	1.94	—	—
1900	2405	1.47	2505	1.66	2600	1.86	—	—	—	—
2000	2467	1.59	2566	1.79	2659	1.99	—	—	—	—

Standard Static 1262-1900 RPM, 0.72 Max BHP

Medium Static 1262-2170 RPM, 1.06 Max BHP

High Static 1262-2660 RPM, 1.92 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE – STANDARD STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	6.6	1453	7.6	1614	8.5	1757	9.2	1888	9.9
1300	1333	7.0	1517	8.0	1674	8.8	1814	9.5	—	—
1400	1405	7.4	1583	8.3	1736	9.1	1872	9.9	—	—
1500	1478	7.8	1650	8.7	1799	9.5	—	—	—	—
1600	1553	8.2	1718	9.0	1863	9.8	—	—	—	—
1700	1628	8.6	1787	9.4	—	—	—	—	—	—
1800	1704	9.0	1858	9.8	—	—	—	—	—	—
1900	1781	9.4	—		—	—	—	—	—	—
2000	1859	9.8	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1262-1900 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE – MEDIUM STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	5.8	1453	6.7	1614	7.4	1757	8.1	1888	8.7
1300	1333	6.1	1517	7.0	1674	7.7	1814	8.4	1942	8.9
1400	1405	6.5	1583	7.3	1736	8.0	1872	8.6	1998	9.2
1500	1478	6.8	1650	7.6	1799	8.3	1932	8.9	2055	9.5
1600	1553	7.2	1718	7.9	1863	8.6	1994	9.2	2114	9.7
1700	1628	7.5	1787	8.2	1929	8.9	2057	9.5	—	—
1800	1704	7.9	1858	8.6	1995	9.2	2121	9.8	—	—
1900	1781	8.2	1929	8.9	2063	9.5	—	—	—	—
2000	1859	8.6	2001	9.2	2132	9.8	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	2011	9.3	2126	9.8	—	—	—	—	—	—
1300	2061	9.5	—	—	—	—	—	—	—	—
1400	2114	9.7	—	—	—	—	—	—	—	—
1500	2169	10.0	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1262-2170 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE – HIGH STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1262	4.7	1453	5.5	1614	6.1	1757	6.6	1888	7.1
1300	1333	5.0	1517	5.7	1674	6.3	1814	6.8	1942	7.3
1400	1405	5.3	1583	6.0	1736	6.5	1872	7.0	1998	7.5
1500	1478	5.6	1650	6.2	1799	6.8	1932	7.3	2055	7.7
1600	1553	5.8	1718	6.5	1863	7.0	1994	7.5	2114	7.9
1700	1628	6.1	1787	6.7	1929	7.3	2057	7.7	2174	8.2
1800	1704	6.4	1858	7.0	1995	7.5	2121	8.0	2236	8.4
1900	1781	6.7	1929	7.3	2063	7.8	2186	8.2	2299	8.6
2000	1859	7.0	2001	7.5	2132	8.0	2252	8.5	2363	8.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	2011	7.6	2126	8.0	2236	8.4	2341	8.8	2442	9.2
1300	2061	7.7	2174	8.2	2281	8.6	2383	9.0	2482	9.3
1400	2114	7.9	2224	8.4	2329	8.8	2429	9.1	2526	9.5
1500	2169	8.2	2277	8.6	2379	8.9	2478	9.3	2572	9.7
1600	2226	8.4	2332	8.8	2432	9.1	2528	9.5	2621	9.9
1700	2284	8.6	2388	9.0	2487	9.3	2581	9.7	—	—
1800	2344	8.8	2446	9.2	2543	9.6	2636	9.9	—	—
1900	2405	9.0	2505	9.4	2600	9.8	—	—	—	—
2000	2467	9.3	2566	9.6	2659	10.0	—	—	—	—

High Static 1262-2660 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE — 5 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1478	0.34	1650	0.48	1799	0.62	1932	0.76	2055	0.92
1625	1571	0.41	1735	0.55	1879	0.70	2009	0.86	2129	1.02
1750	1666	0.49	1822	0.64	1962	0.80	2088	0.96	2205	1.13
1875	1761	0.58	1910	0.74	2046	0.91	2169	1.08	2283	1.26
2000	1859	0.68	2001	0.85	2132	1.02	2252	1.21	2363	1.39
2125	1957	0.79	2093	0.97	2218	1.15	2335	1.34	—	—
2250	2056	0.92	2185	1.10	2307	1.30	—	—	—	—
2375	2155	1.06	2279	1.25	—	—	—	—	—	—
2500	2256	1.21	2374	1.41	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2169	1.08	2277	1.25	2379	1.43	—	—	—	—
1625	2240	1.19	2345	1.37	—	—	—	—	—	—
1750	2314	1.31	—	—	—	—	—	—	—	—
1875	2389	1.44	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1478-2150 RPM, 1.06 Max BHP

Medium Static 1478-2390 RPM, 1.44 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE – STANDARD STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1478	6.9	1650	7.7	1799	8.4	1932	9.0	2055	9.6
1625	1571	7.3	1735	8.1	1879	8.7	2009	9.3	2129	9.9
1750	1666	7.7	1822	8.5	1962	9.1	2088	9.7	—	—
1875	1761	8.2	1910	8.9	2046	9.5	—	—	—	—
2000	1859	8.6	2001	9.3	2132	9.9	—	—	—	—
2125	1957	9.1	2093	9.7	—	—	—	—	—	—
2250	2056	9.6	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	—	—	—	—	—	—	—	—	—	—
1625	—	—	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1478-2150 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE – MEDIUM STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1478	6.2	1650	6.9	1799	7.5	1932	8.1	2055	8.6
1625	1571	6.6	1735	7.3	1879	7.9	2009	8.4	2129	8.9
1750	1666	7.0	1822	7.6	1962	8.2	2088	8.7	2205	9.2
1875	1761	7.4	1910	8.0	2046	8.6	2169	9.1	2283	9.6
2000	1859	7.8	2001	8.4	2132	8.9	2252	9.4	2363	9.9
2125	1957	8.2	2093	8.8	2218	9.3	2335	9.8	—	—
2250	2056	8.6	2185	9.1	2307	9.7	—	—	—	—
2375	2155	9.0	2279	9.5	—	—	—	—	—	—
2500	2256	9.4	2374	9.9	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2169	9.1	2277	9.5	2379	10.0	—	—	—	—
1625	2240	9.4	2345	9.8	—	—	—	—	—	—
1750	2314	9.7	—	—	—	—	—	—	—	—
1875	2389	10.0	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1478-2390 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE — 5 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1478	0.34	1650	0.48	1798	0.62	1932	0.76	2055	0.92
1625	1571	0.41	1735	0.55	1879	0.70	2009	0.86	2129	1.02
1750	1665	0.49	1822	0.64	1962	0.80	2088	0.96	2205	1.13
1875	1762	0.58	1911	0.74	2046	0.91	2169	1.08	2283	1.26
2000	1859	0.68	2001	0.85	2132	1.02	2252	1.21	2363	1.39
2125	1957	0.79	2093	0.97	2219	1.15	2335	1.34	2444	1.54
2250	2055	0.92	2185	1.10	2307	1.30	2420	1.50	2527	1.70
2375	2156	1.06	2279	1.25	2397	1.45	2507	1.66	2610	1.88
2500	2256	1.21	2374	1.41	2487	1.62	2594	1.84	2695	2.07

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2169	1.08	2277	1.25	2379	1.43	2477	1.61	2572	1.80
1625	2240	1.19	2345	1.37	2445	1.55	2541	1.74	2633	1.93
1750	2314	1.31	2417	1.49	2514	1.68	2608	1.88	2698	2.08
1875	2389	1.44	2490	1.63	2586	1.83	2677	2.03	2766	2.24
2000	2467	1.59	2565	1.78	2659	1.99	2749	2.20	2836	2.41
2125	2546	1.74	2643	1.95	2734	2.16	2823	2.38	—	—
2250	2627	1.91	2721	2.13	2812	2.35	—	—	—	—
2375	2708	2.10	2801	2.32	—	—	—	—	—	—
2500	2791	2.30	—	—	—	—	—	—	—	—

Standard Static 1478-2150 RPM, 1.06 Max BHP

Medium Static 1478-2390 RPM, 1.44 Max BHP

High Static 1478-2836 RPM, 2.43 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE – STANDARD STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1478	6.9	1650	7.7	1798	8.4	1932	9.0	2055	9.6
1625	1571	7.3	1735	8.1	1879	8.7	2009	9.3	2129	9.9
1750	1665	7.7	1822	8.5	1962	9.1	2088	9.7		
1875	1762	8.2	1911	8.9	2046	9.5	—	—	—	—
2000	1859	8.6	2001	9.3	2132	9.9	—	—	—	—
2125	1957	9.1	2093	9.7	—	—	—	—	—	—
2250	2055	9.6	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	—	—	—	—	—	—	—	—	—	—
1625	—	—	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1478-2150 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFA06 THREE PHASE – MEDIUM STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1478	6.2	1650	6.9	1798	7.5	1932	8.1	2055	8.6
1625	1571	6.6	1735	7.3	1879	7.9	2009	8.4	2129	8.9
1750	1665	7.0	1822	7.6	1962	8.2	2088	8.7	2205	9.2
1875	1762	7.4	1911	8.0	2046	8.6	2169	9.1	2283	9.6
2000	1859	7.8	2001	8.4	2132	8.9	2252	9.4	2363	9.9
2125	1957	8.2	2093	8.8	2219	9.3	2335	9.8	—	—
2250	2055	8.6	2185	9.1	2307	9.7	—	—	—	—
2375	2156	9.0	2279	9.5	—	—	—	—	—	—
2500	2256	9.4	2374	9.9	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2169	9.1	2277	9.5	2379	10.0	—	—	—	—
1625	2240	9.4	2345	9.8	—	—	—	—	—	—
1750	2314	9.7	—	—	—	—	—	—	—	—
1875	2389	10.0	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1478-2390 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE – HIGH STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1478	5.2	1650	5.8	1798	6.3	1932	6.8	2055	7.2
1625	1571	5.5	1735	6.1	1879	6.6	2009	7.1	2129	7.5
1750	1665	5.9	1822	6.4	1962	6.9	2088	7.4	2205	7.8
1875	1762	6.2	1911	6.7	2046	7.2	2169	7.6	2283	8.1
2000	1859	6.6	2001	7.1	2132	7.5	2252	7.9	2363	8.3
2125	1957	6.9	2093	7.4	2219	7.8	2335	8.2	2444	8.6
2250	2055	7.2	2185	7.7	2307	8.1	2420	8.5	2527	8.9
2375	2156	7.6	2279	8.0	2397	8.5	2507	8.8	2610	9.2
2500	2256	8.0	2374	8.4	2487	8.8	2594	9.1	2695	9.5

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2169	7.6	2277	8.0	2379	8.4	2477	8.7	2572	9.1
1625	2240	7.9	2345	8.3	2445	8.6	2541	9.0	2633	9.3
1750	2314	8.2	2417	8.5	2514	8.9	2608	9.2	2698	9.5
1875	2389	8.4	2490	8.8	2586	9.1	2677	9.4	2766	9.8
2000	2467	8.7	2565	9.0	2659	9.4	2749	9.7	2836	10.0
2125	2546	9.0	2643	9.3	2734	9.6	2823	10.0	—	—
2250	2627	9.3	2721	9.6	2812	9.9	—	—	—	—
2375	2708	9.5	2801	9.9	—	—	—	—	—	—
2500	2791	9.8	—	—	—	—	—	—	—	—

High Static 1478-2836 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFM07 THREE PHASE — 6 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	1596	0.43	1749	0.56	1889	0.71	2015	0.86	2131	1.02
1950	1704	0.52	1847	0.67	1981	0.82	2104	0.98	2217	1.15
2100	1814	0.63	1948	0.78	2075	0.94	2194	1.12	2305	1.29
2250	1924	0.75	2050	0.91	2172	1.08	2286	1.26	2394	1.45
2400	2037	0.89	2155	1.06	2270	1.24	2381	1.43	2485	1.62
2550	2150	1.05	2261	1.22	2370	1.41	2476	1.61	2578	1.81
2700	2265	1.23	2368	1.40	2472	1.60	2574	1.80	2672	2.02
2850	2379	1.43	2477	1.61	2576	1.81	2674	2.02	2768	2.24
3000	2495	1.64	2587	1.83	2681	2.04	2775	2.26	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	2239	1.19	2340	1.35	2436	1.53	2528	1.71	2615	1.89
1950	2323	1.32	2422	1.50	2516	1.68	2605	1.87	2691	2.06
2100	2408	1.47	2505	1.66	2597	1.85	2685	2.04	2770	2.25
2250	2495	1.64	2590	1.84	2681	2.04	2767	2.24	—	—
2400	2584	1.82	2677	2.03	2766	2.24	—	—	—	—
2550	2674	2.02	2766	2.24	—	—	—	—	—	—
2700	2766	2.24	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Standard Static 1596-2300 RPM, 1.31 Max BHP

Medium Static 1596-2530 RPM, 1.76 Max BHP

High Static 1596-2836 RPM, 2.43 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFM07 THREE PHASE – STANDARD STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1596	6.9	1749	7.6	1889	8.2	2015	8.8	2131	9.3
1950	1704	7.4	1847	8.0	1981	8.6	2104	9.1	2217	9.6
2100	1814	7.9	1948	8.5	2075	9.0	2194	9.5	—	—
2250	1925	8.4	2050	8.9	2172	9.4	2286	9.9	—	—
2400	2037	8.9	2154	9.4	2270	9.9	—	—	—	—
2550	2150	9.3	2261	9.8	—	—	—	—	—	—
2700	2265	9.8	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2239	9.7	—	—	—	—	—	—	—	—
1950	—	—	—	—	—	—	—	—	—	—
2100	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Standard Static 1596-2300 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFM07 THREE PHASE – MEDIUM STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1596	6.3	1749	6.9	1889	7.5	2015	8.0	2131	8.4
1950	1704	6.7	1847	7.3	1981	7.8	2104	8.3	2217	8.8
2100	1814	7.2	1948	7.7	2075	8.2	2194	8.7	2305	9.1
2250	1925	7.6	2050	8.1	2172	8.6	2286	9.0	2394	9.5
2400	2037	8.1	2154	8.5	2270	9.0	2381	9.4	2485	9.8
2550	2150	8.5	2261	8.9	2370	9.4	2477	9.8	—	—
2700	2265	9.0	2368	9.4	2472	9.8	—	—	—	—
2850	2379	9.4	2477	9.8	—	—	—	—	—	—
3000	2495	9.9	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2239	8.8	2340	9.2	2436	9.6	2527	10.0	—	—
1950	2323	9.2	2422	9.6	2516	9.9	—	—	—	—
2100	2408	9.5	2505	9.9	—	—	—	—	—	—
2250	2495	9.9	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Medium Static 1596-2530 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFM07 THREE PHASE – HIGH STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1596	5.6	1749	6.2	1889	6.7	2015	7.1	2131	7.5
1950	1704	6.0	1847	6.5	1981	7.0	2104	7.4	2217	7.8
2100	1814	6.4	1948	6.9	2075	7.3	2194	7.7	2305	8.1
2250	1925	6.8	2050	7.2	2172	7.7	2286	8.1	2394	8.4
2400	2037	7.2	2154	7.6	2270	8.0	2381	8.4	2485	8.8
2550	2150	7.6	2261	8.0	2370	8.4	2477	8.7	2578	9.1
2700	2265	8.0	2368	8.3	2472	8.7	2574	9.1	2672	9.4
2850	2379	8.4	2477	8.7	2576	9.1	2674	9.4	2768	9.8
3000	2495	8.8	2587	9.1	2681	9.5	2775	9.8	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2239	7.9	2340	8.3	2436	8.6	2527	8.9	2615	9.2
1950	2323	8.2	2422	8.5	2516	8.9	2605	9.2	2691	9.5
2100	2408	8.5	2505	8.8	2597	9.2	2685	9.5	2770	9.8
2250	2495	8.8	2590	9.1	2681	9.5	2767	9.8	—	—
2400	2584	9.1	2677	9.4	2766	9.8	—	—	—	—
2550	2674	9.4	2766	9.8	—	—	—	—	—	—
2700	2766	9.8	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

High Static 1596-2836 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE — 3 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1079	0.09	1315	0.16	1510	0.24	1679	0.33	1830	0.43
975	1126	0.10	1355	0.17	1546	0.26	1713	0.35	1863	0.45
1050	1175	0.11	1396	0.19	1584	0.28	1749	0.37	1897	0.48
1125	1226	0.13	1438	0.21	1622	0.30	1785	0.40	1932	0.50
1200	1278	0.15	1482	0.23	1662	0.32	1822	0.42	1968	0.53
1275	1331	0.16	1528	0.25	1703	0.34	1861	0.45	2004	0.56
1350	1386	0.19	1575	0.27	1746	0.37	1900	0.48	2042	0.59
1425	1441	0.21	1623	0.30	1789	0.40	1941	0.51	2080	0.63
1500	1498	0.23	1672	0.33	1834	0.43	1982	0.54	2119	0.66

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1968	0.53	2096	0.64	2215	0.76	2328	0.88	2434	1.00
975	2000	0.56	2127	0.67	2246	0.79	2358	0.91	2464	1.04
1050	2033	0.59	2159	0.70	2277	0.82	2389	0.95	—	—
1125	2067	0.61	2192	0.73	2309	0.86	2420	0.99	—	—
1200	2101	0.65	2225	0.77	2342	0.89	2452	1.03	—	—
1275	2136	0.68	2260	0.80	2376	0.93	2485	1.07	—	—
1350	2172	0.71	2295	0.84	2410	0.97	—	—	—	—
1425	2209	0.75	2330	0.88	2445	1.02	—	—	—	—
1500	2247	0.79	2367	0.92	2480	1.06	—	—	—	—

Standard Static 1079-1890 RPM, 0.44 Max BHP

Medium Static 1079-2190 RPM, 0.71 Max BHP

High Static 1079-2490 RPM, 1.07 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE – STANDARD STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	5.7	1315	7.0	1510	8.0	1679	8.9	1830	9.7
975	1126	6.0	1355	7.2	1546	8.2	1713	9.1	—	—
1050	1175	6.2	1396	7.4	1584	8.4	1749	9.3	—	—
1125	1226	6.5	1438	7.6	1622	8.6	1785	9.4	—	—
1200	1278	6.8	1482	7.8	1662	8.8	1822	9.6	—	—
1275	1331	7.0	1528	8.1	1703	9.0	—	—	—	—
1350	1386	7.3	1575	8.3	1746	9.2	—	—	—	—
1425	1441	7.6	1623	8.6	1789	9.5	—	—	—	—
1500	1498	7.9	1672	8.8	1834	9.7	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1079-1890 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCEA04 SINGLE PHASE – MEDIUM STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	4.9	1315	6.0	1510	6.9	1679	7.7	1830	8.4
975	1126	5.1	1355	6.2	1546	7.1	1713	7.8	1863	8.5
1050	1175	5.4	1396	6.4	1584	7.2	1749	8.0	1897	8.7
1125	1226	5.6	1438	6.6	1622	7.4	1785	8.2	1932	8.8
1200	1278	5.8	1482	6.8	1662	7.6	1822	8.3	1968	9.0
1275	1331	6.1	1528	7.0	1703	7.8	1861	8.5	2004	9.2
1350	1386	6.3	1575	7.2	1746	8.0	1900	8.7	2042	9.3
1425	1441	6.6	1623	7.4	1789	8.2	1941	8.9	2080	9.5
1500	1498	6.8	1672	7.6	1834	8.4	1982	9.1	2119	9.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1968	9.0	2096	9.6	—	—	—	—	—	—
975	2000	9.1	2127	9.7	—	—	—	—	—	—
1050	2033	9.3	2159	9.9	—	—	—	—	—	—
1125	2067	9.4	—	—	—	—	—	—	—	—
1200	2101	9.6	—	—	—	—	—	—	—	—
1275	2136	9.8	—	—	—	—	—	—	—	—
1350	2172	9.9	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1079-2190 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 SINGLE PHASE – HIGH STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	4.3	1315	5.3	1510	6.1	1679	6.7	1830	7.3
975	1126	4.5	1355	5.4	1546	6.2	1713	6.9	1863	7.5
1050	1175	4.7	1396	5.6	1584	6.4	1749	7.0	1897	7.6
1125	1226	4.9	1438	5.8	1622	6.5	1785	7.2	1932	7.8
1200	1278	5.1	1482	6.0	1662	6.7	1822	7.3	1968	7.9
1275	1331	5.3	1528	6.1	1703	6.8	1861	7.5	2004	8.0
1350	1386	5.6	1575	6.3	1746	7.0	1900	7.6	2042	8.2
1425	1441	5.8	1623	6.5	1789	7.2	1941	7.8	2080	8.4
1500	1498	6.0	1672	6.7	1834	7.4	1982	8.0	2119	8.5

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1968	7.9	2096	8.4	2215	8.9	2328	9.3	2434	9.8
975	2000	8.0	2127	8.5	2246	9.0	2358	9.5	2464	9.9
1050	2033	8.2	2159	8.7	2277	9.1	2389	9.6	—	—
1125	2067	8.3	2192	8.8	2309	9.3	2420	9.7	—	—
1200	2101	8.4	2225	8.9	2342	9.4	2452	9.8	—	—
1275	2136	8.6	2260	9.1	2376	9.5	2485	10.0	—	—
1350	2172	8.7	2295	9.2	2410	9.7	—	—	—	—
1425	2209	8.9	2330	9.4	2445	9.8	—	—	—	—
1500	2247	9.0	2367	9.5	2480	10.0	—	—	—	—

High Static 1079-2490 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE — 3 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1079	0.09	1315	0.16	1510	0.24	1679	0.33	1830	0.43
975	1126	0.10	1355	0.17	1546	0.26	1713	0.35	1863	0.45
1050	1175	0.11	1396	0.19	1584	0.28	1749	0.37	1897	0.48
1125	1226	0.13	1438	0.21	1622	0.30	1785	0.40	1932	0.50
1200	1278	0.15	1482	0.23	1662	0.32	1822	0.42	1968	0.53
1275	1331	0.16	1528	0.25	1703	0.34	1861	0.45	2004	0.56
1350	1386	0.19	1575	0.27	1746	0.37	1900	0.48	2042	0.59
1425	1441	0.21	1623	0.30	1789	0.40	1941	0.51	2080	0.63
1500	1498	0.23	1672	0.33	1834	0.43	1982	0.54	2119	0.66

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1968	0.53	2096	0.64	2215	0.76	2328	0.88	2434	1.00
975	2000	0.56	2127	0.67	2246	0.79	2358	0.91	2464	1.04
1050	2033	0.59	2159	0.70	2277	0.82	2389	0.95	—	—
1125	2067	0.61	2192	0.73	2309	0.86	2420	0.99	—	—
1200	2101	0.65	2225	0.77	2342	0.89	2452	1.03	—	—
1275	2136	0.68	2260	0.80	2376	0.93	2485	1.07	—	—
1350	2172	0.71	2295	0.84	2410	0.97	—	—	—	—
1425	2209	0.75	2330	0.88	2445	1.02	—	—	—	—
1500	2247	0.79	2367	0.92	2480	1.06	—	—	—	—

Standard Static 1079-1890 RPM, 0.44 Max BHP

Medium Static 1079-2190 RPM, 0.71 Max BHP

High Static 1079-2490 RPM, 1.07 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE – STANDARD STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	5.7	1315	7.0	1510	8.0	1679	8.9	1830	9.7
975	1126	6.0	1355	7.2	1546	8.2	1713	9.1	—	—
1050	1175	6.2	1396	7.4	1584	8.4	1749	9.3	—	—
1125	1226	6.5	1438	7.6	1622	8.6	1785	9.4	—	—
1200	1278	6.8	1482	7.8	1662	8.8	1822	9.6	—	—
1275	1331	7.0	1528	8.1	1703	9.0	—	—	—	—
1350	1386	7.3	1575	8.3	1746	9.2	—	—	—	—
1425	1441	7.6	1623	8.6	1789	9.5	—	—	—	—
1500	1498	7.9	1672	8.8	1834	9.7	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1079-1890 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCEA04 THREE PHASE – MEDIUM STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	4.9	1315	6.0	1510	6.9	1679	7.7	1830	8.4
975	1126	5.1	1355	6.2	1546	7.1	1713	7.8	1863	8.5
1050	1175	5.4	1396	6.4	1584	7.2	1749	8.0	1897	8.7
1125	1226	5.6	1438	6.6	1622	7.4	1785	8.2	1932	8.8
1200	1278	5.8	1482	6.8	1662	7.6	1822	8.3	1968	9.0
1275	1331	6.1	1528	7.0	1703	7.8	1861	8.5	2004	9.2
1350	1386	6.3	1575	7.2	1746	8.0	1900	8.7	2042	9.3
1425	1441	6.6	1623	7.4	1789	8.2	1941	8.9	2080	9.5
1500	1498	6.8	1672	7.6	1834	8.4	1982	9.1	2119	9.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1968	9.0	2096	9.6	—	—	—	—	—	—
975	2000	9.1	2127	9.7	—	—	—	—	—	—
1050	2033	9.3	2159	9.9	—	—	—	—	—	—
1125	2067	9.4	—	—	—	—	—	—	—	—
1200	2101	9.6	—	—	—	—	—	—	—	—
1275	2136	9.8	—	—	—	—	—	—	—	—
1350	2172	9.9	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1079-2190 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEA04 THREE PHASE – HIGH STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1079	4.3	1315	5.3	1510	6.1	1679	6.7	1830	7.3
975	1126	4.5	1355	5.4	1546	6.2	1713	6.9	1863	7.5
1050	1175	4.7	1396	5.6	1584	6.4	1749	7.0	1897	7.6
1125	1226	4.9	1438	5.8	1622	6.5	1785	7.2	1932	7.8
1200	1278	5.1	1482	6.0	1662	6.7	1822	7.3	1968	7.9
1275	1331	5.3	1528	6.1	1703	6.8	1861	7.5	2004	8.0
1350	1386	5.6	1575	6.3	1746	7.0	1900	7.6	2042	8.2
1425	1441	5.8	1623	6.5	1789	7.2	1941	7.8	2080	8.4
1500	1498	6.0	1672	6.7	1834	7.4	1982	8.0	2119	8.5

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1968	7.9	2096	8.4	2215	8.9	2328	9.3	2434	9.8
975	2000	8.0	2127	8.5	2246	9.0	2358	9.5	2464	9.9
1050	2033	8.2	2159	8.7	2277	9.1	2389	9.6	—	—
1125	2067	8.3	2192	8.8	2309	9.3	2420	9.7	—	—
1200	2101	8.4	2225	8.9	2342	9.4	2452	9.8	—	—
1275	2136	8.6	2260	9.1	2376	9.5	2485	10.0	—	—
1350	2172	8.7	2295	9.2	2410	9.7	—	—	—	—
1425	2209	8.9	2330	9.4	2445	9.8	—	—	—	—
1500	2247	9.0	2367	9.5	2480	10.0	—	—	—	—

High Static 1079-2490 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE — 4 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1217	0.19	1411	0.30	1576	0.42	1722	0.55	1855	0.68
1300	1283	0.23	1470	0.34	1631	0.46	1774	0.60	1904	0.74
1400	1351	0.26	1531	0.38	1688	0.51	1827	0.65	1955	0.80
1500	1420	0.31	1593	0.43	1746	0.57	1883	0.71	2008	0.86
1600	1491	0.35	1657	0.48	1805	0.63	1939	0.78	2062	0.93
1700	1563	0.41	1722	0.54	1866	0.69	1997	0.85	2118	1.01
1800	1635	0.46	1789	0.61	1928	0.76	2056	0.92	2174	1.09
1900	1709	0.53	1856	0.68	1991	0.84	2116	1.01	2232	1.18
2000	1784	0.60	1925	0.76	2056	0.92	2178	1.10	2291	1.28

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1979	0.83	2094	0.98	2204	1.15	2308	1.32	2409	1.50
1300	2025	0.89	2138	1.05	2246	1.21	2349	1.39	2447	1.57
1400	2074	0.95	2185	1.11	2291	1.28	2391	1.46	—	—
1500	2124	1.02	2234	1.19	2338	1.36	2436	1.54	—	—
1600	2176	1.10	2284	1.27	2386	1.45	—	—	—	—
1700	2230	1.18	2336	1.36	2436	1.54	—	—	—	—
1800	2285	1.27	2389	1.45	—	—	—	—	—	—
1900	2341	1.36	2444	1.55	—	—	—	—	—	—
2000	2398	1.46	—	—	—	—	—	—	—	—

Standard Static 1217-1990 RPM, 0.72 Max BHP

Medium Static 1217-2170 RPM, 1.06 Max BHP

High Static 1217-2460 RPM, 1.53 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE – STANDARD STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1217	6.4	1411	7.4	1576	8.3	1722	9.1	1855	9.8
1300	1283	6.8	1470	7.7	1631	8.6	1774	9.3	—	—
1400	1351	7.1	1531	8.1	1688	8.9	1827	9.6	—	—
1500	1420	7.5	1593	8.4	1746	9.2	1883	9.9	—	—
1600	1491	7.8	1657	8.7	1805	9.5	—	—	—	—
1700	1563	8.2	1722	9.1	1866	9.8	—	—	—	—
1800	1635	8.6	1789	9.4	—	—	—	—	—	—
1900	1709	9.0	1856	9.8	—	—	—	—	—	—
2000	1784	9.4	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1217-1990 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFA05 SINGLE PHASE – MEDIUM STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1217	5.6	1411	6.5	1576	7.3	1722	7.9	1855	8.5
1300	1283	5.9	1470	6.8	1631	7.5	1774	8.2	1904	8.8
1400	1351	6.2	1531	7.1	1688	7.8	1827	8.4	1955	9.0
1500	1420	6.5	1593	7.3	1746	8.0	1883	8.7	2008	9.3
1600	1491	6.9	1657	7.6	1805	8.3	1939	8.9	2062	9.5
1700	1563	7.2	1722	7.9	1866	8.6	1997	9.2	2118	9.8
1800	1635	7.5	1789	8.2	1928	8.9	2056	9.5	—	—
1900	1709	7.9	1856	8.6	1991	9.2	2116	9.8	—	—
2000	1784	8.2	1925	8.9	2056	9.5	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1979	9.1	2094	9.6	—	—	—	—	—	—
1300	2025	9.3	2138	9.9	—	—	—	—	—	—
1400	2074	9.6	—	—	—	—	—	—	—	—
1500	2124	9.8	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1217-2170 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 SINGLE PHASE – HIGH STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1217	4.9	1411	5.7	1576	6.4	1722	7.0	1855	7.5
1300	1283	5.2	1470	6.0	1631	6.6	1774	7.2	1904	7.7
1400	1351	5.5	1531	6.2	1688	6.9	1827	7.4	1955	7.9
1500	1420	5.8	1593	6.5	1746	7.1	1883	7.7	2008	8.2
1600	1491	6.1	1657	6.7	1805	7.3	1939	7.9	2062	8.4
1700	1563	6.4	1722	7.0	1866	7.6	1997	8.1	2118	8.6
1800	1635	6.6	1789	7.3	1928	7.8	2056	8.4	2174	8.8
1900	1709	6.9	1856	7.5	1991	8.1	2116	8.6	2232	9.1
2000	1784	7.3	1925	7.8	2056	8.4	2178	8.9	2291	9.3

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1979	8.0	2094	8.5	2204	9.0	2308	9.4	2409	9.8
1300	2025	8.2	2138	8.7	2246	9.1	2349	9.5	2447	9.9
1400	2074	8.4	2185	8.9	2291	9.3	2391	9.7	—	—
1500	2124	8.6	2234	9.1	2338	9.5	2436	9.9	—	—
1600	2176	8.8	2284	9.3	2386	9.7	—	—	—	—
1700	2230	9.1	2336	9.5	2436	9.9	—	—	—	—
1800	2285	9.3	2389	9.7	—	—	—	—	—	—
1900	2341	9.5	2444	9.9	—	—	—	—	—	—
2000	2398	9.7	—	—	—	—	—	—	—	—

High Static 1217-2460 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE — 4 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1216	0.19	1411	0.30	1576	0.42	1722	0.55	1855	0.68
1300	1282	0.23	1470	0.34	1631	0.46	1773	0.60	1904	0.74
1400	1351	0.26	1531	0.38	1688	0.51	1827	0.65	1955	0.80
1500	1420	0.31	1593	0.43	1746	0.57	1882	0.71	2008	0.86
1600	1491	0.35	1657	0.48	1806	0.63	1940	0.78	2062	0.93
1700	1563	0.41	1722	0.54	1866	0.69	1997	0.85	2118	1.01
1800	1636	0.47	1788	0.61	1928	0.76	2056	0.92	2175	1.09
1900	1710	0.53	1856	0.68	1991	0.84	2116	1.01	2233	1.18
2000	1784	0.60	1924	0.76	2055	0.92	2178	1.10	2292	1.28

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1978	0.83	2094	0.98	2204	1.15	2308	1.32	2409	1.50
1300	2025	0.89	2138	1.05	2246	1.21	2349	1.39	2447	1.57
1400	2073	0.95	2185	1.11	2291	1.28	2392	1.46	2488	1.64
1500	2124	1.02	2233	1.19	2337	1.36	2437	1.54	2532	1.73
1600	2176	1.10	2284	1.27	2386	1.45	2483	1.63	2577	1.82
1700	2230	1.18	2336	1.36	2436	1.54	2532	1.73	2624	1.92
1800	2285	1.27	2389	1.45	2488	1.64	2582	1.83	—	—
1900	2341	1.36	2443	1.55	2541	1.74	2634	1.94	—	—
2000	2399	1.46	2499	1.66	2595	1.85	—	—	—	—

Standard Static 1216-1900 RPM, 0.72 Max BHP

Medium Static 1216-2170 RPM, 1.06 Max BHP

High Static 1216-2660 RPM, 1.96 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE – STANDARD STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1216	6.4	1411	7.4	1576	8.3	1722	9.1	1855	9.8
1300	1282	6.7	1470	7.7	1631	8.6	1773	9.3	—	—
1400	1351	7.1	1531	8.1	1688	8.9	1827	9.6	—	—
1500	1420	7.5	1593	8.4	1746	9.2	1882	9.9	—	—
1600	1491	7.8	1657	8.7	1806	9.5	—	—	—	—
1700	1563	8.2	1722	9.1	1866	9.8	—	—	—	—
1800	1636	8.6	1788	9.4	—	—	—	—	—	—
1900	1710	9.0	1856	9.8	—	—	—	—	—	—
2000	1784	9.4	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1216-1900 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFA05 THREE PHASE – MEDIUM STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1216	5.6	1411	6.5	1576	7.3	1722	7.9	1855	8.5
1300	1282	5.9	1470	6.8	1631	7.5	1773	8.2	1904	8.8
1400	1351	6.2	1531	7.1	1688	7.8	1827	8.4	1955	9.0
1500	1420	6.5	1593	7.3	1746	8.0	1882	8.7	2008	9.3
1600	1491	6.9	1657	7.6	1806	8.3	1940	8.9	2062	9.5
1700	1563	7.2	1722	7.9	1866	8.6	1997	9.2	2118	9.8
1800	1636	7.5	1788	8.2	1928	8.9	2056	9.5	—	—
1900	1710	7.9	1856	8.6	1991	9.2	2116	9.8	—	—
2000	1784	8.2	1924	8.9	2055	9.5	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1978	9.1	2094	9.6	—	—	—	—	—	—
1300	2025	9.3	2139	9.9	—	—	—	—	—	—
1400	2073	9.6	—	—	—	—	—	—	—	—
1500	2124	9.8	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1216-2170 RPM,

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA05 THREE PHASE – HIGH STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1216	4.6	1411	5.3	1576	5.9	1722	6.5	1855	7.0
1300	1282	4.8	1470	5.5	1631	6.1	1773	6.7	1904	7.2
1400	1351	5.1	1531	5.8	1688	6.3	1827	6.9	1955	7.3
1500	1420	5.3	1593	6.0	1746	6.6	1882	7.1	2008	7.5
1600	1491	5.6	1657	6.2	1806	6.8	1940	7.3	2062	7.8
1700	1563	5.9	1722	6.5	1866	7.0	1997	7.5	2118	8.0
1800	1636	6.2	1788	6.7	1928	7.2	2056	7.7	2175	8.2
1900	1710	6.4	1856	7.0	1991	7.5	2116	8.0	2233	8.4
2000	1784	6.7	1924	7.2	2055	7.7	2178	8.2	2292	8.6

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1978	7.4	2094	7.9	2204	8.3	2308	8.7	2409	9.1
1300	2025	7.6	2139	8.0	2246	8.4	2349	8.8	2447	9.2
1400	2073	7.8	2185	8.2	2291	8.6	2392	9.0	2488	9.4
1500	2124	8.0	2233	8.4	2337	8.8	2437	9.2	2532	9.5
1600	2176	8.2	2284	8.6	2386	9.0	2483	9.3	2577	9.7
1700	2230	8.4	2336	8.8	2436	9.2	2532	9.5	2624	9.9
1800	2285	8.6	2389	9.0	2488	9.4	2582	9.7	—	—
1900	2341	8.8	2443	9.2	2541	9.6	2634	9.9	—	—
2000	2399	9.0	2499	9.4	2595	9.8	—	—	—	—

High Static 1216-2660 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE — 5 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1420	0.31	1593	0.43	1746	0.57	1883	0.71	2008	0.86
1625	1509	0.37	1673	0.50	1820	0.64	1954	0.79	2076	0.95
1750	1599	0.43	1755	0.57	1897	0.73	2026	0.88	2146	1.05
1875	1691	0.51	1839	0.66	1975	0.82	2101	0.98	2218	1.16
2000	1784	0.60	1925	0.76	2056	0.92	2178	1.10	2291	1.28
2125	1878	0.70	2011	0.86	2138	1.04	2255	1.22	2367	1.41
2250	1974	0.81	2100	0.98	2221	1.16	2335	1.35	—	—
2375	2070	0.94	2189	1.11	2305	1.30	—	—	—	—
2500	2166	1.08	2280	1.25	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2124	1.02	2234	1.19	2338	1.36	—	—	—	—
1625	2190	1.12	2297	1.29	—	—	—	—	—	—
1750	2257	1.22	2362	1.40	—	—	—	—	—	—
1875	2327	1.34	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1420-2150 RPM, 1.06 Max BHP

Medium Static 1420-2390 RPM, 1.44 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE – STANDARD STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	6.6	1593	7.4	1746	8.1	1883	8.8	2008	9.3
1625	1509	7.0	1673	7.8	1820	8.5	1954	9.1	2076	9.7
1750	1599	7.4	1755	8.2	1897	8.8	2026	9.4	2146	10.0
1875	1691	7.9	1839	8.6	1975	9.2	2101	9.8	—	—
2000	1784	8.3	1925	9.0	2056	9.6	—	—	—	—
2125	1878	8.7	2011	9.4	2138	9.9	—	—	—	—
2250	1974	9.2	2100	9.8	—	—	—	—	—	—
2375	2070	9.6	—	—	—	—	—	—	—	—
2500	–	–	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2124	9.9	—	—	—	—	—	—	—	—
1625	—	—	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1420-2150 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 SINGLE PHASE – MEDIUM STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	5.9	1593	6.7	1746	7.3	1883	7.9	2008	8.4
1625	1509	6.3	1673	7.0	1820	7.6	1954	8.2	2076	8.7
1750	1599	6.7	1755	7.3	1897	7.9	2026	8.5	2146	9.0
1875	1691	7.1	1839	7.7	1975	8.3	2101	8.8	2218	9.3
2000	1784	7.5	1925	8.1	2056	8.6	2178	9.1	2291	9.6
2125	1878	7.9	2011	8.4	2138	8.9	2255	9.4	2367	9.9
2250	1974	8.3	2100	8.8	2221	9.3	2335	9.8	—	—
2375	2070	8.7	2189	9.2	2305	9.6	—	—	—	—
2500	2166	9.1	2280	9.5	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2124	8.9	2234	9.3	2338	9.8	—	—	—	—
1625	2190	9.2	2297	9.6	—	—	—	—	—	—
1750	2257	9.4	2362	9.9	—	—	—	—	—	—
1875	2327	9.7	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1420-2390 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE — 5 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1420	0.31	1593	0.43	1746	0.57	1883	0.71	2008	0.86
1625	1509	0.37	1673	0.50	1820	0.64	1954	0.79	2076	0.95
1750	1599	0.43	1755	0.57	1897	0.73	2026	0.88	2146	1.05
1875	1691	0.51	1839	0.66	1976	0.82	2102	0.99	2218	1.16
2000	1784	0.60	1924	0.76	2056	0.92	2178	1.10	2291	1.28
2125	1879	0.70	2011	0.86	2137	1.03	2256	1.22	2367	1.41
2250	1974	0.81	2099	0.98	2221	1.16	2335	1.35	2444	1.55
2375	2070	0.94	2189	1.11	2305	1.30	2416	1.49	2522	1.70
2500	2166	1.08	2280	1.25	2391	1.45	2499	1.65	2601	1.86

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2124	1.02	2233	1.19	2337	1.36	2436	1.54	2532	1.73
1625	2190	1.12	2296	1.29	2398	1.47	2495	1.65	2589	1.85
1750	2257	1.22	2362	1.40	2462	1.59	2557	1.78	2648	1.97
1875	2327	1.34	2430	1.52	2528	1.72	2621	1.91	2710	2.11
2000	2398	1.46	2499	1.66	2595	1.85	2687	2.06	2775	2.27
2125	2471	1.60	2570	1.80	2665	2.01	2755	2.22	—	—
2250	2546	1.75	2643	1.96	2735	2.17	2824	2.39	—	—
2375	2622	1.91	2717	2.12	2807	2.34	—	—	—	—
2500	2699	2.08	2792	2.30	—	—	—	—	—	—

Standard Static 1420-2150 RPM, 1.06 Max BHP

Medium Static 1420-2390 RPM, 1.44 Max BHP

High Static 1420-2836 RPM, 2.43 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE – STANDARD STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	6.6	1593	7.4	1746	8.1	1883	8.8	2008	9.3
1625	1509	7.0	1673	7.8	1820	8.5	1954	9.1	2076	9.7
1750	1599	7.4	1755	8.2	1897	8.8	2026	9.4	2146	10.0
1875	1691	7.9	1839	8.6	1976	9.2	2102	9.8	—	—
2000	1784	8.3	1924	8.9	2056	9.6	—	—	—	—
2125	1878	8.7	2011	9.4	2137	9.9	—	—	—	—
2250	1974	9.2	2099	9.8	—	—	—	—	—	—
2375	2070	9.6	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2124	9.9	—	—	—	—	—	—	—	—
1625	—	—	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1420-2150 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

Fan data (cont)

48FCFA06 THREE PHASE – MEDIUM STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	5.9	1593	6.7	1746	7.3	1883	7.9	2008	8.4
1625	1509	6.3	1673	7.0	1820	7.6	1954	8.2	2076	8.7
1750	1599	6.7	1755	7.3	1897	7.9	2026	8.5	2146	9.0
1875	1691	7.1	1839	7.7	1976	8.3	2102	8.8	2218	9.3
2000	1784	7.5	1924	8.1	2056	8.6	2178	9.1	2291	9.6
2125	1878	7.9	2011	8.4	2137	8.9	2256	9.4	2367	9.9
2250	1974	8.3	2099	8.8	2221	9.3	2335	9.8	—	—
2375	2070	8.7	2189	9.2	2305	9.6	—	—	—	—
2500	2166	9.1	2280	9.5	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2124	8.9	2233	9.3	2337	9.8	—	—	—	—
1625	2190	9.2	2296	9.6	—	—	—	—	—	—
1750	2257	9.4	2362	9.9	—	—	—	—	—	—
1875	2327	9.7	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1420-2390 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFA06 THREE PHASE – HIGH STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1420	5.0	1593	5.6	1746	6.2	1883	6.6	2008	7.1
1625	1509	5.3	1673	5.9	1820	6.4	1954	6.9	2076	7.3
1750	1599	5.6	1755	6.2	1897	6.7	2026	7.1	2146	7.6
1875	1691	6.0	1839	6.5	1976	7.0	2102	7.4	2218	7.8
2000	1784	6.3	1924	6.8	2056	7.2	2178	7.7	2291	8.1
2125	1878	6.6	2011	7.1	2137	7.5	2256	8.0	2367	8.3
2250	1974	7.0	2099	7.4	2221	7.8	2335	8.2	2444	8.6
2375	2070	7.3	2189	7.7	2305	8.1	2416	8.5	2522	8.9
2500	2166	7.6	2280	8.0	2391	8.4	2499	8.8	2601	9.2

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2124	7.5	2233	7.9	2337	8.2	2436	8.6	2532	8.9
1625	2190	7.7	2296	8.1	2398	8.5	2495	8.8	2589	9.1
1750	2257	8.0	2362	8.3	2462	8.7	2557	9.0	2648	9.3
1875	2327	8.2	2430	8.6	2528	8.9	2621	9.2	2710	9.6
2000	2398	8.5	2499	8.8	2595	9.2	2687	9.5	2775	9.8
2125	2471	8.7	2570	9.1	2665	9.4	2755	9.7	—	—
2250	2546	9.0	2643	9.3	2735	9.6	2824	10.0	—	—
2375	2622	9.2	2717	9.6	2807	9.9	—	—	—	—
2500	2699	9.5	2792	9.8	—	—	—	—	—	—

High Static 1420-2836 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCFM07 THREE PHASE — 6 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	1537	0.38	1685	0.51	1824	0.64	1953	0.79	2071	0.94
1950	1641	0.47	1778	0.59	1911	0.74	2035	0.89	2150	1.05
2100	1748	0.56	1874	0.69	2000	0.84	2119	1.00	2231	1.17
2250	1855	0.67	1973	0.81	2091	0.96	2206	1.13	2314	1.31
2400	1964	0.80	2074	0.94	2185	1.10	2294	1.27	2399	1.45
2550	2074	0.94	2176	1.08	2281	1.25	2385	1.43	2486	1.62
2700	2185	1.10	2281	1.25	2379	1.42	2478	1.60	2575	1.80
2850	2296	1.27	2386	1.43	2479	1.60	2573	1.79	2666	1.99
3000	2408	1.47	2493	1.63	2581	1.81	2670	2.00	2759	2.21

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	2182	1.10	2285	1.26	2382	1.43	2476	1.60	2564	1.78
1950	2258	1.21	2359	1.39	2455	1.56	2547	1.74	2634	1.93
2100	2337	1.34	2436	1.52	2530	1.71	2620	1.90	2706	2.09
2250	2417	1.49	2514	1.67	2606	1.86	2695	2.06	2780	2.26
2400	2499	1.64	2594	1.84	2685	2.04	2771	2.24	—	—
2550	2583	1.81	2676	2.02	2765	2.22	—	—	—	—
2700	2669	2.00	2759	2.21	—	—	—	—	—	—
2850	2757	2.20	—	—	—	—	—	—	—	—
3000			—	—	—	—	—	—	—	—

Standard Static 1537-2300 RPM, 1.31 Max BHP

Medium Static 1537-2530 RPM, 1.76 Max BHP

High Static 1537-2836 RPM, 2.43 Max BHP

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEM07 THREE PHASE – STANDARD STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1537	6.7	1685	7.3	1824	7.9	1953	8.5	2071	9.0
1950	1641	7.1	1778	7.7	1911	8.3	2035	8.8	2150	9.3
2100	1748	7.6	1874	8.1	2000	8.7	2119	9.2	2231	9.7
2250	1855	8.1	1973	8.6	2091	9.1	2206	9.6	—	—
2400	1964	8.5	2074	9.0	2185	9.5	2294	10.0	—	—
2550	2074	9.0	2176	9.5	2281	9.9	—	—	—	—
2700	2185	9.5	2281	9.9	—	—	—	—	—	—
2850	2296	10.0	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2182	9.5	2285	9.9	—	—	—	—	—	—
1950	2258	9.8	—	—	—	—	—	—	—	—
2100	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Standard Static 1537-2300 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEM07 THREE PHASE – MEDIUM STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1537	6.1	1685	6.7	1824	7.2	1953	7.7	2071	8.2
1950	1641	6.5	1778	7.0	1911	7.6	2035	8.0	2150	8.5
2100	1748	6.9	1874	7.4	2000	7.9	2119	8.4	2231	8.8
2250	1855	7.3	1973	7.8	2091	8.3	2206	8.7	2314	9.1
2400	1964	7.8	2074	8.2	2185	8.6	2294	9.1	2399	9.5
2550	2074	8.2	2176	8.6	2281	9.0	2385	9.4	2486	9.8
2700	2185	8.6	2281	9.0	2379	9.4	2478	9.8	—	—
2850	2296	9.1	2386	9.4	2479	9.8	—	—	—	—
3000	2408	9.5	2493	9.9	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2182	8.6	2285	9.0	2382	9.4	2476	9.8		
1950	2258	8.9	2359	9.3	2455	9.7	—	—	—	—
2100	2337	9.2	2436	9.6	2530	10.0	—	—	—	—
2250	2417	9.6	2514	9.9	—	—	—	—	—	—
2400	2499	9.9	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Medium Static 1537-2530 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

48FCEM07 THREE PHASE – HIGH STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1537	5.4	1685	5.9	1824	6.4	1953	6.9	2071	7.3
1950	1641	5.8	1778	6.3	1911	6.7	2035	7.2	2150	7.6
2100	1748	6.2	1874	6.6	2000	7.1	2119	7.5	2231	7.9
2250	1855	6.5	1973	7.0	2091	7.4	2206	7.8	2314	8.2
2400	1964	6.9	2074	7.3	2185	7.7	2294	8.1	2399	8.5
2550	2074	7.3	2176	7.7	2281	8.0	2385	8.4	2486	8.8
2700	2185	7.7	2281	8.0	2379	8.4	2478	8.7	2575	9.1
2850	2296	8.1	2386	8.4	2479	8.7	2573	9.1	2666	9.4
3000	2408	8.5	2493	8.8	2581	9.1	2670	9.4	2759	9.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2182	7.7	2285	8.1	2382	8.4	2476	8.7	2564	9.0
1950	2258	8.0	2359	8.3	2455	8.7	2547	9.0	2634	9.3
2100	2337	8.2	2436	8.6	2530	8.9	2620	9.2	2706	9.5
2250	2417	8.5	2514	8.9	2606	9.2	2695	9.5	2780	9.8
2400	2499	8.8	2594	9.1	2685	9.5	2771	9.8	—	—
2550	2583	9.1	2676	9.4	2765	9.7	—	—	—	—
2700	2669	9.4	2759	9.7	—	—	—	—	—	—
2850	2757	9.7	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

High Static 1537-2836 RPM

NOTE: Fan tables include highest gas heat. Utilize static pressure deduction tables for lower gas heat capacities.

50FC-A04 SINGLE PHASE — 3 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1040	0.08	1307	0.16	1526	0.25	1705	0.35	1859	0.45
975	1082	0.09	1336	0.17	1554	0.26	1736	0.36	1892	0.47
1050	1127	0.10	1366	0.18	1582	0.28	1766	0.38	1925	0.50
1125	1175	0.11	1398	0.19	1609	0.29	1795	0.40	1956	0.52
1200	1225	0.13	1434	0.21	1638	0.31	1822	0.42	1984	0.54
1275	1277	0.15	1472	0.22	1667	0.32	1849	0.44	2012	0.57
1350	1330	0.16	1514	0.24	1699	0.34	1878	0.46	2040	0.59
1425	1385	0.19	1557	0.26	1734	0.36	1906	0.48	2068	0.62
1500	1440	0.21	1603	0.29	1771	0.39	1937	0.51	2095	0.64

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1995	0.55	2119	0.66	2234	0.78	2342	0.89	2444	1.02
975	2031	0.58	2156	0.70	2272	0.82	2380	0.94	2482	1.06
1050	2065	0.61	2192	0.73	2309	0.86	2418	0.98	—	—
1125	2098	0.64	2226	0.77	2345	0.90	2454	1.03	—	—
1200	2129	0.67	2259	0.80	2379	0.94	2490	1.07	—	—
1275	2159	0.70	2291	0.84	2412	0.98	—	—	—	—
1350	2187	0.73	2321	0.87	2444	1.02	—	—	—	—
1425	2215	0.76	2350	0.90	2474	1.05	—	—	—	—
1500	2242	0.78	2378	0.94	—	—	—	—	—	—

Standard Static 1040-1890 RPM, 0.44 Max BHP

Medium Static 1040-2190 RPM, 0.71 Max BHP

High Static 1040-2490 RPM, 1.07 Max BHP

50FC-A04 SINGLE PHASE – STANDARD STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	5.5	1307	6.9	1526	8.1	1705	9.0	—	—
975	1082	5.7	1336	7.1	1554	8.2	1736	9.2	—	—
1050	1127	6.0	1366	7.2	1582	8.4	1766	9.3	—	—
1125	1175	6.2	1398	7.4	1609	8.5	1795	9.5	—	—
1200	1225	6.5	1434	7.6	1638	8.7	1822	9.6	—	—
1275	1277	6.8	1472	7.8	1667	8.8	1849	9.8	—	—
1350	1330	7.0	1514	8.0	1699	9.0	—	—	—	—
1425	1385	7.3	1557	8.2	1734	9.2	—	—	—	—
1500	1440	7.6	1603	8.5	1771	9.4	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1040-1890 RPM

Fan data (cont)

50FC-A04 SINGLE PHASE – MEDIUM STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	4.7	1307	6.0	1526	7.0	1705	7.8	1859	8.5
975	1082	4.9	1336	6.1	1554	7.1	1736	7.9	1892	8.6
1050	1127	5.1	1366	6.2	1582	7.2	1766	8.1	1925	8.8
1125	1175	5.4	1398	6.4	1609	7.3	1795	8.2	1956	8.9
1200	1225	5.6	1434	6.5	1638	7.5	1822	8.3	1984	9.1
1275	1277	5.8	1472	6.7	1667	7.6	1849	8.4	2012	9.2
1350	1330	6.1	1514	6.9	1699	7.8	1878	8.6	2040	9.3
1425	1385	6.3	1557	7.1	1734	7.9	1906	8.7	2068	9.4
1500	1440	6.6	1603	7.3	1771	8.1	1937	8.8	2095	9.6

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1995	9.1	2119	9.7	—	—	—	—	—	—
975	2031	9.3	2156	9.8	—	—	—	—	—	—
1050	2065	9.4	—	—	—	—	—	—	—	—
1125	2098	9.6	—	—	—	—	—	—	—	—
1200	2129	9.7	—	—	—	—	—	—	—	—
1275	2159	9.9	—	—	—	—	—	—	—	—
1350	2187	10.0	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1040-2190 RPM

50FC-A04 SINGLE PHASE – HIGH STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	4.2	1307	5.2	1526	6.1	1705	6.8	1859	7.5
975	1082	4.3	1336	5.4	1554	6.2	1736	7.0	1892	7.6
1050	1127	4.5	1366	5.5	1582	6.4	1766	7.1	1925	7.7
1125	1175	4.7	1398	5.6	1609	6.5	1795	7.2	1956	7.9
1200	1225	4.9	1434	5.8	1638	6.6	1822	7.3	1984	8.0
1275	1277	5.1	1472	5.9	1667	6.7	1849	7.4	2012	8.1
1350	1330	5.3	1514	6.1	1699	6.8	1878	7.5	2040	8.2
1425	1385	5.6	1557	6.3	1734	7.0	1906	7.7	2068	8.3
1500	1440	5.8	1603	6.4	1771	7.1	1937	7.8	2095	8.4

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1995	8.0	2119	8.5	2234	9.0	2342	9.4	2444	9.8
975	2031	8.2	2156	8.7	2272	9.1	2380	9.6	2482	10.0
1050	2065	8.3	2192	8.8	2309	9.3	2418	9.7	—	—
1125	2098	8.4	2226	8.9	2345	9.4	2454	9.9	—	—
1200	2129	8.6	2259	9.1	2379	9.6	2490	10.0	—	—
1275	2159	8.7	2291	9.2	2412	9.7	—	—	—	—
1350	2187	8.8	2321	9.3	2444	9.8	—	—	—	—
1425	2215	8.9	2350	9.4	2474	9.9	—	—	—	—
1500	2242	9.0	2378	9.6	—	—	—	—	—	—

High Static 1040-2490 RPM

50FC-A04 THREE PHASE — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1040	0.08	1307	0.16	1526	0.25	1705	0.35	1859	0.45
975	1082	0.09	1336	0.17	1554	0.26	1736	0.36	1892	0.47
1050	1127	0.10	1366	0.18	1582	0.28	1766	0.38	1925	0.50
1125	1175	0.11	1398	0.19	1609	0.29	1795	0.40	1956	0.52
1200	1225	0.13	1434	0.21	1638	0.31	1822	0.42	1984	0.54
1275	1277	0.15	1472	0.22	1667	0.32	1849	0.44	2012	0.57
1350	1330	0.16	1514	0.24	1699	0.34	1878	0.46	2040	0.59
1425	1385	0.19	1557	0.26	1734	0.36	1906	0.48	2068	0.62
1500	1440	0.21	1603	0.29	1771	0.39	1937	0.51	2095	0.64

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1995	0.55	2119	0.66	2234	0.78	2342	0.89	2444	1.02
975	2031	0.58	2156	0.70	2272	0.82	2380	0.94	2482	1.06
1050	2065	0.61	2192	0.73	2309	0.86	2418	0.98	—	—
1125	2098	0.64	2226	0.77	2345	0.90	2454	1.03	—	—
1200	2129	0.67	2259	0.80	2379	0.94	2490	1.07	—	—
1275	2159	0.70	2291	0.84	2412	0.98	—	—	—	—
1350	2187	0.73	2321	0.87	2444	1.02	—	—	—	—
1425	2215	0.76	2350	0.90	2474	1.05	—	—	—	—
1500	2242	0.78	2378	0.94	—	—	—	—	—	—

Standard Static 1040-1890 RPM, 0.44 Max BHP

Medium Static 1040-2190 RPM, 0.71 Max BHP

High Static 1040-2490 RPM, 1.07 Max BHP

50FC-A04 THREE PHASE – STANDARD STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	5.5	1307	6.9	1526	8.1	1705	9.0	—	—
975	1082	5.7	1336	7.1	1554	8.2	1736	9.2	—	—
1050	1127	6.0	1366	7.2	1582	8.4	1766	9.3	—	—
1125	1175	6.2	1398	7.4	1609	8.5	1795	9.5	—	—
1200	1225	6.5	1434	7.6	1638	8.7	1822	9.6	—	—
1275	1277	6.8	1472	7.8	1667	8.8	1849	9.8	—	—
1350	1330	7.0	1514	8.0	1699	9.0	—	—	—	—
1425	1385	7.3	1557	8.2	1734	9.2	—	—	—	—
1500	1440	7.6	1603	8.5	1771	9.4	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1040-1890 RPM

Fan data (cont)

50FC-A04 THREE PHASE – MEDIUM STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	4.7	1307	6.0	1526	7.0	1705	7.8	1859	8.5
975	1082	4.9	1336	6.1	1554	7.1	1736	7.9	1892	8.6
1050	1127	5.1	1366	6.2	1582	7.2	1766	8.1	1925	8.8
1125	1175	5.4	1398	6.4	1609	7.3	1795	8.2	1956	8.9
1200	1225	5.6	1434	6.5	1638	7.5	1822	8.3	1984	9.1
1275	1277	5.8	1472	6.7	1667	7.6	1849	8.4	2012	9.2
1350	1330	6.1	1514	6.9	1699	7.8	1878	8.6	2040	9.3
1425	1385	6.3	1557	7.1	1734	7.9	1906	8.7	2068	9.4
1500	1440	6.6	1603	7.3	1771	8.1	1937	8.8	2095	9.6

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1995	9.1	2119	9.7	—	—	—	—	—	—
975	2031	9.3	2156	9.8	—	—	—	—	—	—
1050	2065	9.4	—	—	—	—	—	—	—	—
1125	2098	9.6	—	—	—	—	—	—	—	—
1200	2129	9.7	—	—	—	—	—	—	—	—
1275	2159	9.9	—	—	—	—	—	—	—	—
1350	2187	10.0	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1040-2190 RPM

50FC-A04 THREE PHASE – HIGH STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1040	4.2	1307	5.2	1526	6.1	1705	6.8	1859	7.5
975	1082	4.3	1336	5.4	1554	6.2	1736	7.0	1892	7.6
1050	1127	4.5	1366	5.5	1582	6.4	1766	7.1	1925	7.7
1125	1175	4.7	1398	5.6	1609	6.5	1795	7.2	1956	7.9
1200	1225	4.9	1434	5.8	1638	6.6	1822	7.3	1984	8.0
1275	1277	5.1	1472	5.9	1667	6.7	1849	7.4	2012	8.1
1350	1330	5.3	1514	6.1	1699	6.8	1878	7.5	2040	8.2
1425	1385	5.6	1557	6.3	1734	7.0	1906	7.7	2068	8.3
1500	1440	5.8	1603	6.4	1771	7.1	1937	7.8	2095	8.4

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1995	8.0	2119	8.5	2234	9.0	2342	9.4	2444	9.8
975	2031	8.2	2156	8.7	2272	9.1	2380	9.6	2482	10.0
1050	2065	8.3	2192	8.8	2309	9.3	2418	9.7	—	—
1125	2098	8.4	2226	8.9	2345	9.4	2454	9.9	—	—
1200	2129	8.6	2259	9.1	2379	9.6	2490	10.0	—	—
1275	2159	8.7	2291	9.2	2412	9.7	—	—	—	—
1350	2187	8.8	2321	9.3	2444	9.8	—	—	—	—
1425	2215	8.9	2350	9.4	2474	9.9	—	—	—	—
1500	2242	9.0	2378	9.6	—	—	—	—	—	—

High Static 1040-2490 RPM

50FC-A05 SINGLE PHASE — 4 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1120	0.15	1327	0.25	1506	0.37	1667	0.50	1814	0.65
1300	1178	0.18	1375	0.28	1549	0.40	1705	0.54	1849	0.69
1400	1238	0.21	1424	0.31	1593	0.44	1745	0.57	1886	0.73
1500	1300	0.24	1476	0.35	1639	0.47	1788	0.62	1925	0.77
1600	1365	0.27	1530	0.39	1688	0.52	1832	0.66	1966	0.82
1700	1430	0.31	1586	0.43	1737	0.56	1878	0.71	2009	0.87
1800	1497	0.36	1644	0.48	1789	0.61	1925	0.76	2053	0.93
1900	1565	0.41	1703	0.53	1842	0.67	1974	0.82	2099	0.99
2000	1633	0.46	1764	0.59	1897	0.73	2025	0.89	2146	1.05

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1950	0.81	2077	0.97	2195	1.15	2307	1.33	2411	1.52
1300	1983	0.85	2108	1.02	2225	1.19	2336	1.38	2442	1.58
1400	2017	0.89	2140	1.06	2256	1.24	2367	1.43	—	—
1500	2053	0.93	2174	1.11	2289	1.29	2399	1.49	—	—
1600	2092	0.98	2210	1.16	2323	1.35	2431	1.55	—	—
1700	2132	1.04	2248	1.22	2359	1.41	—	—	—	—
1800	2173	1.10	2288	1.28	2397	1.47	—	—	—	—
1900	2217	1.16	2329	1.35	2436	1.54	—	—	—	—
2000	2262	1.23	2372	1.42	—	—	—	—	—	—

Standard Static 1120-1900 RPM, 0.72 Max BHP

Medium Static 1120-2170 RPM, 1.06 Max BHP

High Static 1120-2460 RPM, 1.53 Max BHP

50FC-A05 SINGLE PHASE – STANDARD STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1120	5.9	1327	7.0	1506	7.9	1667	8.8	1814	9.5
1300	1178	6.2	1375	7.2	1549	8.2	1705	9.0	1849	9.7
1400	1238	6.5	1424	7.5	1593	8.4	1745	9.2	1886	9.9
1500	1300	6.8	1476	7.8	1639	8.6	1788	9.4	—	—
1600	1365	7.2	1530	8.1	1688	8.9	1832	9.6	—	—
1700	1430	7.5	1586	8.3	1737	9.1	1878	9.9	—	—
1800	1497	7.9	1644	8.7	1789	9.4	—	—	—	—
1900	1565	8.2	1703	9.0	1842	9.7	—	—	—	—
2000	1633	8.6	1764	9.3	1897	10.0	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1120-1900 RPM

50FC-A05 SINGLE PHASE – MEDIUM STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1120	5.2	1327	6.1	1506	6.9	1667	7.7	1814	8.4
1300	1178	5.4	1375	6.3	1549	7.1	1705	7.9	1849	8.5
1400	1238	5.7	1424	6.6	1593	7.3	1745	8.0	1886	8.7
1500	1300	6.0	1476	6.8	1639	7.6	1788	8.2	1925	8.9
1600	1365	6.3	1530	7.1	1688	7.8	1832	8.4	1966	9.1
1700	1430	6.6	1586	7.3	1737	8.0	1878	8.7	2009	9.3
1800	1497	6.9	1644	7.6	1789	8.2	1925	8.9	2053	9.5
1900	1565	7.2	1703	7.8	1842	8.5	1974	9.1	2099	9.7
2000	1633	7.5	1764	8.1	1897	8.7	2025	9.3	2146	9.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1950	9.0	2077	9.6	—	—	—	—	—	—
1300	1983	9.1	2108	9.7	—	—	—	—	—	—
1400	2017	9.3	2140	9.9	—	—	—	—	—	—
1500	2053	9.5	—	—	—	—	—	—	—	—
1600	2092	9.6	—	—	—	—	—	—	—	—
1700	2132	9.8	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1120-2170 RPM

50FC-A05 SINGLE PHASE – HIGH STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1120	4.6	1327	5.4	1506	6.1	1667	6.8	1814	7.4
1300	1178	4.8	1375	5.6	1549	6.3	1705	6.9	1849	7.5
1400	1238	5.0	1424	5.8	1593	6.5	1745	7.1	1886	7.7
1500	1300	5.3	1476	6.0	1639	6.7	1788	7.3	1925	7.8
1600	1365	5.5	1530	6.2	1688	6.9	1832	7.4	1966	8.0
1700	1430	5.8	1586	6.4	1737	7.1	1878	7.6	2009	8.2
1800	1497	6.1	1644	6.7	1789	7.3	1925	7.8	2053	8.3
1900	1565	6.4	1703	6.9	1842	7.5	1974	8.0	2099	8.5
2000	1633	6.6	1764	7.2	1897	7.7	2025	8.2	2146	8.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1950	7.9	2077	8.4	2195	8.9	2307	9.4	2411	9.8
1300	1983	8.1	2108	8.6	2225	9.0	2336	9.5	2442	9.9
1400	2017	8.2	2140	8.7	2256	9.2	2367	9.6	—	—
1500	2053	8.3	2174	8.8	2289	9.3	2399	9.8	—	—
1600	2092	8.5	2210	9.0	2323	9.4	2431	9.9	—	—
1700	2132	8.7	2248	9.1	2359	9.6	—	—	—	—
1800	2173	8.8	2288	9.3	2397	9.7	—	—	—	—
1900	2217	9.0	2329	9.5	2436	9.9	—	—	—	—
2000	2262	9.2	2372	9.6	—	—	—	—	—	—

High Static 1120-2460 RPM

50FC-A05 THREE PHASE — 4 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1115	0.15	1332	0.26	1513	0.37	1665	0.50	1801	0.63
1300	1174	0.17	1376	0.28	1557	0.41	1709	0.54	1843	0.67
1400	1236	0.20	1422	0.31	1601	0.44	1754	0.58	1887	0.72
1500	1300	0.24	1471	0.34	1644	0.48	1798	0.62	1932	0.77
1600	1366	0.27	1524	0.38	1688	0.51	1841	0.67	1976	0.82
1700	1433	0.31	1579	0.42	1734	0.56	1884	0.71	2020	0.88
1800	1501	0.36	1637	0.47	1783	0.60	1928	0.76	2063	0.93
1900	1570	0.41	1698	0.52	1834	0.66	1973	0.82	2106	0.99
2000	1640	0.47	1761	0.58	1888	0.71	2020	0.88	2150	1.06

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1931	0.78	2061	0.95	2200	1.15	2363	1.43	2617	1.94
1300	1967	0.82	2087	0.98	2207	1.16	2332	1.37	2471	1.62
1400	2009	0.87	2123	1.03	2234	1.20	2345	1.38	2460	1.60
1500	2052	0.93	2164	1.09	2271	1.25	2375	1.43	2478	1.63
1600	2097	0.99	2208	1.15	2312	1.32	2412	1.50	2510	1.69
1700	2141	1.05	2252	1.22	2356	1.39	2454	1.58	2548	1.76
1800	2185	1.11	2297	1.29	2400	1.47	2497	1.66	2590	1.85
1900	2229	1.18	2341	1.36	2445	1.55	2542	1.75	2634	1.94
2000	2272	1.25	2385	1.44	2489	1.64	2586	1.84	—	—

Standard Static 1115-1900 RPM, 0.72 Max BHP

Medium Static 1115-2170 RPM, 1.06 Max BHP

High Static 1115-2660 RPM, 1.96 Max BHP

50FC-A05 THREE PHASE – STANDARD STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1115	5.9	1332	7.0	1513	8.0	1665	8.8	1801	9.5
1300	1174	6.2	1376	7.2	1557	8.2	1709	9.0	1843	9.7
1400	1236	6.5	1422	7.5	1601	8.4	1754	9.2	1887	9.9
1500	1300	6.8	1471	7.7	1644	8.7	1798	9.5	—	—
1600	1366	7.2	1524	8.0	1688	8.9	1841	9.7	—	—
1700	1433	7.5	1579	8.3	1734	9.1	1884	9.9	—	—
1800	1501	7.9	1637	8.6	1783	9.4	—	—	—	—
1900	1570	8.3	1698	8.9	1834	9.7	—	—	—	—
2000	1640	8.6	1761	9.3	1888	9.9	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1115-1900 RPM

Fan data (cont)

50FC-A05 THREE PHASE – MEDIUM STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1115	5.1	1332	6.1	1513	7.0	1665	7.7	1801	8.3
1300	1174	5.4	1376	6.3	1557	7.2	1709	7.9	1843	8.5
1400	1236	5.7	1422	6.6	1601	7.4	1754	8.1	1887	8.7
1500	1300	6.0	1471	6.8	1644	7.6	1798	8.3	1932	8.9
1600	1366	6.3	1524	7.0	1688	7.8	1841	8.5	1976	9.1
1700	1433	6.6	1579	7.3	1734	8.0	1884	8.7	2020	9.3
1800	1501	6.9	1637	7.5	1783	8.2	1928	8.9	2063	9.5
1900	1570	7.2	1698	7.8	1834	8.5	1973	9.1	2106	9.7
2000	1640	7.6	1761	8.1	1888	8.7	2020	9.3	2150	9.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1931	8.9	2061	9.5	—	—	—	—	—	—
1300	1967	9.1	2087	9.6	—	—	—	—	—	—
1400	2009	9.3	2123	9.8	—	—	—	—	—	—
1500	2052	9.5	—	—	—	—	—	—	—	—
1600	2097	9.7	—	—	—	—	—	—	—	—
1700	2141	9.9	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1115-2170 RPM

50FC-A05 THREE PHASE – HIGH STATIC — 4 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1115	4.2	1332	5.0	1513	5.7	1665	6.3	1801	6.8
1300	1174	4.4	1376	5.2	1557	5.9	1709	6.4	1843	6.9
1400	1236	4.6	1422	5.3	1601	6.0	1754	6.6	1887	7.1
1500	1300	4.9	1471	5.5	1644	6.2	1798	6.8	1932	7.3
1600	1366	5.1	1524	5.7	1688	6.3	1841	6.9	1976	7.4
1700	1433	5.4	1579	5.9	1734	6.5	1884	7.1	2020	7.6
1800	1501	5.6	1637	6.2	1783	6.7	1928	7.2	2063	7.8
1900	1570	5.9	1698	6.4	1834	6.9	1973	7.4	2106	7.9
2000	1640	6.2	1761	6.6	1888	7.1	2020	7.6	2150	8.1

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1931	7.3	2061	7.7	2200	8.3	2363	8.9	2617	9.8
1300	1967	7.4	2087	7.8	2207	8.3	2332	8.8	2471	9.3
1400	2009	7.6	2123	8.0	2234	8.4	2345	8.8	2460	9.2
1500	2052	7.7	2164	8.1	2271	8.5	2375	8.9	2478	9.3
1600	2097	7.9	2208	8.3	2312	8.7	2412	9.1	2510	9.4
1700	2141	8.0	2252	8.5	2356	8.9	2454	9.2	2548	9.6
1800	2185	8.2	2297	8.6	2400	9.0	2497	9.4	2590	9.7
1900	2229	8.4	2341	8.8	2445	9.2	2542	9.6	2634	9.9
2000	2272	8.5	2385	9.0	2489	9.4	2586	9.7	—	—

High Static 1115-2660 RPM

50FC-A06 SINGLE PHASE — 5 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1301	0.24	1476	0.35	1639	0.47	1788	0.62	1925	0.77
1625	1381	0.28	1545	0.40	1700	0.53	1843	0.67	1976	0.83
1750	1463	0.34	1615	0.45	1763	0.59	1901	0.74	2031	0.90
1875	1548	0.40	1688	0.51	1828	0.65	1962	0.81	2087	0.97
2000	1633	0.46	1764	0.59	1897	0.73	2025	0.89	2146	1.05
2125	1720	0.54	1842	0.67	1967	0.81	2090	0.97	2208	1.15
2250	1808	0.63	1922	0.75	2040	0.90	2157	1.07	2271	1.24
2375	1897	0.72	2003	0.85	2115	1.00	2227	1.17	2336	1.35
2500	1987	0.83	2086	0.96	2191	1.11	2298	1.28	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2053	0.93	2174	1.11	2289	1.29	—	—	—	—
1625	2101	1.00	2220	1.18	2332	1.36	—	—	—	—
1750	2152	1.07	2268	1.25	2378	1.44	—	—	—	—
1875	2206	1.15	2318	1.33	—	—	—	—	—	—
2000	2262	1.23	2372	1.42	—	—	—	—	—	—
2125	2320	1.33	—	—	—	—	—	—	—	—
2250	2380	1.43	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1301-2150 RPM, 1.06 Max BHP

Medium Static 1301-2390 RPM, 1.44 Max BHP

50FC-A06 SINGLE PHASE – STANDARD STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1301	6.1	1476	6.9	1639	7.6	1788	8.3	1925	9.0
1625	1381	6.4	1545	7.2	1700	7.9	1843	8.6	1976	9.2
1750	1463	6.8	1615	7.5	1763	8.2	1901	8.8	2031	9.4
1875	1548	7.2	1688	7.9	1828	8.5	1962	9.1	2087	9.7
2000	1633	7.6	1764	8.2	1897	8.8	2025	9.4	2146	10.0
2125	1720	8.0	1842	8.6	1967	9.1	2090	9.7	—	—
2250	1808	8.4	1922	8.9	2040	9.5	—	—	—	—
2375	1897	8.8	2003	9.3	2115	9.8	—	—	—	—
2500	1987	9.2	2086	9.7	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2053	9.5	—	—	—	—	—	—	—	—
1625	2101	9.8	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1301-2150 RPM

Fan data (cont)

50FC-A06 SINGLE PHASE – MEDIUM STATIC — 3 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1301	5.4	1476	6.2	1639	6.9	1788	7.5	1925	8.1
1625	1381	5.8	1545	6.5	1700	7.1	1843	7.7	1976	8.3
1750	1463	6.1	1615	6.8	1763	7.4	1901	8.0	2031	8.5
1875	1548	6.5	1688	7.1	1828	7.6	1962	8.2	2087	8.7
2000	1633	6.8	1764	7.4	1897	7.9	2025	8.5	2146	9.0
2125	1720	7.2	1842	7.7	1967	8.2	2090	8.7	2208	9.2
2250	1808	7.6	1922	8.0	2040	8.5	2157	9.0	2271	9.5
2375	1897	7.9	2003	8.4	2115	8.8	2227	9.3	2336	9.8
2500	1987	8.3	2086	8.7	2191	9.2	2298	9.6	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2053	8.6	2174	9.1	2289	9.6	—	—	—	—
1625	2101	8.8	2220	9.3	2332	9.8	—	—	—	—
1750	2152	9.0	2268	9.5	2378	9.9	—	—	—	—
1875	2206	9.2	2318	9.7	—	—	—	—	—	—
2000	2262	9.5	2372	9.9	—	—	—	—	—	—
2125	2320	9.7	—	—	—	—	—	—	—	—
2250	2380	10.0	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1301-2390 RPM

50FC-A06 THREE PHASE — 5 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1301	0.24	1477	0.35	1639	0.47	1788	0.62	1925	0.77
1625	1381	0.28	1545	0.40	1700	0.53	1843	0.67	1977	0.83
1750	1463	0.34	1615	0.45	1763	0.59	1902	0.74	2031	0.90
1875	1548	0.40	1688	0.51	1829	0.65	1962	0.81	2088	0.97
2000	1633	0.46	1764	0.59	1897	0.73	2025	0.89	2147	1.06
2125	1720	0.54	1842	0.67	1968	0.81	2090	0.97	2208	1.15
2250	1809	0.63	1922	0.75	2040	0.90	2158	1.07	2271	1.24
2375	1897	0.72	2003	0.85	2115	1.00	2227	1.17	2336	1.35
2500	1987	0.83	2086	0.96	2192	1.12	2299	1.29	2403	1.47

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2053	0.93	2174	1.11	2289	1.29	2398	1.49	2502	1.69
1625	2102	1.00	2220	1.18	2332	1.36	2439	1.56	2542	1.77
1750	2153	1.07	2268	1.25	2378	1.44	2483	1.64	2584	1.85
1875	2206	1.15	2319	1.33	2426	1.53	2529	1.73	2628	1.94
2000	2262	1.23	2372	1.42	2477	1.62	2578	1.83	2675	2.04
2125	2320	1.33	2427	1.52	2530	1.72	2629	1.93	2724	2.15
2250	2380	1.43	2485	1.63	2585	1.83	2682	2.05	2775	2.27
2375	2443	1.55	2544	1.75	2642	1.96	2737	2.17	2828	2.40
2500	2506	1.67	2605	1.87	2701	2.09	2794	2.31	—	—

Standard Static 1301-2150 RPM, 1.06 Max BHP

Medium Static 1301-2390 RPM, 1.44 Max BHP

High Static 1301-2836 RPM, 2.43 Max BHP

50FC-A06 THREE PHASE – STANDARD STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1301	6.1	1477	6.9	1639	7.6	1788	8.3	1925	9.0
1625	1381	6.4	1545	7.2	1700	7.9	1843	8.6	1977	9.2
1750	1463	6.8	1615	7.5	1763	8.2	1902	8.8	2031	9.4
1875	1548	7.2	1688	7.9	1829	8.5	1962	9.1	2088	9.7
2000	1633	7.6	1764	8.2	1897	8.8	2025	9.4	2147	10.0
2125	1720	8.0	1842	8.6	1968	9.2	2090	9.7	—	—
2250	1809	8.4	1922	8.9	2040	9.5	—	—	—	—
2375	1897	8.8	2003	9.3	2115	9.8	—	—	—	—
2500	1987	9.2	2086	9.7	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2053	9.5	—	—	—	—	—	—	—	—
1625	2102	9.8	—	—	—	—	—	—	—	—
1750	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1301-2150 RPM

Fan data (cont)

50FC-A06 THREE PHASE – MEDIUM STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1301	5.4	1477	6.2	1639	6.9	1788	7.5	1925	8.1
1625	1381	5.8	1545	6.5	1700	7.1	1843	7.7	1977	8.3
1750	1463	6.1	1615	6.8	1763	7.4	1902	8.0	2031	8.5
1875	1548	6.5	1688	7.1	1829	7.7	1962	8.2	2088	8.7
2000	1633	6.8	1764	7.4	1897	7.9	2025	8.5	2147	9.0
2125	1720	7.2	1842	7.7	1968	8.2	2090	8.7	2208	9.2
2250	1809	7.6	1922	8.0	2040	8.5	2158	9.0	2271	9.5
2375	1897	7.9	2003	8.4	2115	8.8	2227	9.3	2336	9.8
2500	1987	8.3	2086	8.7	2192	9.2	2299	9.6	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2053	8.6	2174	9.1	2289	9.6	—	—	—	—
1625	2102	8.8	2220	9.3	2332	9.8	—	—	—	—
1750	2153	9.0	2268	9.5	2378	9.9	—	—	—	—
1875	2206	9.2	2319	9.7	—	—	—	—	—	—
2000	2262	9.5	2372	9.9	—	—	—	—	—	—
2125	2320	9.7	—	—	—	—	—	—	—	—
2250	2380	10.0	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1301-2390 RPM

50FC-A06 THREE PHASE – HIGH STATIC — 5 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1301	4.6	1477	5.2	1639	5.8	1788	6.3	1925	6.8
1625	1381	4.9	1545	5.4	1700	6.0	1843	6.5	1977	7.0
1750	1463	5.2	1615	5.7	1763	6.2	1902	6.7	2031	7.2
1875	1548	5.5	1688	6.0	1829	6.4	1962	6.9	2088	7.4
2000	1633	5.8	1764	6.2	1897	6.7	2025	7.1	2147	7.6
2125	1720	6.1	1842	6.5	1968	6.9	2090	7.4	2208	7.8
2250	1809	6.4	1922	6.8	2040	7.2	2158	7.6	2271	8.0
2375	1897	6.7	2003	7.1	2115	7.5	2227	7.9	2336	8.2
2500	1987	7.0	2086	7.4	2192	7.7	2299	8.1	2403	8.5

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2053	7.2	2174	7.7	2289	8.1	2398	8.5	2502	8.8
1625	2102	7.4	2220	7.8	2332	8.2	2439	8.6	2542	9.0
1750	2153	7.6	2268	8.0	2378	8.4	2483	8.8	2584	9.1
1875	2206	7.8	2319	8.2	2426	8.6	2529	8.9	2628	9.3
2000	2262	8.0	2372	8.4	2477	8.7	2578	9.1	2675	9.4
2125	2320	8.2	2427	8.6	2530	8.9	2629	9.3	2724	9.6
2250	2380	8.4	2485	8.8	2585	9.1	2682	9.5	2775	9.8
2375	2443	8.6	2544	9.0	2642	9.3	2737	9.7	2828	10.0
2500	2506	8.8	2605	9.2	2701	9.5	2794	9.9	—	—

High Static 1301-2836 RPM

50FC-M07 THREE PHASE — 6 TON VERTICAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	1423	0.30	1550	0.39	1682	0.50	1820	0.64	1955	0.79
1950	1521	0.37	1638	0.46	1758	0.57	1883	0.70	2011	0.86
2100	1620	0.45	1730	0.54	1839	0.65	1953	0.78	2071	0.93
2250	1720	0.53	1824	0.64	1924	0.75	2029	0.88	2137	1.02
2400	1820	0.63	1919	0.74	2013	0.85	2109	0.98	2209	1.13
2550	1921	0.74	2016	0.86	2105	0.98	2194	1.11	2286	1.25
2700	2022	0.86	2113	0.99	2198	1.11	2282	1.24	2368	1.39
2850	2123	1.00	2212	1.13	2293	1.26	2373	1.40	2453	1.54
3000	2225	1.15	2311	1.29	2389	1.42	2465	1.56	2541	1.71

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	2079	0.95	2192	1.11	2296	1.28	2393	1.45	2485	1.62
1950	2133	1.02	2247	1.19	2353	1.37	2451	1.55	2543	1.73
2100	2189	1.10	2301	1.28	2408	1.47	2507	1.66	2601	1.85
2250	2248	1.19	2357	1.37	2462	1.57	2562	1.76	2656	1.97
2400	2312	1.30	2416	1.48	2517	1.67	2616	1.88	2711	2.09
2550	2381	1.41	2479	1.60	2576	1.79	2672	2.00	2765	2.21
2700	2456	1.55	2546	1.73	2638	1.92	2730	2.13	2821	2.35
2850	2535	1.70	2619	1.88	2705	2.07	2793	2.28	—	—
3000	2618	1.87	2696	2.05	2777	2.24	—	—	—	—

Standard Static 1423-2300 RPM, 1.31 Max BHP

Medium Static 1423-2530 RPM, 1.76 Max BHP

High Static 1423-2836 RPM, 2.43 Max BHP

50FC-M07 THREE PHASE – STANDARD STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1423	6.2	1550	6.7	1682	7.3	1820	7.9	1955	8.5
1950	1521	6.6	1638	7.1	1758	7.6	1883	8.2	2011	8.7
2100	1620	7.0	1730	7.5	1839	8.0	1953	8.5	2071	9.0
2250	1720	7.5	1824	7.9	1924	8.4	2029	8.8	2137	9.3
2400	1820	7.9	1919	8.3	2013	8.8	2109	9.2	2209	9.6
2550	1921	8.4	2016	8.8	2105	9.2	2194	9.5	2286	9.9
2700	2022	8.8	2113	9.2	2198	9.6	2282	9.9	—	—
2850	2123	9.2	2212	9.6	2293	10.0	—	—	—	—
3000	2225	9.7	—	—	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2079	9.0	2192	9.5	2296	10.0	—	—	—	—
1950	2133	9.3	2247	9.8	—	—	—	—	—	—
2100	2189	9.5	—	—	—	—	—	—	—	—
2250	2248	9.8	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Standard Static 1423-2300 RPM

Fan data (cont)

50FC-M07 THREE PHASE – MEDIUM STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1423	5.6	1550	6.1	1682	6.6	1820	7.2	1955	7.7
1950	1521	6.0	1638	6.5	1758	6.9	1883	7.4	2011	7.9
2100	1620	6.4	1730	6.8	1839	7.3	1953	7.7	2071	8.2
2250	1720	6.8	1824	7.2	1924	7.6	2029	8.0	2137	8.4
2400	1820	7.2	1919	7.6	2013	8.0	2109	8.3	2209	8.7
2550	1921	7.6	2016	8.0	2105	8.3	2194	8.7	2286	9.0
2700	2022	8.0	2113	8.4	2198	8.7	2282	9.0	2368	9.4
2850	2123	8.4	2212	8.7	2293	9.1	2373	9.4	2453	9.7
3000	2225	8.8	2311	9.1	2389	9.4	2465	9.7	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2079	8.2	2192	8.7	2296	9.1	2393	9.5	2485	9.8
1950	2133	8.4	2247	8.9	2353	9.3	2451	9.7	—	—
2100	2189	8.7	2301	9.1	2408	9.5	2507	9.9	—	—
2250	2248	8.9	2357	9.3	2462	9.7	—	—	—	—
2400	2312	9.1	2416	9.5	2517	9.9	—	—	—	—
2550	2381	9.4	2479	9.8	—	—	—	—	—	—
2700	2456	9.7	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Medium Static 1423-2530 RPM

50FC-M07 THREE PHASE – HIGH STATIC — 6 TON VERTICAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1423	5.0	1550	5.5	1682	5.9	1820	6.4	1955	6.9
1950	1521	5.4	1638	5.8	1758	6.2	1883	6.6	2011	7.1
2100	1620	5.7	1730	6.1	1839	6.5	1953	6.9	2071	7.3
2250	1720	6.1	1824	6.4	1924	6.8	2029	7.2	2137	7.5
2400	1820	6.4	1919	6.8	2013	7.1	2109	7.4	2209	7.8
2550	1921	6.8	2016	7.1	2105	7.4	2194	7.7	2286	8.1
2700	2022	7.1	2113	7.5	2198	7.8	2282	8.0	2368	8.3
2850	2123	7.5	2212	7.8	2293	8.1	2373	8.4	2453	8.6
3000	2225	7.8	2311	8.1	2389	8.4	2465	8.7	2541	9.0

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2079	7.3	2192	7.7	2296	8.1	2393	8.4	2485	8.8
1950	2133	7.5	2247	7.9	2353	8.3	2451	8.6	2543	9.0
2100	2189	7.7	2301	8.1	2408	8.5	2507	8.8	2601	9.2
2250	2248	7.9	2357	8.3	2462	8.7	2562	9.0	2656	9.4
2400	2312	8.2	2416	8.5	2517	8.9	2616	9.2	2711	9.6
2550	2381	8.4	2479	8.7	2576	9.1	2672	9.4	2765	9.7
2700	2456	8.7	2546	9.0	2638	9.3	2730	9.6	2821	9.9
2850	2535	8.9	2619	9.2	2705	9.5	2793	9.8	—	—
3000	2618	9.2	2696	9.5	2777	9.8	—	—	—	—

High Static 1423-2836 RPM

50FC-A04 SINGLE PHASE — 3 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1017	0.07	1284	0.15	1501	0.24	1684	0.33	1843	0.44
975	1055	0.08	1311	0.16	1527	0.25	1711	0.35	1871	0.46
1050	1096	0.09	1340	0.17	1553	0.26	1737	0.36	1899	0.48
1125	1140	0.10	1371	0.18	1580	0.27	1763	0.38	1925	0.50
1200	1186	0.12	1404	0.19	1608	0.29	1789	0.40	1951	0.52
1275	1236	0.13	1440	0.21	1637	0.31	1816	0.42	1977	0.54
1350	1286	0.15	1477	0.22	1666	0.32	1843	0.44	2004	0.56
1425	1338	0.17	1517	0.24	1698	0.34	1871	0.46	2030	0.58
1500	1391	0.19	1559	0.26	1733	0.36	1900	0.48	2057	0.61

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1984	0.54	2113	0.66	2231	0.77	2342	0.89	2446	1.02
975	2014	0.57	2144	0.69	2264	0.81	2376	0.93	2481	1.06
1050	2043	0.59	2174	0.72	2295	0.84	2408	0.97	—	—
1125	2071	0.62	2203	0.74	2325	0.88	2439	1.01	—	—
1200	2098	0.64	2231	0.77	2354	0.91	2469	1.05	—	—
1275	2124	0.67	2258	0.80	2382	0.94	—	—	—	—
1350	2150	0.69	2285	0.83	2410	0.97	—	—	—	—
1425	2176	0.72	2311	0.86	2436	1.01	—	—	—	—
1500	2202	0.74	2337	0.89	2462	1.04	—	—	—	—

Standard Static 1017-1890 RPM, 0.44 Max BHP

Medium Static 1017-2190 RPM, 0.71 Max BHP

High Static 1017-2490 RPM, 1.07 Max BHP

50FC-A04 SINGLE PHASE – STANDARD STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	5.4	1284	6.8	1501	7.9	1684	8.9	1843	9.8
975	1055	5.6	1311	6.9	1527	8.1	1711	9.1	—	—
1050	1096	5.8	1340	7.1	1553	8.2	1737	9.2	—	—
1125	1140	6.0	1371	7.3	1580	8.4	1763	9.3	—	—
1200	1186	6.3	1404	7.4	1608	8.5	1789	9.5	—	—
1275	1236	6.5	1440	7.6	1637	8.7	1816	9.6	—	—
1350	1286	6.8	1477	7.8	1666	8.8	1843	9.8	—	—
1425	1338	7.1	1517	8.0	1698	9.0	—	—	—	—
1500	1391	7.4	1559	8.2	1733	9.2	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1017-1890 RPM

Fan data (cont)

50FC-A04 SINGLE PHASE – MEDIUM STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	4.6	1284	5.9	1501	6.9	1684	7.7	1843	8.4
975	1055	4.8	1311	6.0	1527	7.0	1711	7.8	1871	8.5
1050	1096	5.0	1340	6.1	1553	7.1	1737	7.9	1899	8.7
1125	1140	5.2	1371	6.3	1580	7.2	1763	8.1	1925	8.8
1200	1186	5.4	1404	6.4	1608	7.3	1789	8.2	1951	8.9
1275	1236	5.6	1440	6.6	1637	7.5	1816	8.3	1977	9.0
1350	1286	5.9	1477	6.7	1666	7.6	1843	8.4	2004	9.2
1425	1338	6.1	1517	6.9	1698	7.8	1871	8.5	2030	9.3
1500	1391	6.4	1559	7.1	1733	7.9	1900	8.7	2057	9.4

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1984	9.1	2113	9.6	—	—	—	—	—	—
975	2014	9.2	2144	9.8	—	—	—	—	—	—
1050	2043	9.3	—	—	—	—	—	—	—	—
1125	2071	9.5	—	—	—	—	—	—	—	—
1200	2098	9.6	—	—	—	—	—	—	—	—
1275	2124	9.7	—	—	—	—	—	—	—	—
1350	2150	9.8	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1017-2190 RPM

50FC-A04 SINGLE PHASE – HIGH STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	4.1	1284	5.2	1501	6.0	1684	6.8	1843	7.4
975	1055	4.2	1311	5.3	1527	6.1	1711	6.9	1871	7.5
1050	1096	4.4	1340	5.4	1553	6.2	1737	7.0	1899	7.6
1125	1140	4.6	1371	5.5	1580	6.3	1763	7.1	1925	7.7
1200	1186	4.8	1404	5.6	1608	6.5	1789	7.2	1951	7.8
1275	1236	5.0	1440	5.8	1637	6.6	1816	7.3	1977	7.9
1350	1286	5.2	1477	5.9	1666	6.7	1843	7.4	2004	8.0
1425	1338	5.4	1517	6.1	1698	6.8	1871	7.5	2030	8.2
1500	1391	5.6	1559	6.3	1733	7.0	1900	7.6	2057	8.3

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1984	8.0	2113	8.5	2231	9.0	2342	9.4	2446	9.8
975	2014	8.1	2144	8.6	2264	9.1	2376	9.5	2481	10.0
1050	2043	8.2	2174	8.7	2295	9.2	2408	9.7	—	—
1125	2071	8.3	2203	8.8	2325	9.3	2439	9.8	—	—
1200	2098	8.4	2231	9.0	2354	9.5	2469	9.9	—	—
1275	2124	8.5	2258	9.1	2382	9.6	—	—	—	—
1350	2150	8.6	2285	9.2	2410	9.7	—	—	—	—
1425	2176	8.7	2311	9.3	2436	9.8	—	—	—	—
1500	2202	8.8	2337	9.4	2462	9.9	—	—	—	—

High Static 1017-2490 RPM

50FC-A04 THREE PHASE — 3 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1017	0.07	1284	0.15	1501	0.24	1684	0.33	1843	0.44
975	1055	0.08	1311	0.16	1527	0.25	1711	0.35	1871	0.46
1050	1096	0.09	1340	0.17	1553	0.26	1737	0.36	1899	0.48
1125	1140	0.10	1371	0.18	1580	0.27	1763	0.38	1925	0.50
1200	1186	0.12	1404	0.19	1608	0.29	1789	0.40	1951	0.52
1275	1236	0.13	1440	0.21	1637	0.31	1816	0.42	1977	0.54
1350	1286	0.15	1477	0.22	1666	0.32	1843	0.44	2004	0.56
1425	1338	0.17	1517	0.24	1698	0.34	1871	0.46	2030	0.58
1500	1391	0.19	1559	0.26	1733	0.36	1900	0.48	2057	0.61

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1984	0.54	2113	0.66	2231	0.77	2342	0.89	2446	1.02
975	2014	0.57	2144	0.69	2264	0.81	2376	0.93	2481	1.06
1050	2043	0.59	2174	0.72	2295	0.84	2408	0.97	—	—
1125	2071	0.62	2203	0.74	2325	0.88	2439	1.01	—	—
1200	2098	0.64	2231	0.77	2354	0.91	2469	1.05	—	—
1275	2124	0.67	2258	0.80	2382	0.94	—	—	—	—
1350	2150	0.69	2285	0.83	2410	0.97	—	—	—	—
1425	2176	0.72	2311	0.86	2436	1.01	—	—	—	—
1500	2202	0.74	2337	0.89	2462	1.04	—	—	—	—

Standard Static 1017-1890 RPM, 0.44 Max BHP

Medium Static 1017-2190 RPM, 0.71 Max BHP

High Static 1017-2490 RPM, 1.07 Max BHP

50FC-A04 THREE PHASE – STANDARD STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	5.4	1284	6.8	1501	7.9	1684	8.9	1843	9.8
975	1055	5.6	1311	6.9	1527	8.1	1711	9.1	—	—
1050	1096	5.8	1340	7.1	1553	8.2	1737	9.2	—	—
1125	1140	6.0	1371	7.3	1580	8.4	1763	9.3	—	—
1200	1186	6.3	1404	7.4	1608	8.5	1789	9.5	—	—
1275	1236	6.5	1440	7.6	1637	8.7	1816	9.6	—	—
1350	1286	6.8	1477	7.8	1666	8.8	1843	9.8	—	—
1425	1338	7.1	1517	8.0	1698	9.0	—	—	—	—
1500	1391	7.4	1559	8.2	1733	9.2	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	—	—	—	—	—	—	—	—	—	—
975	—	—	—	—	—	—	—	—	—	—
1050	—	—	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Standard Static 1017-1890 RPM

50FC-A04 THREE PHASE – MEDIUM STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	4.6	1284	5.9	1501	6.9	1684	7.7	1843	8.4
975	1055	4.8	1311	6.0	1527	7.0	1711	7.8	1871	8.5
1050	1096	5.0	1340	6.1	1553	7.1	1737	7.9	1899	8.7
1125	1140	5.2	1371	6.3	1580	7.2	1763	8.1	1925	8.8
1200	1186	5.4	1404	6.4	1608	7.3	1789	8.2	1951	8.9
1275	1236	5.6	1440	6.6	1637	7.5	1816	8.3	1977	9.0
1350	1286	5.9	1477	6.7	1666	7.6	1843	8.4	2004	9.2
1425	1338	6.1	1517	6.9	1698	7.8	1871	8.5	2030	9.3
1500	1391	6.4	1559	7.1	1733	7.9	1900	8.7	2057	9.4

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1984	9.1	2113	9.6	—	—	—	—	—	—
975	2014	9.2	2144	9.8	—	—	—	—	—	—
1050	2043	9.3	—	—	—	—	—	—	—	—
1125	2071	9.5	—	—	—	—	—	—	—	—
1200	2098	9.6	—	—	—	—	—	—	—	—
1275	2124	9.7	—	—	—	—	—	—	—	—
1350	2150	9.8	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Medium Static 1017-2190 RPM

50FC-A04 THREE PHASE – HIGH STATIC — 3 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1017	4.1	1284	5.2	1501	6.0	1684	6.8	1843	7.4
975	1055	4.2	1311	5.3	1527	6.1	1711	6.9	1871	7.5
1050	1096	4.4	1340	5.4	1553	6.2	1737	7.0	1899	7.6
1125	1140	4.6	1371	5.5	1580	6.3	1763	7.1	1925	7.7
1200	1186	4.8	1404	5.6	1608	6.5	1789	7.2	1951	7.8
1275	1236	5.0	1440	5.8	1637	6.6	1816	7.3	1977	7.9
1350	1286	5.2	1477	5.9	1666	6.7	1843	7.4	2004	8.0
1425	1338	5.4	1517	6.1	1698	6.8	1871	7.5	2030	8.2
1500	1391	5.6	1559	6.3	1733	7.0	1900	7.6	2057	8.3

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
900	1984	8.0	2113	8.5	2231	9.0	2342	9.4	2446	9.8
975	2014	8.1	2144	8.6	2264	9.1	2376	9.5	2481	10.0
1050	2043	8.2	2174	8.7	2295	9.2	2408	9.7	—	—
1125	2071	8.3	2203	8.8	2325	9.3	2439	9.8	—	—
1200	2098	8.4	2231	9.0	2354	9.5	2469	9.9	—	—
1275	2124	8.5	2258	9.1	2382	9.6	—	—	—	—
1350	2150	8.6	2285	9.2	2410	9.7	—	—	—	—
1425	2176	8.7	2311	9.3	2436	9.8	—	—	—	—
1500	2202	8.8	2337	9.4	2462	9.9	—	—	—	—

High Static 1017-2490 RPM

50FC-A05 SINGLE PHASE — 4 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1092	0.14	1306	0.24	1497	0.35	1667	0.49	1819	0.64
1300	1148	0.16	1348	0.26	1533	0.38	1700	0.52	1851	0.67
1400	1207	0.18	1394	0.28	1571	0.41	1734	0.55	1882	0.70
1500	1267	0.21	1442	0.31	1612	0.44	1770	0.58	1916	0.73
1600	1329	0.24	1493	0.35	1655	0.47	1808	0.61	1951	0.77
1700	1393	0.28	1546	0.38	1700	0.51	1848	0.65	1988	0.81
1800	1458	0.32	1602	0.42	1748	0.55	1890	0.70	2026	0.86
1900	1523	0.36	1659	0.47	1797	0.60	1934	0.75	2066	0.91
2000	1590	0.41	1719	0.52	1849	0.65	1980	0.80	2108	0.96

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1958	0.79	2089	0.96	2211	1.14	2327	1.33	2438	1.53
1300	1988	0.83	2117	1.00	2238	1.18	2352	1.37	—	—
1400	2020	0.86	2146	1.03	2266	1.22	2379	1.41	—	—
1500	2051	0.90	2177	1.08	2296	1.26	2408	1.46	—	—
1600	2084	0.94	2209	1.12	2327	1.31	2438	1.51	—	—
1700	2119	0.99	2242	1.17	2358	1.36	—	—	—	—
1800	2154	1.03	2276	1.22	2391	1.41	—	—	—	—
1900	2191	1.08	2311	1.27	2424	1.47	—	—	—	—
2000	2230	1.14	2347	1.33	2459	1.53	—	—	—	—

Standard Static 1092-1900 RPM, 0.72 Max BHP

Medium Static 1092-2170 RPM, 1.06 Max BHP

High Static 1092-2460 RPM, 1.53 Max BHP

50FC-A05 SINGLE PHASE – STANDARD STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1092	5.7	1306	6.9	1497	7.9	1667	8.8	1819	9.6
1300	1148	6.0	1348	7.1	1533	8.1	1700	8.9	1851	9.7
1400	1207	6.4	1394	7.3	1571	8.3	1734	9.1	1882	9.9
1500	1267	6.7	1442	7.6	1612	8.5	1770	9.3	—	—
1600	1329	7.0	1493	7.9	1655	8.7	1808	9.5	—	—
1700	1393	7.3	1546	8.1	1700	8.9	1848	9.7	—	—
1800	1458	7.7	1602	8.4	1748	9.2	1890	9.9	—	—
1900	1523	8.0	1659	8.7	1797	9.5	—	—	—	—
2000	1590	8.4	1719	9.0	1849	9.7	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1092-1900 RPM

50FC-A05 SINGLE PHASE – MEDIUM STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1092	5.0	1306	6.0	1497	6.9	1667	7.7	1819	8.4
1300	1148	5.3	1348	6.2	1533	7.1	1700	7.8	1851	8.5
1400	1207	5.6	1394	6.4	1571	7.2	1734	8.0	1882	8.7
1500	1267	5.8	1442	6.6	1612	7.4	1770	8.2	1916	8.8
1600	1329	6.1	1493	6.9	1655	7.6	1808	8.3	1951	9.0
1700	1393	6.4	1546	7.1	1700	7.8	1848	8.5	1988	9.2
1800	1458	6.7	1602	7.4	1748	8.1	1890	8.7	2026	9.3
1900	1523	7.0	1659	7.6	1797	8.3	1934	8.9	2066	9.5
2000	1590	7.3	1719	7.9	1849	8.5	1980	9.1	2108	9.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1959	9.0	2089	9.6	—	—	—	—	—	—
1300	1988	9.2	2117	9.8	—	—	—	—	—	—
1400	2020	9.3	2146	9.9	—	—	—	—	—	—
1500	2051	9.5	—	—	—	—	—	—	—	—
1600	2084	9.6	—	—	—	—	—	—	—	—
1700	2119	9.8	—	—	—	—	—	—	—	—
1800	2154	9.9	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1092-2170 RPM

50FC-A05 SINGLE PHASE – HIGH STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1092	4.4	1306	5.3	1497	6.1	1667	6.8	1819	7.4
1300	1148	4.7	1348	5.5	1533	6.2	1700	6.9	1851	7.5
1400	1207	4.9	1394	5.7	1571	6.4	1734	7.0	1882	7.7
1500	1267	5.2	1442	5.9	1612	6.6	1770	7.2	1916	7.8
1600	1329	5.4	1493	6.1	1655	6.7	1808	7.3	1951	7.9
1700	1393	5.7	1546	6.3	1700	6.9	1848	7.5	1988	8.1
1800	1458	5.9	1602	6.5	1748	7.1	1890	7.7	2026	8.2
1900	1523	6.2	1659	6.7	1797	7.3	1934	7.9	2066	8.4
2000	1590	6.5	1719	7.0	1849	7.5	1980	8.0	2108	8.6

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1959	8.0	2089	8.5	2211	9.0	2327	9.5	2438	9.9
1300	1988	8.1	2117	8.6	2238	9.1	2352	9.6	—	—
1400	2020	8.2	2146	8.7	2266	9.2	2379	9.7	—	—
1500	2051	8.3	2177	8.8	2296	9.3	2408	9.8	—	—
1600	2084	8.5	2209	9.0	2327	9.5	2438	9.9	—	—
1700	2119	8.6	2242	9.1	2358	9.6	—	—	—	—
1800	2154	8.8	2276	9.3	2391	9.7	—	—	—	—
1900	2191	8.9	2311	9.4	2424	9.9	—	—	—	—
2000	2230	9.1	2347	9.5	2459	10.0	—	—	—	—

High Static 1092-2460 RPM

50FC-A05 THREE PHASE — 4 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1093	0.14	1306	0.24	1497	0.35	1667	0.49	1819	0.64
1300	1148	0.16	1348	0.26	1533	0.38	1700	0.52	1850	0.67
1400	1206	0.18	1393	0.28	1571	0.41	1734	0.55	1883	0.70
1500	1266	0.21	1442	0.31	1612	0.44	1770	0.58	1916	0.73
1600	1329	0.24	1493	0.35	1655	0.47	1808	0.61	1951	0.77
1700	1393	0.28	1546	0.38	1700	0.51	1848	0.65	1988	0.81
1800	1458	0.32	1602	0.42	1747	0.55	1890	0.70	2026	0.86
1900	1523	0.36	1659	0.47	1797	0.60	1934	0.75	2066	0.91
2000	1590	0.41	1718	0.52	1849	0.65	1980	0.80	2108	0.96

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1959	0.79	2089	0.96	2211	1.14	2327	1.33	2438	1.53
1300	1988	0.83	2117	1.00	2238	1.18	2352	1.37	2462	1.57
1400	2019	0.86	2146	1.03	2266	1.22	2379	1.41	2487	1.61
1500	2052	0.90	2177	1.08	2296	1.26	2408	1.46	2515	1.66
1600	2084	0.94	2209	1.12	2327	1.31	2438	1.51	2544	1.71
1700	2119	0.99	2242	1.17	2358	1.36	2469	1.56	2574	1.77
1800	2154	1.03	2276	1.22	2391	1.41	2500	1.61	2605	1.83
1900	2191	1.08	2311	1.27	2424	1.47	2533	1.68	2636	1.89
2000	2230	1.14	2347	1.33	2459	1.53	2566	1.74	—	—

Standard Static 1093-1900 RPM, 0.72 Max BHP

Medium Static 1093-2170 RPM, 1.06 Max BHP

High Static 1093-2660 RPM, 1.96 Max BHP

50FC-A05 THREE PHASE – STANDARD STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1093	5.8	1306	6.9	1497	7.9	1667	8.8	1819	9.6
1300	1148	6.0	1348	7.1	1533	8.1	1700	8.9	1850	9.7
1400	1206	6.3	1393	7.3	1571	8.3	1734	9.1	1883	9.9
1500	1266	6.7	1442	7.6	1612	8.5	1770	9.3	—	—
1600	1329	7.0	1493	7.9	1655	8.7	1808	9.5	—	—
1700	1393	7.3	1546	8.1	1700	8.9	1848	9.7	—	—
1800	1458	7.7	1602	8.4	1747	9.2	1890	9.9	—	—
1900	1523	8.0	1659	8.7	1797	9.5	—	—	—	—
2000	1590	8.4	1718	9.0	1849	9.7	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	—	—	—	—	—	—	—	—	—	—
1300	—	—	—	—	—	—	—	—	—	—
1400	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Standard Static 1093-1900 RPM

Fan data (cont)

50FC-M05 THREE PHASE – MEDIUM STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1093	5.0	1306	6.0	1497	6.9	1667	7.7	1819	8.4
1300	1148	5.3	1348	6.2	1533	7.1	1700	7.8	1850	8.5
1400	1206	5.6	1393	6.4	1571	7.2	1734	8.0	1883	8.7
1500	1266	5.8	1442	6.6	1612	7.4	1770	8.2	1916	8.8
1600	1329	6.1	1493	6.9	1655	7.6	1808	8.3	1951	9.0
1700	1393	6.4	1546	7.1	1700	7.8	1848	8.5	1988	9.2
1800	1458	6.7	1602	7.4	1747	8.1	1890	8.7	2026	9.3
1900	1523	7.0	1659	7.6	1797	8.3	1934	8.9	2066	9.5
2000	1590	7.3	1718	7.9	1849	8.5	1980	9.1	2108	9.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1959	9.0	2089	9.6	—	—	—	—	—	—
1300	1988	9.2	2117	9.8	—	—	—	—	—	—
1400	2019	9.3	2146	9.9	—	—	—	—	—	—
1500	2052	9.5	—	—	—	—	—	—	—	—
1600	2084	9.6	—	—	—	—	—	—	—	—
1700	2119	9.8	—	—	—	—	—	—	—	—
1800	2154	9.9	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—

Medium Static 1093-2170 RPM

50FC-M05 THREE PHASE – HIGH STATIC — 4 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1093	4.1	1306	4.9	1497	5.6	1667	6.3	1819	6.8
1300	1148	4.3	1348	5.1	1533	5.8	1700	6.4	1850	7.0
1400	1206	4.5	1393	5.2	1571	5.9	1734	6.5	1883	7.1
1500	1266	4.8	1442	5.4	1612	6.1	1770	6.7	1916	7.2
1600	1329	5.0	1493	5.6	1655	6.2	1808	6.8	1951	7.3
1700	1393	5.2	1546	5.8	1700	6.4	1848	6.9	1988	7.5
1800	1458	5.5	1602	6.0	1747	6.6	1890	7.1	2026	7.6
1900	1523	5.7	1659	6.2	1797	6.8	1934	7.3	2066	7.8
2000	1590	6.0	1718	6.5	1849	7.0	1980	7.4	2108	7.9

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1200	1959	7.4	2089	7.9	2211	8.3	2327	8.7	2438	9.2
1300	1988	7.5	2117	8.0	2238	8.4	2352	8.8	2462	9.3
1400	2019	7.6	2146	8.1	2266	8.5	2379	8.9	2487	9.3
1500	2052	7.7	2177	8.2	2296	8.6	2408	9.1	2515	9.5
1600	2084	7.8	2209	8.3	2327	8.7	2438	9.2	2544	9.6
1700	2119	8.0	2242	8.4	2358	8.9	2469	9.3	2574	9.7
1800	2154	8.1	2276	8.6	2391	9.0	2500	9.4	2605	9.8
1900	2191	8.2	2311	8.7	2424	9.1	2533	9.5	2636	9.9
2000	2230	8.4	2347	8.8	2459	9.2	2566	9.6	—	—

High Static 1093-2660 RPM

50FC-A06 SINGLE PHASE — 5 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1267	0.21	1442	0.31	1612	0.44	1770	0.58	1916	0.73
1625	1345	0.25	1506	0.35	1666	0.48	1818	0.62	1960	0.78
1750	1425	0.30	1574	0.40	1723	0.53	1869	0.68	2006	0.84
1875	1507	0.35	1644	0.46	1785	0.59	1923	0.73	2056	0.90
2000	1590	0.41	1718	0.52	1849	0.65	1980	0.80	2108	0.96
2125	1674	0.48	1794	0.59	1917	0.72	2041	0.87	2163	1.04
2250	1759	0.56	1872	0.67	1987	0.80	2104	0.95	2221	1.12
2375	1845	0.64	1951	0.76	2060	0.89	2171	1.05	2281	1.21
2500	1932	0.74	2032	0.86	2135	0.99	2239	1.15	2345	1.32

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2051	0.90	2177	1.08	2296	1.26	—	—	—	—
1625	2093	0.95	2217	1.13	2334	1.32	—	—	—	—
1750	2136	1.01	2259	1.19	2374	1.38	—	—	—	—
1875	2182	1.07	2302	1.26	—	—	—	—	—	—
2000	2230	1.14	2347	1.33	—	—	—	—	—	—
2125	2281	1.22	—	—	—	—	—	—	—	—
2250	2334	1.30	—	—	—	—	—	—	—	—
2375	2390	1.40	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1267-2150 RPM, 1.06 Max BHP

Medium Static 1267-2390 RPM, 1.44 Max BHP

50FC-A06 SINGLE PHASE – STANDARD STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1267	5.9	1442	6.7	1612	7.5	1770	8.2	1916	8.9
1625	1345	6.3	1506	7.0	1666	7.7	1818	8.5	1960	9.1
1750	1425	6.6	1574	7.3	1723	8.0	1869	8.7	2006	9.3
1875	1507	7.0	1644	7.6	1785	8.3	1923	8.9	2056	9.6
2000	1590	7.4	1719	8.0	1849	8.6	1980	9.2	2108	9.8
2125	1674	7.8	1794	8.3	1917	8.9	2041	9.5	—	—
2250	1760	8.2	1872	8.7	1987	9.2	2104	9.8	—	—
2375	1845	8.6	1951	9.1	2060	9.6	—	—	—	—
2500	1932	9.0	2032	9.5	2135	9.9	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2051	9.5	—	—	—	—	—	—	—	—
1625	2093	9.7	—	—	—	—	—	—	—	—
1750	2136	9.9	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1267-2150 RPM

Fan data (cont)

50FC-A06 SINGLE PHASE – MEDIUM STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1267	5.3	1442	6.0	1612	6.7	1770	7.4	1916	8.0
1625	1345	5.6	1506	6.3	1666	7.0	1818	7.6	1960	8.2
1750	1425	6.0	1574	6.6	1723	7.2	1869	7.8	2006	8.4
1875	1507	6.3	1644	6.9	1785	7.5	1923	8.0	2056	8.6
2000	1590	6.7	1719	7.2	1849	7.7	1980	8.3	2108	8.8
2125	1674	7.0	1794	7.5	1917	8.0	2041	8.5	2163	9.1
2250	1760	7.4	1872	7.8	1987	8.3	2104	8.8	2221	9.3
2375	1845	7.7	1951	8.2	2060	8.6	2171	9.1	2281	9.5
2500	1932	8.1	2032	8.5	2135	8.9	2239	9.4	2345	9.8

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2051	8.6	2177	9.1	2296	9.6	—	—	—	—
1625	2093	8.8	2217	9.3	2334	9.8	—	—	—	—
1750	2136	8.9	2259	9.5	2374	9.9	—	—	—	—
1875	2182	9.1	2302	9.6	—	—	—	—	—	—
2000	2230	9.3	2347	9.8	—	—	—	—	—	—
2125	2281	9.5	—	—	—	—	—	—	—	—
2250	2334	9.8	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1267-2390 RPM

50FC-A06 THREE PHASE — 5 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1267	0.21	1442	0.31	1612	0.44	1770	0.58	1916	0.73
1625	1345	0.25	1506	0.35	1666	0.48	1818	0.62	1960	0.78
1750	1425	0.30	1574	0.40	1723	0.53	1869	0.68	2006	0.84
1875	1507	0.35	1644	0.46	1785	0.59	1923	0.73	2056	0.90
2000	1590	0.41	1718	0.52	1849	0.65	1980	0.80	2108	0.96
2125	1674	0.48	1794	0.59	1917	0.72	2041	0.87	2163	1.04
2250	1759	0.56	1872	0.67	1987	0.80	2104	0.95	2221	1.12
2375	1845	0.64	1951	0.76	2060	0.89	2171	1.05	2281	1.21
2500	1932	0.74	2032	0.86	2135	0.99	2239	1.15	2345	1.32

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	2051	0.90	2177	1.08	2296	1.26	2408	1.46	2515	1.66
1625	2093	0.95	2217	1.13	2334	1.32	2445	1.52	2551	1.72
1750	2136	1.01	2259	1.19	2374	1.38	2484	1.59	2589	1.80
1875	2182	1.07	2302	1.26	2416	1.45	2524	1.66	2628	1.87
2000	2230	1.14	2347	1.33	2459	1.53	2566	1.74	2669	1.96
2125	2281	1.22	2395	1.41	2505	1.61	2610	1.83	2711	2.05
2250	2334	1.30	2445	1.50	2552	1.70	2655	1.92	2754	2.14
2375	2391	1.40	2497	1.59	2601	1.80	2702	2.02	2800	2.25
2500	2449	1.50	2552	1.70	2653	1.91	2751	2.13	—	—

Standard Static 1267-2150 RPM, 1.06 Max BHP

Medium Static 1267-2390 RPM, 1.44 Max BHP

High Static 1267-2836 RPM, 2.43 Max BHP

50FC-A06 THREE PHASE – STANDARD STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1267	5.9	1442	6.7	1612	7.5	1770	8.2	1916	8.9
1625	1345	6.3	1506	7.0	1666	7.7	1818	8.5	1960	9.1
1750	1425	6.6	1574	7.3	1723	8.0	1869	8.7	2006	9.3
1875	1507	7.0	1644	7.6	1785	8.3	1923	8.9	2056	9.6
2000	1590	7.4	1719	8.0	1849	8.6	1980	9.2	2108	9.8
2125	1674	7.8	1794	8.3	1917	8.9	2041	9.5	—	—
2250	1760	8.2	1872	8.7	1987	9.2	2104	9.8	—	—
2375	1845	8.6	1951	9.1	2060	9.6	—	—	—	—
2500	1932	9.0	2032	9.5	2135	9.9	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2051	9.5	—	—	—	—	—	—	—	—
1625	2093	9.7	—	—	—	—	—	—	—	—
1750	2136	9.9	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2125	—	—	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Standard Static 1267-2150 RPM

Fan data (cont)

50FC-A06 THREE PHASE – MEDIUM STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1267	5.3	1442	6.0	1612	6.7	1770	7.4	1916	8.0
1625	1345	5.6	1506	6.3	1666	7.0	1818	7.6	1960	8.2
1750	1425	6.0	1574	6.6	1723	7.2	1869	7.8	2006	8.4
1875	1507	6.3	1644	6.9	1785	7.5	1923	8.0	2056	8.6
2000	1590	6.7	1719	7.2	1849	7.7	1980	8.3	2108	8.8
2125	1674	7.0	1794	7.5	1917	8.0	2041	8.5	2163	9.1
2250	1760	7.4	1872	7.8	1987	8.3	2104	8.8	2221	9.3
2375	1845	7.7	1951	8.2	2060	8.6	2171	9.1	2281	9.5
2500	1932	8.1	2032	8.5	2135	8.9	2239	9.4	2345	9.8

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2051	8.6	2177	9.1	2296	9.6	—	—	—	—
1625	2093	8.8	2217	9.3	2334	9.8	—	—	—	—
1750	2136	8.9	2259	9.5	2374	9.9	—	—	—	—
1875	2182	9.1	2302	9.6	—	—	—	—	—	—
2000	2230	9.3	2347	9.8	—	—	—	—	—	—
2125	2281	9.5	—	—	—	—	—	—	—	—
2250	2334	9.8	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

Medium Static 1267-2390 RPM

50FC-A06 THREE PHASE – HIGH STATIC — 5 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	1267	4.5	1442	5.1	1612	5.7	1770	6.2	1916	6.8
1625	1345	4.7	1506	5.3	1666	5.9	1818	6.4	1960	6.9
1750	1425	5.0	1574	5.6	1723	6.1	1869	6.6	2006	7.1
1875	1507	5.3	1644	5.8	1785	6.3	1923	6.8	2056	7.2
2000	1590	5.6	1719	6.1	1849	6.5	1980	7.0	2108	7.4
2125	1674	5.9	1794	6.3	1917	6.8	2041	7.2	2163	7.6
2250	1760	6.2	1872	6.6	1987	7.0	2104	7.4	2221	7.8
2375	1845	6.5	1951	6.9	2060	7.3	2171	7.7	2281	8.0
2500	1932	6.8	2032	7.2	2135	7.5	2239	7.9	2345	8.3

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1500	2051	7.2	2177	7.7	2296	8.1	2408	8.5	2515	8.9
1625	2093	7.4	2217	7.8	2334	8.2	2445	8.6	2551	9.0
1750	2136	7.5	2259	8.0	2374	8.4	2484	8.8	2589	9.1
1875	2182	7.7	2302	8.1	2416	8.5	2524	8.9	2628	9.3
2000	2230	7.9	2347	8.3	2459	8.7	2566	9.0	2669	9.4
2125	2281	8.0	2395	8.4	2505	8.8	2610	9.2	2711	9.6
2250	2334	8.2	2445	8.6	2552	9.0	2655	9.4	2755	9.7
2375	2391	8.4	2498	8.8	2602	9.2	2702	9.5	2800	9.9
2500	2449	8.6	2552	9.0	2653	9.4	2752	9.7	—	—

High Static 1267-2836 RPM

50FC-M07 THREE PHASE — 6 TON HORIZONTAL SUPPLY (RPM - BHP)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	1379	0.27	1512	0.35	1650	0.46	1786	0.58	1918	0.72
1950	1473	0.32	1594	0.41	1721	0.52	1848	0.64	1973	0.78
2100	1569	0.39	1680	0.48	1796	0.59	1915	0.71	2032	0.85
2250	1666	0.47	1769	0.56	1876	0.67	1986	0.79	2096	0.93
2400	1764	0.55	1860	0.65	1959	0.76	2061	0.88	2165	1.02
2550	1863	0.65	1952	0.75	2045	0.86	2140	0.99	2237	1.13
2700	1963	0.76	2047	0.86	2133	0.97	2222	1.10	2313	1.24
2850	2063	0.88	2142	0.99	2223	1.10	2307	1.23	2393	1.37
3000	2163	1.01	2238	1.12	2315	1.24	2394	1.37	2474	1.52

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	2044	0.87	2163	1.03	2276	1.20	2383	1.38	2486	1.57
1950	2094	0.93	2210	1.10	2320	1.27	2426	1.45	2527	1.64
2100	2148	1.00	2260	1.17	2367	1.34	2471	1.53	2570	1.72
2250	2206	1.08	2313	1.25	2417	1.43	2518	1.61	2616	1.81
2400	2268	1.18	2371	1.34	2471	1.52	2569	1.71	2664	1.90
2550	2335	1.28	2432	1.45	2528	1.62	2622	1.81	2715	2.01
2700	2405	1.40	2497	1.56	2589	1.74	2680	1.93	2769	2.13
2850	2479	1.53	2566	1.69	2654	1.87	2740	2.06	2826	2.26
3000	2556	1.67	2639	1.84	2722	2.02	2804	2.21	—	—

Standard Static 1379-2300 RPM, 1.31 Max BHP

Medium Static 1379-2530 RPM, 1.76 Max BHP

High Static 1379-2836 RPM, 2.43 Max BHP

50FC-M07 THREE PHASE – STANDARD STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1379	6.0	1512	6.6	1650	7.2	1786	7.8	1918	8.3
1950	1473	6.4	1594	6.9	1721	7.5	1848	8.0	1973	8.6
2100	1569	6.8	1680	7.3	1796	7.8	1915	8.3	2032	8.8
2250	1666	7.2	1769	7.7	1876	8.2	1986	8.6	2096	9.1
2400	1764	7.7	1860	8.1	1959	8.5	2061	9.0	2165	9.4
2550	1863	8.1	1952	8.5	2045	8.9	2140	9.3	2237	9.7
2700	1963	8.5	2047	8.9	2133	9.3	2222	9.7	—	—
2850	2063	9.0	2142	9.3	2223	9.7	—	—	—	—
3000	2163	9.4	2238	9.7	—	—	—	—	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2044	8.9	2163	9.4	2276	9.9	—	—	—	—
1950	2094	9.1	2210	9.6	—	—	—	—	—	—
2100	2148	9.3	2260	9.8	—	—	—	—	—	—
2250	2206	9.6	—	—	—	—	—	—	—	—
2400	2268	9.9	—	—	—	—	—	—	—	—
2550	—	—	—	—	—	—	—	—	—	—
2700	—	—	—	—	—	—	—	—	—	—
2850	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Standard Static 1379-2300 RPM

50FC-M07 THREE PHASE – MEDIUM STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1379	5.5	1512	6.0	1650	6.5	1786	7.1	1918	7.6
1950	1473	5.8	1594	6.3	1721	6.8	1848	7.3	1973	7.8
2100	1569	6.2	1680	6.6	1796	7.1	1915	7.6	2032	8.0
2250	1666	6.6	1769	7.0	1876	7.4	1986	7.8	2096	8.3
2400	1764	7.0	1860	7.4	1959	7.7	2061	8.1	2165	8.6
2550	1863	7.4	1952	7.7	2045	8.1	2140	8.5	2237	8.8
2700	1963	7.8	2047	8.1	2133	8.4	2222	8.8	2313	9.1
2850	2063	8.2	2142	8.5	2223	8.8	2307	9.1	2393	9.5
3000	2163	8.5	2238	8.8	2315	9.2	2394	9.5	2474	9.8

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2044	8.1	2163	8.5	2276	9.0	2383	9.4	2486	9.8
1950	2094	8.3	2210	8.7	2320	9.2	2426	9.6	2527	10.0
2100	2148	8.5	2260	8.9	2367	9.4	2471	9.8	—	—
2250	2206	8.7	2313	9.1	2417	9.6	2518	10.0	—	—
2400	2268	9.0	2371	9.4	2471	9.8	—	—	—	—
2550	2335	9.2	2432	9.6	2528	10.0	—	—	—	—
2700	2405	9.5	2497	9.9	—	—	—	—	—	—
2850	2479	9.8	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

Medium Static 1379-2530 RPM

50FC-M07 THREE PHASE – HIGH STATIC — 6 TON HORIZONTAL SUPPLY (RPM - VDC)

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	1379	4.9	1512	5.3	1650	5.8	1786	6.3	1918	6.8
1950	1473	5.2	1594	5.6	1721	6.1	1848	6.5	1973	7.0
2100	1569	5.5	1680	5.9	1796	6.3	1915	6.8	2032	7.2
2250	1666	5.9	1769	6.2	1876	6.6	1986	7.0	2096	7.4
2400	1764	6.2	1860	6.6	1959	6.9	2061	7.3	2165	7.6
2550	1863	6.6	1952	6.9	2045	7.2	2140	7.5	2237	7.9
2700	1963	6.9	2047	7.2	2133	7.5	2222	7.8	2313	8.2
2850	2063	7.3	2142	7.6	2223	7.8	2307	8.1	2393	8.4
3000	2163	7.6	2238	7.9	2315	8.2	2394	8.4	2474	8.7

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc	RPM	Vdc
1800	2044	7.2	2163	7.6	2276	8.0	2383	8.4	2486	8.8
1950	2094	7.4	2210	7.8	2320	8.2	2426	8.6	2527	8.9
2100	2148	7.6	2260	8.0	2367	8.3	2471	8.7	2570	9.1
2250	2206	7.8	2313	8.2	2417	8.5	2518	8.9	2616	9.2
2400	2268	8.0	2371	8.4	2471	8.7	2569	9.1	2664	9.4
2550	2335	8.2	2432	8.6	2528	8.9	2622	9.2	2715	9.6
2700	2405	8.5	2497	8.8	2589	9.1	2680	9.4	2769	9.8
2850	2479	8.7	2566	9.0	2654	9.4	2740	9.7	2826	10.0
3000	2556	9.0	2639	9.3	2722	9.6	2804	9.9	—	—

High Static 1379-2836 RPM

Legend and Notes

Applicable for Electrical Data Tables on pages 98 to 118

LEGEND

BRKR	— Circuit Breaker
C.O.	— Convenience Outlet
FLA	— Full Load Amps
IFM	— Indoor Fan Motor
LRA	— Locked Rotor Amps
MCA	— Minimum Circuit Amps
P.E.	— Power Exhaust
PWRD C.O.	— Powered Convenience Outlet
RLA	— Rated Load Amps
UNPWR C.O.	— Unpowered Convenience Outlet

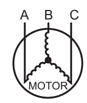
NOTES:

1. In compliance with NEC requirements for multi-motor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. For 208/230 v units, where one value is show it is the same for either 208 or 230 volts.
3. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.
(AB) 227-224 = 3 v
(BC) 231-227 = 4 v
(AC) 227-226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100\text{x} \frac{4}{227} = 1.78\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

NOTE: Check all factory and field electrical connections for tightness.

Electrical data (cont)

48/50FC**04-07 COOLING ELECTRICAL DATA

48/50FC UNIT	V-Ph-Hz	UNIT VOLTAGE RANGE		COMPRESSOR		OFM (EA)		IFM			COMBUSTION FAN MOTOR	POWER EXHAUST	
		MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFFCY AT FULL LOAD	FLA	FLA	KIT QTY	FLA (EA KIT)
**04	208-1-60	187	253	15.4	84	275	1.5	STD	83%	3.0	0.48	1	1.9
								MED	84%	4.5			
								HIGH	89%	6.1			
	230-1-60	187	253	15.4	84	275	1.5	STD	83%	3.0	0.48	1	1.9
								MED	84%	4.5			
								HIGH	89%	6.1			
	208-3-60	187	253	10.4	73	275	1.5	STD	83%	3.0	0.48	1	1.9
								MED	84%	4.5			
								HIGH	89%	6.1			
	230-3-60	187	253	10.4	73	275	1.5	STD	83%	3.0	0.48	1	1.9
								MED	84%	4.5			
								HIGH	89%	6.1			
	460-3-60	414	506	5.8	38	275	0.8	STD	85%	0.8	0.25	1	1.0
								MED	85%	1.2			
								HIGH	84%	1.5			
	575-3-60	518	633	3.8	37	275	0.6	STD	84%	0.8	0.24	1	1.9
								MED	84%	1.1			
								HIGH	85%	1.5			
**05	208-1-60	187	253	19.6	130	275	1.5	STD	84%	4.5	0.48	1	1.9
								MED	88%	6.1			
								HIGH	84%	8.8			
	230-1-60	187	253	19.6	130	275	1.5	STD	84%	4.5	0.48	1	1.9
								MED	88%	6.1			
								HIGH	84%	8.8			
	208-3-60	187	253	13.7	83	275	1.5	STD	84%	4.5	0.48	1	1.9
								MED	88%	6.1			
								HIGH	85%	5.1			
	230-3-60	187	253	13.7	83	275	1.5	STD	84%	4.5	0.48	1	1.9
								MED	88%	6.1			
								HIGH	85%	5.1			
	460-3-60	414	506	6.2	41	275	0.8	STD	85%	1.2	0.25	1	1.0
								MED	86%	1.5			
								HIGH	88%	2.4			
	575-3-60	518	633	4.8	33	275	0.6	STD	84%	1.1	0.24	1	1.9
								MED	85%	1.5			
								HIGH	88%	2.2			
**06	208-1-60	187	253	24.4	144	275	1.5	STD	85%	6.4	0.48	1	1.9
								MED	84%	8.6			
	230-1-60	187	253	24.4	144	275	1.5	STD	85%	6.4	0.48	1	1.9
								MED	84%	8.6			
	208-3-60	187	253	16.0	110	275	1.5	STD	85%	6.4	0.48	1	1.9
								MED	84%	8.6			
								HIGH	84%	6.4			
	230-3-60	187	253	16.0	110	275	1.5	STD	85%	6.4	0.48	1	1.9
								MED	84%	8.6			
								HIGH	84%	6.4			
	460-3-60	414	506	7.8	52	275	0.8	STD	86%	1.5	0.25	1	1.0
								MED	86%	1.9			
								HIGH	88%	2.9			
	575-3-60	518	633	5.7	39	275	0.6	STD	84%	1.5	0.24	1	1.9
								MED	85%	1.8			
								HIGH	87%	2.5			

48/50FC**04-07 COOLING ELECTRICAL DATA (cont)

48/50FC UNIT	V-Ph-Hz	UNIT VOLTAGE RANGE		COMPRESSOR		OFM (EA)		IFM			COMBUSTION FAN MOTOR	POWER EXHAUST	
		MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFFCY AT FULL LOAD	FLA	FLA	KIT QTY	FLA (EA KIT)
**07	208-3-60	187	253	17.5	136	275	1.5	STD	84%	7.8	0.48	1	1.9
								MED	88%	4.5			
								HIGH	84%	6.4			
	230-3-60	187	253	17.5	136	275	1.5	STD	84%	7.8	0.48	1	1.9
								MED	88%	4.5			
								HIGH	84%	6.4			
	460-3-60	414	506	8.4	66	275	0.8	STD	85%	1.8	0.25	1	1.0
								MED	88%	2.2			
								HIGH	88%	2.9			
	575-3-60	518	633	6.3	55	275	0.6	STD	85%	1.7	0.24	1	1.9
								MED	88%	2.0			
								HIGH	87%	2.5			

48FC04-07 MCA MOCP ELECTRICAL DATA**

48FC UNIT SIZE	NOM. V-PH-Hz	IFM TYPE	NO CONVENIENCE OUTLET OR UNPOWERED CONVENIENCE OUTLET							
			NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			MCA	FUSE OR HACR BREAKER	DISCONNECT SIZE		MCA	FUSE OR HACR BREAKER	DISCONNECT SIZE	
					FLA	LRA			FLA	LRA
**04	208/230-1-60	STD	24	30	23	92	26	30	25	94
		MED	26	30	25	94	28	40	27	96
		HIGH	27	40	26	97	29	40	29	99
	208/230-3-60	STD	18	25	17	81	20	25	19	83
		MED	19	25	19	83	21	30	21	85
		HIGH	21	30	21	86	23	30	23	88
	460-3-60	STD	9	15	9	41	10	15	10	42
		MED	10	15	9	42	11	15	10	43
		HIGH	10	15	9	42	11	15	10	43
	575-3-60	STD	7	15	6	40	9	15	8	42
		MED	7	15	6	41	9	15	9	43
		HIGH	7	15	7	41	9	15	9	43
**05	208/230-1-60	STD	31	50	29	140	33	50	32	142
		MED	33	50	31	143	34	50	33	145
		HIGH	35	50	34	146	37	50	37	148
	208/230-3-60	STD	24	30	23	93	25	30	25	95
		MED	25	30	24	96	27	40	27	98
		HIGH	24	30	23	94	26	30	26	96
	460-3-60	STD	10	15	9	45	11	15	11	46
		MED	11	15	10	45	12	15	11	46
		HIGH	11	15	11	46	12	15	12	47
	575-3-60	STD	8	15	7	37	10	15	10	39
		MED	9	15	8	37	10	15	10	39
		HIGH	9	15	9	38	11	15	11	40
**06	208/230-1-60	STD	39	60	37	157	41	60	39	159
		MED	41	60	40	160	43	60	42	162
	208/230-3-60	STD	28	40	27	123	30	45	30	125
		MED	31	45	30	126	32	45	32	128
		HIGH	28	40	27	123	30	45	30	125
	460-3-60	STD	13	15	12	56	14	20	13	57
		MED	13	20	12	57	14	20	13	58
		HIGH	14	20	13	58	15	20	14	59
	575-3-60	STD	10	15	9	43	12	15	11	45
		MED	10	15	9	43	12	15	12	45
		HIGH	11	15	10	45	13	15	12	47
**07	208/230-3-60	STD	32	45	31	151	34	50	33	153
		MED	28	45	27	146	30	45	29	148
		HIGH	30	45	29	149	32	45	31	151
	460-3-60	STD	14	20	13	71	15	20	14	72
		MED	14	20	13	71	15	20	14	72
		HIGH	15	20	14	72	16	20	15	73
	575-3-60	STD	11	15	10	59	13	15	12	61
		MED	11	15	10	60	13	15	12	62
		HIGH	11	15	11	61	13	15	13	63

48FC**04-07 MCA MOCP ELECTRICAL DATA (cont)

48FC UNIT SIZE	NOM. V-PH-Hz	IFM TYPE	w/ POWERED CONVENIENCE OUTLET							
			NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			MCA	FUSE OR HACR BREAKER	DISCONNECT SIZE		MCA	FUSE OR HACR BREAKER	DISCONNECT SIZE	
					FLA	LRA			FLA	LRA
**04	208/230-3-60	STD	23	30	23	86	25	30	25	88
		MED	24	30	24	88	26	30	27	90
		HIGH	26	30	26	91	28	30	28	93
	460-3-60	STD	12	15	11	43	13	15	12	44
		MED	12	15	12	44	13	15	13	45
		HIGH	12	15	12	44	13	15	13	45
	575-3-60	STD	8	15	8	42	10	15	10	44
		MED	9	15	8	43	11	15	10	45
		HIGH	9	15	9	43	11	15	11	45
**05	208/230-3-60	STD	28	40	28	98	30	40	30	100
		MED	30	40	30	101	32	45	32	103
		HIGH	29	40	29	99	31	40	31	101
	460-3-60	STD	12	15	12	47	13	15	13	48
		MED	13	15	12	47	14	15	13	48
		HIGH	14	15	13	48	15	20	14	49
	575-3-60	STD	10	15	9	39	12	15	12	41
		MED	10	15	10	39	12	15	12	41
		HIGH	11	15	11	40	13	15	13	42
**06	208/230-3-60	STD	33	45	33	128	35	50	35	130
		MED	35	50	36	131	37	50	38	133
		HIGH	33	45	33	128	35	50	35	130
	460-3-60	STD	15	20	14	58	16	20	15	59
		MED	15	20	15	59	16	20	16	60
		HIGH	16	20	16	60	17	20	17	61
	575-3-60	STD	11	15	11	45	13	15	13	47
		MED	12	15	11	45	14	15	13	47
		HIGH	12	15	12	47	14	20	14	49
**07	208/230-3-60	STD	36	50	36	156	38	50	39	158
		MED	33	50	33	151	35	50	35	153
		HIGH	35	50	35	154	37	50	37	156
	460-3-60	STD	16	20	15	73	17	20	16	74
		MED	16	20	16	73	17	25	17	74
		HIGH	17	20	16	74	18	25	18	75
	575-3-60	STD	12	15	12	61	14	20	14	63
		MED	13	15	12	62	15	20	14	64
		HIGH	13	15	13	63	15	20	15	65

Electrical data (cont)

50FC**04 MCA MOCP ELECTRICAL DATA

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			NO CONVENIENCE OUTLET or UNPOWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**04	208/230-1-60	STD	NONE	—	—	24	30	23	92	26	30	25	94
			323A	3.3/4.4	15.9/18.3	24/27	30/30	23/24	92/92	26/29	30/30	25/27	94/94
			324A	4.9/6.5	23.5/27.1	34/38	35/40	30/35	92/92	36/40	40/45	33/37	94/94
			325A	6.5/8.7	31.4/36.3	43/50	45/50	40/45	92/92	46/52	50/60	42/47	94/94
			326A	7.9/10.5	37.9/43.8	52/59	60/60	47/54	92/92	54/61	60/70	49/56	94/94
			327A	9.8/13.0	46.9/54.2	63/72	70/80	57/66	92/92	65/74	70/80	60/68	94/94
		MED	NONE	—	—	26	30	25	94	28	40	27	96
			323A	3.3/4.4	15.9/18.3	26/29	30/30	25/26	94/94	28/31	40/40	27/28	96/96
			324A	4.9/6.5	23.5/27.1	35/40	40/40	32/36	94/94	38/42	40/45	34/39	96/96
			325A	6.5/8.7	31.4/36.3	45/51	45/60	41/47	94/94	48/54	50/60	43/49	96/96
			326A	7.9/10.5	37.9/43.8	53/61	60/70	49/56	94/94	56/63	60/70	51/58	96/96
			327A	9.8/13.0	46.9/54.2	65/74	70/80	59/68	94/94	67/76	70/80	61/70	96/96
		HIGH	NONE	—	—	27	40	26	97	29	40	29	99
			323A	3.3/4.4	15.9/18.3	28/31	40/40	26/28	97/97	30/33	40/40	29/30	99/99
			324A	4.9/6.5	23.5/27.1	37/42	40/45	34/38	97/97	40/44	40/45	36/40	99/99
			325A	6.5/8.7	31.4/36.3	47/53	50/60	43/49	97/97	50/56	50/60	45/51	99/99
			326A	7.9/10.5	37.9/43.8	55/63	60/70	51/57	97/97	58/65	60/70	53/60	99/99
			327A	9.8/13.0	46.9/54.2	67/76	70/80	61/69	97/97	69/78	70/80	63/72	99/99
	208/230-3-60	STD	NONE	—	—	18	25	17	81	20	25	19	83
			323A	3.3/4.4	9.2/10.6	18/18	25/25	17/17	81/81	20/20	25/25	19/19	83/83
			324A	4.9/6.5	13.6/15.6	21/24	25/25	19/21	81/81	24/26	25/30	21/24	83/83
			325A	6.5/8.7	18.1/20.9	27/30	30/30	24/27	81/81	29/33	30/35	26/30	83/83
			326A	7.9/10.5	21.9/25.3	32/36	35/40	29/33	81/81	34/38	35/40	31/35	83/83
			328A	12.0/16.0	33.4/38.5	46/52	50/60	42/48	81/81	48/55	50/60	44/50	83/83
		MED	NONE	—	—	19	25	19	83	21	30	21	85
			323A	3.3/4.4	9.2/10.6	19/19	25/25	19/19	83/83	21/22	30/30	21/21	85/85
			324A	4.9/6.5	13.6/15.6	23/26	25/30	21/23	83/83	25/28	30/30	23/25	85/85
			325A	6.5/8.7	18.1/20.9	29/32	30/35	26/29	83/83	31/35	35/35	28/31	85/85
			326A	7.9/10.5	21.9/25.3	33/38	35/40	30/34	83/83	36/40	40/40	33/36	85/85
			328A	12.0/16.0	33.4/38.5	48/54	50/60	44/49	83/83	50/57	50/60	46/52	85/85
		HIGH	NONE	—	—	21	30	21	86	23	30	23	88
			323A	3.3/4.4	9.2/10.6	21/21	30/30	21/21	86/86	23/24	30/30	23/23	88/88
			324A	4.9/6.5	13.6/15.6	25/28	30/30	23/25	86/86	27/30	30/30	25/27	88/88
			325A	6.5/8.7	18.1/20.9	31/34	35/35	28/31	86/86	33/37	35/40	30/33	88/88
			326A	7.9/10.5	21.9/25.3	35/40	35/40	32/36	86/86	38/42	40/45	34/38	88/88
			328A	12.0/16.0	33.4/38.5	50/56	50/60	45/51	86/86	52/59	60/60	48/53	88/88
	460-3-60	STD	NONE	—	—	9	15	9	41	10	15	10	42
			333A	6.0	7.2	10	15	9	41	12	15	10	42
			334A	8.8	10.6	15	15	13	41	16	20	14	42
			335A	11.5	13.8	19	20	17	41	20	20	18	42
			336A	14.0	16.8	22	25	20	41	24	25	21	42
		MED	NONE	—	—	10	15	9	42	11	15	10	43
			333A	6.0	7.2	11	15	10	42	12	15	11	43
			334A	8.8	10.6	15	15	14	42	16	20	15	43
			335A	11.5	13.8	19	20	17	42	20	25	18	43
			336A	14.0	16.8	23	25	21	42	24	25	22	43
		HIGH	NONE	—	—	10	15	9	42	11	15	10	43
			333A	6.0	7.2	11	15	10	42	13	15	11	43
			334A	8.8	10.6	16	20	14	42	17	20	15	43
			335A	11.5	13.8	20	20	18	42	21	25	19	43
			336A	14.0	16.8	23	25	21	42	25	25	22	43
	575-3-60	STD	NONE	—	—	7	15	6	40	9	15	8	42
			339A	10.0	9.6	13	15	12	40	16	20	14	42
			340A	15.0	14.4	19	20	17	40	22	25	20	42
		MED	NONE	—	—	7	15	6	41	9	15	9	43
			339A	10.0	9.6	14	15	12	41	16	20	14	43
			340A	15.0	14.4	20	20	18	41	22	25	20	43
		HIGH	NONE	—	—	7	15	7	41	9	15	9	43
			339A	10.0	9.6	14	15	13	41	17	20	15	43
			340A	15.0	14.4	20	20	18	41	23	25	20	43

50FC**04 MCA MOCP ELECTRICAL DATA (cont)

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			w/ POWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**04	208/230-3-60	STD	NONE	—	—	23	30	23	86	25	30	25	88
			323A	3.3/4.4	9.2/10.6	23/23	30/30	23/23	86/86	25/26	30/30	25/25	88/88
			324A	4.9/6.5	13.6/15.6	27/30	30/30	25/27	86/86	30/32	30/35	27/29	88/88
			325A	6.5/8.7	18.1/20.9	33/36	35/40	30/33	86/86	35/39	35/40	32/35	88/88
			326A	7.9/10.5	21.9/25.3	38/42	40/45	34/38	86/86	40/44	40/45	36/40	88/88
			328A	12.0/16.0	33.4/38.5	52/58	60/60	47/53	86/86	54/61	60/70	50/55	88/88
		MED	NONE	—	—	24	30	24	88	26	30	27	90
			323A	3.3/4.4	9.2/10.6	24/25	30/30	24/24	88/88	26/28	30/30	27/27	90/90
			324A	4.9/6.5	13.6/15.6	29/32	30/35	26/29	88/88	31/34	35/35	29/31	90/90
			325A	6.5/8.7	18.1/20.9	35/38	35/40	32/35	88/88	37/41	40/45	34/37	90/90
			326A	7.9/10.5	21.9/25.3	39/44	40/45	36/40	88/88	42/46	45/50	38/42	90/90
			328A	12.0/16.0	33.4/38.5	54/60	60/60	49/55	88/88	56/63	60/70	51/57	90/90
		HIGH	NONE	—	—	26	30	26	91	28	30	28	93
			323A	3.3/4.4	9.2/10.6	26/27	30/30	26/26	91/91	28/30	30/30	28/28	93/93
			324A	4.9/6.5	13.6/15.6	31/34	35/35	28/30	91/91	33/36	35/40	30/33	93/93
			325A	6.5/8.7	18.1/20.9	37/40	40/40	33/37	91/91	39/43	40/45	36/39	93/93
			326A	7.9/10.5	21.9/25.3	41/46	45/50	38/42	91/91	44/48	45/50	40/44	93/93
			328A	12.0/16.0	33.4/38.5	56/62	60/70	51/57	91/91	58/65	60/70	53/59	93/93
	460-3-60	STD	NONE	—	—	12	15	11	43	13	15	12	44
			333A	6.0	7.2	13	15	12	43	14	15	13	44
			334A	8.8	10.6	17	20	16	43	19	20	17	44
			335A	11.5	13.8	21	25	19	43	23	25	20	44
			336A	14.0	16.8	25	25	23	43	26	30	24	44
		MED	NONE	—	—	12	15	12	44	13	15	13	45
			333A	6.0	7.2	14	15	12	44	15	15	13	45
			334A	8.8	10.6	18	20	16	44	19	20	17	45
			335A	11.5	13.8	22	25	20	44	23	25	21	45
			336A	14.0	16.8	26	30	23	44	27	30	24	45
		HIGH	NONE	—	—	12	15	12	44	13	15	13	45
			333A	6.0	7.2	14	15	13	44	15	15	14	45
			334A	8.8	10.6	18	20	16	44	20	20	18	45
			335A	11.5	13.8	22	25	20	44	24	25	21	45
			336A	14.0	16.8	26	30	24	44	27	30	25	45
	575-3-60	STD	NONE	—	—	8	15	8	42	10	15	10	44
			339A	10.0	9.6	16	20	14	42	18	20	16	44
			340A	15.0	14.4	22	25	19	42	24	25	22	44
		MED	NONE	—	—	9	15	8	43	11	15	10	45
			339A	10.0	9.6	16	20	14	43	18	20	16	45
			340A	15.0	14.4	22	25	20	43	24	25	22	45
		HIGH	NONE	—	—	9	15	9	43	11	15	11	45
			339A	10.0	9.6	16	20	15	43	19	20	17	45
			340A	15.0	14.4	22	25	20	43	25	25	22	45

Electrical data (cont)

50FC**05 MCA MOCP ELECTRICAL DATA

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			NO CONVENIENCE OUTLET or UNPOWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
								DISCONNECT SIZE				DISCONNECT SIZE	
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	FLA	LRA	MCA	FUSE OR HACR BRKR	FLA	LRA
**05	208/230-1-60	STD	NONE	—	—	31	50	29	140	33	50	32	142
			323A	3.3/4.4	15.9/18.3	31/31	50/50	29/29	140/140	33/33	50/50	32/32	142/142
			325A	6.5/8.7	31.4/36.3	45/51	50/60	41/47	140/140	48/54	50/60	43/49	142/142
			327A	9.8/13.0	46.9/54.2	65/74	70/80	59/68	140/140	67/76	70/80	61/70	142/142
			329A	13.1/17.4	62.8/72.5	85/97	90/100	77/89	140/140	87/99	90/100	80/91	142/142
			330A*	14.4/19.2	69.3/80.0	93/106	100/110	85/97	140/140	95/108	100/110	87/99	142/142
			331A†	15.8/21.0	75.8/87.5	101/115	110/125	92/106	140/140	103/118	110/125	95/108	142/142
		MED	NONE	—	—	33	50	31	143	34	50	33	145
			323A	3.3/4.4	15.9/18.3	33/33	50/50	31/31	143/143	34/34	50/50	33/33	145/145
			325A	6.5/8.7	31.4/36.3	47/53	50/60	43/49	143/143	50/56	50/60	45/51	145/145
			327A	9.8/13.0	46.9/54.2	67/76	70/80	61/69	143/143	69/78	70/80	63/72	145/145
			329A	13.1/17.4	62.8/72.5	87/99	90/100	79/90	143/143	89/101	90/110	81/93	145/145
			330A*	14.4/19.2	69.3/80.0	95/108	100/110	87/99	143/143	97/110	100/125	89/101	145/145
			331A†	15.8/21.0	75.8/87.5	103/117	110/125	94/108	143/143	105/120	110/125	96/110	145/145
		HIGH	NONE	—	—	35	50	34	146	37	50	37	148
			323A	3.3/4.4	15.9/18.3	35/35	50/50	34/34	146/146	37/37	50/50	37/37	148/148
			325A	6.5/8.7	31.4/36.3	51/57	60/60	46/52	146/146	53/59	60/60	48/54	148/148
			327A	9.8/13.0	46.9/54.2	70/79	70/80	64/72	146/146	72/82	80/90	66/75	148/148
			329A	13.1/17.4	62.8/72.5	90/102	90/110	82/93	146/146	92/104	100/110	85/96	148/148
			330A*	14.4/19.2	69.3/80.0	98/111	100/125	90/102	146/146	100/114	110/125	92/104	148/148
			331A†	15.8/21.0	75.8/87.5	106/121	110/125	97/111	146/146	109/123	110/125	99/113	148/148
	208/230-3-60	STD	NONE	—	—	24	30	23	93	25	30	25	95
			324A	4.9/6.5	13.6/15.6	24/26	30/30	23/23	93/93	25/28	30/30	25/25	95/95
			325A	6.5/8.7	18.1/20.9	29/32	30/35	26/29	93/93	31/35	35/35	28/31	95/95
			328A	12.0/16.0	33.4/38.5	48/54	50/60	44/49	93/93	50/57	50/60	46/52	95/95
			330A*	14.4/19.2	40.0/46.2	56/64	60/70	51/58	93/93	58/66	60/70	53/60	95/95
			331A†	15.8/21.0	43.8/50.5	61/69	70/70	56/63	93/93	63/72	70/80	58/65	95/95
		MED	NONE	—	—	25	30	24	96	27	40	27	98
			324A	4.9/6.5	13.6/15.6	25/28	30/30	24/25	96/96	27/30	40/40	27/27	98/98
			325A	6.5/8.7	18.1/20.9	31/34	35/35	28/31	96/96	33/37	40/40	30/33	98/98
			328A	12.0/16.0	33.4/38.5	50/56	50/60	45/51	96/96	52/59	60/60	48/53	98/98
			330A*	14.4/19.2	40.0/46.2	58/66	60/70	53/60	96/96	60/68	60/70	55/62	98/98
			331A†	15.8/21.0	43.8/50.5	63/71	70/80	57/65	96/96	65/74	70/80	60/67	98/98
		HIGH	NONE	—	—	24	30	23	94	26	30	26	96
			324A	4.9/6.5	13.6/15.6	24/26	30/30	23/24	94/94	26/29	30/30	26/26	96/96
			325A	6.5/8.7	18.1/20.9	29/33	30/35	27/30	94/94	32/35	35/35	29/32	96/96
			328A	12.0/16.0	33.4/38.5	49/55	50/60	44/50	94/94	51/57	60/60	46/52	96/96
			330A*	14.4/19.2	40.0/46.2	57/65	60/70	52/59	94/94	59/67	60/70	54/61	96/96
			331A†	15.8/21.0	43.8/50.5	62/70	70/70	56/64	94/94	64/72	70/80	58/66	96/96
	460-3-60	STD	NONE	—	—	10	15	9	45	11	15	11	46
			333A	6.0	7.2	11	15	10	45	12	15	11	46
			335A	11.5	13.8	19	20	17	45	20	25	18	46
			336A	14.0	16.8	23	25	21	45	24	25	22	46
			337A	21.5	25.9	34	35	31	45	36	40	32	46
		MED	NONE	—	—	11	15	10	45	12	15	11	46
			333A	6.0	7.2	11	15	10	45	13	15	11	46
			335A	11.5	13.8	20	20	18	45	21	25	19	46
			336A	14.0	16.8	23	25	21	45	25	25	22	46
			337A	21.5	25.9	35	35	32	45	36	40	33	46
		HIGH	NONE	—	—	11	15	11	46	12	15	12	47
			333A	6.0	7.2	12	15	11	46	14	15	12	47
			335A	11.5	13.8	21	25	19	46	22	25	20	47
			336A	14.0	16.8	24	25	22	46	26	30	23	47
			337A	21.5	25.9	36	40	33	46	37	40	34	47

50FC**05 MCA MOCP ELECTRICAL DATA (cont)

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			NO CONVENIENCE OUTLET or UNPOWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**05 (cont)	575-3-60	STD	NONE	—	—	8	15	7	37	10	15	10	39
			339A	10.0	9.6	14	15	12	37	16	20	14	39
			340A	15.0	14.4	20	20	18	37	22	25	20	39
		MED	NONE	—	—	9	15	8	37	10	15	10	39
			339A	10.0	9.6	14	15	13	37	17	20	15	39
			340A	15.0	14.4	20	20	18	37	23	25	20	39
		HIGH	NONE	—	—	9	15	9	38	11	15	11	40
			339A	10.0	9.6	15	15	14	38	18	20	16	40
			340A	15.0	14.4	21	25	19	38	24	25	21	40

*Do not use with size 05 horizontal duct configuration units.

†Do not use with size 05 vertical duct configuration units.

Electrical data (cont)

50FC**05 MCA MOCP ELECTRICAL DATA (cont)

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			w/ POWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
								DISCONNECT SIZE				DISCONNECT SIZE	
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	FLA	LRA	MCA	FUSE OR HACR BRKR	FLA	LRA
**05	208/230-3-60	STD	NONE	—	—	28	40	28	98	30	40	30	100
			324A	4.9/6.5	13.6/15.6	29/32	40/40	28/29	98/98	31/34	40/40	30/31	100/100
			325A	6.5/8.7	18.1/20.9	35/38	40/40	32/35	98/98	37/41	40/45	34/37	100/100
			328A	12.0/16.0	33.4/38.5	54/60	60/60	49/55	98/98	56/63	60/70	51/57	100/100
			330A*	14.4/19.2	40.0/46.2	62/70	70/70	57/64	98/98	64/72	70/80	59/66	100/100
			331A†	15.8/21.0	43.8/50.5	67/75	70/80	61/69	98/98	69/78	70/80	63/71	100/100
		MED	NONE	—	—	30	40	30	101	32	45	32	103
			324A	4.9/6.5	13.6/15.6	31/34	40/40	30/30	101/101	33/36	45/45	32/33	103/103
			325A	6.5/8.7	18.1/20.9	37/40	40/40	33/37	101/101	39/43	45/45	36/39	103/103
			328A	12.0/16.0	33.4/38.5	56/62	60/70	51/57	101/101	58/65	60/70	53/59	103/103
			330A*	14.4/19.2	40.0/46.2	64/72	70/80	59/66	101/101	66/74	70/80	61/68	103/103
			331A†	15.8/21.0	43.8/50.5	69/77	70/80	63/71	101/101	71/80	80/80	65/73	103/103
		HIGH	NONE	—	—	29	40	29	99	31	40	31	101
			324A	4.9/6.5	13.6/15.6	30/32	40/40	29/29	99/99	32/35	40/40	31/32	101/101
			325A	6.5/8.7	18.1/20.9	35/39	40/40	32/35	99/99	38/41	40/45	34/38	101/101
			328A	12.0/16.0	33.4/38.5	55/61	60/70	50/56	99/99	57/63	60/70	52/58	101/101
			330A*	14.4/19.2	40.0/46.2	63/71	70/80	57/65	99/99	65/73	70/80	60/67	101/101
			331A†	15.8/21.0	43.8/50.5	68/76	70/80	62/69	99/99	70/78	70/80	64/72	101/101
	460-3-60	STD	NONE	—	—	12	15	12	47	13	15	13	48
			333A	6.0	7.2	14	15	12	47	15	15	13	48
			335A	11.5	13.8	22	25	20	47	23	25	21	48
			336A	14.0	16.8	26	30	23	47	27	30	24	48
			337A	21.5	25.9	37	40	34	47	38	40	35	48
		MED	NONE	—	—	13	15	12	47	14	15	13	48
			333A	6.0	7.2	14	15	13	47	15	15	14	48
			335A	11.5	13.8	22	25	20	47	24	25	21	48
			336A	14.0	16.8	26	30	24	47	27	30	25	48
			337A	21.5	25.9	37	40	34	47	39	40	35	48
		HIGH	NONE	—	—	14	15	13	48	15	20	14	49
			333A	6.0	7.2	15	15	14	48	16	20	15	49
			335A	11.5	13.8	23	25	21	48	25	25	22	49
			336A	14.0	16.8	27	30	25	48	28	30	26	49
			337A	21.5	25.9	39	40	35	48	40	40	36	49
	575-3-60	STD	NONE	—	—	10	15	9	39	12	15	12	41
			339A	10.0	9.6	16	20	14	39	18	20	16	41
			340A	15.0	14.4	22	25	20	39	24	25	22	41
		MED	NONE	—	—	10	15	10	39	12	15	12	41
			339A	10.0	9.6	16	20	15	39	19	20	17	41
			340A	15.0	14.4	22	25	20	39	25	25	22	41
		HIGH	NONE	—	—	11	15	11	40	13	15	13	42
			339A	10.0	9.6	17	20	16	40	20	20	18	42
			340A	15.0	14.4	23	25	21	40	26	30	23	42

*Do not use with size 05 horizontal duct configuration units.

†Do not use with size 05 vertical duct configuration units.

50FC**06 MCA MOCP ELECTRICAL DATA

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			NO CONVENIENCE OUTLET or UNPOWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
								DISCONNECT SIZE				DISCONNECT SIZE	
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	FLA	LRA	MCA	FUSE OR HACR BRKR	FLA	LRA
**06	208/230-1-60	STD	NONE	—	—	39	60	37	157	41	60	39	159
			324A	4.9/6.5	23.5/27.1	39/42	60/60	37/39	157/157	41/45	60/60	39/41	159/159
			325A	6.5/8.7	31.4/36.3	48/54	60/60	43/49	157/157	50/56	60/60	46/51	159/159
			327A	9.8/13.0	46.9/54.2	67/76	70/80	61/70	157/157	69/79	70/80	63/72	159/159
			329A	13.1/17.4	62.8/72.5	87/99	90/100	80/91	157/157	89/101	90/110	82/93	159/159
			331A	15.8/21.0	75.8/87.5	103/118	110/125	95/108	157/157	106/120	110/125	97/110	159/159
		MED	NONE	—	—	41	60	40	160	43	60	42	162
			324A	4.9/6.5	23.5/27.1	41/45	60/60	40/41	160/160	43/47	60/60	42/43	162/162
			325A	6.5/8.7	31.4/36.3	50/57	60/60	46/52	160/160	53/59	60/60	48/54	162/162
			327A	9.8/13.0	46.9/54.2	70/79	70/80	64/72	160/160	72/81	80/90	66/74	162/162
			329A	13.1/17.4	62.8/72.5	90/102	90/110	82/93	160/160	92/104	100/110	84/95	162/162
			331A	15.8/21.0	75.8/87.5	106/121	110/125	97/111	160/160	108/123	110/125	99/113	162/162
	208/230-3-60	STD	NONE	—	—	28	40	27	123	30	45	30	125
			324A	4.9/6.5	13.6/15.6	28/28	40/40	27/27	123/123	30/30	45/45	30/30	125/125
			326A	7.9/10.5	21.9/25.3	36/40	40/40	33/36	123/123	38/42	45/45	35/39	125/125
			328A	12.0/16.0	33.4/38.5	50/57	50/60	46/52	123/123	53/59	60/60	48/54	125/125
			331A	15.8/21.0	43.8/50.5	63/72	70/80	58/65	123/123	66/74	70/80	60/68	125/125
			332A	18.4/24.5	51.1/58.9	72/82	80/90	66/75	123/123	75/84	80/90	68/77	125/125
		MED	NONE	—	—	31	45	30	126	32	45	32	128
			324A	4.9/6.5	13.6/15.6	31/31	45/45	30/30	126/126	32/33	45/45	32/32	128/128
			326A	7.9/10.5	21.9/25.3	39/43	45/45	35/39	126/126	41/45	45/45	37/41	128/128
			328A	12.0/16.0	33.4/38.5	53/59	60/60	48/54	126/126	55/62	60/70	50/56	128/128
			331A	15.8/21.0	43.8/50.5	66/74	70/80	60/68	126/126	68/77	70/80	62/70	128/128
			332A	18.4/24.5	51.1/58.9	75/85	80/90	69/78	126/126	77/87	80/90	71/80	128/128
		HIGH	NONE	—	—	28	40	27	123	30	45	30	125
			324A	4.9/6.5	13.6/15.6	28/28	40/40	27/27	123/123	30/30	45/45	30/30	125/125
			326A	7.9/10.5	21.9/25.3	36/40	40/40	33/36	123/123	38/42	45/45	35/39	125/125
			328A	12.0/16.0	33.4/38.5	50/57	50/60	46/52	123/123	53/59	60/60	48/54	125/125
			331A	15.8/21.0	43.8/50.5	63/72	70/80	58/65	123/123	66/74	70/80	60/68	125/125
			332A	18.4/24.5	51.1/58.9	72/82	80/90	66/75	123/123	75/84	80/90	68/77	125/125
	460-3-60	STD	NONE	—	—	13	15	12	56	14	20	13	57
			333A	6.0	7.2	13	15	12	56	14	20	13	57
			335A	11.5	13.8	20	20	18	56	21	25	19	57
			336A	14.0	16.8	23	25	21	56	25	25	22	57
			337A	21.5	25.9	35	35	32	56	36	40	33	57
			338A	24.0	28.9	38	40	35	56	40	40	36	57
		MED	NONE	—	—	13	20	12	57	14	20	13	58
			333A	6.0	7.2	13	20	12	57	14	20	13	58
			335A	11.5	13.8	20	20	18	57	21	25	19	58
			336A	14.0	16.8	24	25	22	57	25	25	23	58
			337A	21.5	25.9	35	35	32	57	36	40	33	58
			338A	24.0	28.9	39	40	35	57	40	40	37	58
		HIGH	NONE	—	—	14	20	13	58	15	20	14	59
			333A	6.0	7.2	14	20	13	58	15	20	14	59
			335A	11.5	13.8	21	25	19	58	23	25	20	59
			336A	14.0	16.8	25	25	23	58	26	30	24	59
			337A	21.5	25.9	36	40	33	58	38	40	34	59
			338A	24.0	28.9	40	40	37	58	41	45	38	59
	575-3-60	STD	NONE	—	—	10	15	9	43	12	15	11	45
			340A	15.0	14.4	20	20	18	43	23	25	20	45
			341A	25.0	24.1	32	35	29	43	35	35	32	45
		MED	NONE	—	—	10	15	9	43	12	15	12	45
			340A	15.0	14.4	21	25	19	43	23	25	21	45
			341A	25.0	24.1	33	35	30	43	35	35	32	45
		HIGH	NONE	—	—	11	15	10	45	13	15	12	47
			340A	15.0	14.4	22	25	19	45	24	25	22	47
			341A	25.0	24.1	34	35	31	45	36	40	33	47

Electrical data (cont)

50FC**06 MCA MOCP ELECTRICAL DATA (cont)

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			w/ POWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**06	208/230-3-60	STD	NONE	—	—	33	45	33	128	35	50	35	130
			324A	4.9/6.5	13.6/15.6	33/34	45/45	33/33	128/128	35/36	50/50	35/35	130/130
			326A	7.9/10.5	21.9/25.3	42/46	45/50	38/42	128/128	44/48	50/50	40/44	130/130
			328A	12.0/16.0	33.4/38.5	56/63	60/70	51/57	128/128	59/65	60/70	53/59	130/130
			331A	15.8/21.0	43.8/50.5	69/78	70/80	63/71	128/128	72/80	80/80	65/73	130/130
			332A	18.4/24.5	51.1/58.9	78/88	80/90	72/81	128/128	81/90	90/100	74/83	130/130
		MED	NONE	—	—	35	50	36	131	37	50	38	133
			324A	4.9/6.5	13.6/15.6	35/37	50/50	36/36	131/131	37/39	50/50	38/38	133/133
			326A	7.9/10.5	21.9/25.3	45/49	50/50	41/45	131/131	47/51	50/60	43/47	133/133
			328A	12.0/16.0	33.4/38.5	59/65	60/70	54/60	131/131	61/68	70/70	56/62	133/133
			331A	15.8/21.0	43.8/50.5	72/80	80/80	66/73	131/131	74/83	80/90	68/76	133/133
			332A	18.4/24.5	51.1/58.9	81/91	90/100	74/83	131/131	83/93	90/100	76/85	133/133
		HIGH	NONE	—	—	33	45	33	128	35	50	35	130
			324A	4.9/6.5	13.6/15.6	33/34	45/45	33/33	128/128	35/36	50/50	35/35	130/130
			326A	7.9/10.5	21.9/25.3	42/46	45/50	38/42	128/128	44/48	50/50	40/44	130/130
			328A	12.0/16.0	33.4/38.5	56/63	60/70	51/57	128/128	59/65	60/70	53/59	130/130
			331A	15.8/21.0	43.8/50.5	69/78	70/80	63/71	128/128	72/80	80/80	65/73	130/130
			332A	18.4/24.5	51.1/58.9	78/88	80/90	72/81	128/128	81/90	90/100	74/83	130/130
	460-3-60	STD	NONE	—	—	15	20	14	58	16	20	15	59
			333A	6.0	7.2	15	20	14	58	16	20	15	59
			335A	11.5	13.8	22	25	20	58	24	25	21	59
			336A	14.0	16.8	26	30	24	58	27	30	25	59
			337A	21.5	25.9	37	40	34	58	39	40	35	59
			338A	24.0	28.9	41	45	37	58	42	45	39	59
		MED	NONE	—	—	15	20	15	59	16	20	16	60
			333A	6.0	7.2	15	20	15	59	16	20	16	60
			335A	11.5	13.8	23	25	21	59	24	25	22	60
			336A	14.0	16.8	27	30	24	59	28	30	25	60
			337A	21.5	25.9	38	40	35	59	39	40	36	60
			338A	24.0	28.9	42	45	38	59	43	45	39	60
		HIGH	NONE	—	—	16	20	16	60	17	20	17	61
			333A	6.0	7.2	16	20	16	60	17	20	17	61
			335A	11.5	13.8	24	25	22	60	25	25	23	61
			336A	14.0	16.8	28	30	25	60	29	30	26	61
			337A	21.5	25.9	39	40	36	60	40	45	37	61
			338A	24.0	28.9	43	45	39	60	44	45	40	61
	575-3-60	STD	NONE	—	—	11	15	11	45	13	15	13	47
			340A	15.0	14.4	22	25	20	45	25	25	22	47
			341A	25.0	24.1	35	35	31	45	37	40	34	47
		MED	NONE	—	—	12	15	11	45	14	15	13	47
			340A	15.0	14.4	23	25	21	45	25	25	23	47
			341A	25.0	24.1	35	35	32	45	37	40	34	47
		HIGH	NONE	—	—	12	15	12	47	14	20	14	49
			340A	15.0	14.4	24	25	21	47	26	30	24	49
			341A	25.0	24.1	36	40	33	47	38	40	35	49

50FC**07 MCA MOCP ELECTRICAL DATA

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			NO CONVENIENCE OUTLET or UNPOWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**07	208/230-3-60	STD	NONE	—	—	32	45	31	151	34	50	33	153
			324A	4.9/6.5	13.6/15.6	32/32	45/45	31/31	151/151	34/34	50/50	33/33	153/153
			326A	7.9/10.5	21.9/25.3	38/42	45/45	34/38	151/151	40/44	50/50	36/40	153/153
			328A	12.0/16.0	33.4/38.5	52/58	60/60	47/53	151/151	54/61	60/70	50/55	153/153
			331A	15.8/21.0	43.8/50.5	65/73	70/80	59/67	151/151	67/76	70/80	62/69	153/153
			332A	18.4/24.5	51.1/58.9	74/84	80/90	68/77	151/151	76/86	80/90	70/79	153/153
		MED	NONE	—	—	28	45	27	146	30	45	29	148
			324A	4.9/6.5	13.6/15.6	28/28	45/45	27/27	146/146	30/30	45/45	29/29	148/148
			326A	7.9/10.5	21.9/25.3	33/38	45/45	30/34	146/146	36/40	45/45	33/36	148/148
			328A	12.0/16.0	33.4/38.5	48/54	50/60	44/49	146/146	50/57	50/60	46/52	148/148
			331A	15.8/21.0	43.8/50.5	61/69	70/70	56/63	146/146	63/72	70/80	58/65	148/148
			332A	18.4/24.5	51.1/58.9	70/80	70/80	64/73	146/146	72/82	80/90	66/75	148/148
		HIGH	NONE	—	—	30	45	29	149	32	45	31	151
			324A	4.9/6.5	13.6/15.6	30/30	45/45	29/29	149/149	32/32	45/45	31/31	151/151
			326A	7.9/10.5	21.9/25.3	36/40	45/45	33/36	149/149	38/42	45/45	35/39	151/151
			328A	12.0/16.0	33.4/38.5	50/57	50/60	46/52	149/149	53/59	60/60	48/54	151/151
			331A	15.8/21.0	43.8/50.5	63/72	70/80	58/65	149/149	66/74	70/80	60/68	151/151
			332A	18.4/24.5	51.1/58.9	72/82	80/90	66/75	149/149	75/84	80/90	68/77	151/151
	460-3-60	STD	NONE	—	—	14	20	13	71	15	20	14	72
			333A	6.0	7.2	14	20	13	71	15	20	14	72
			335A	11.5	13.8	20	20	18	71	21	25	19	72
			336A	14.0	16.8	24	25	21	71	25	25	23	72
			337A	21.5	25.9	35	35	32	71	36	40	33	72
			338A	24.0	28.9	39	40	35	71	40	40	36	72
		MED	NONE	—	—	14	20	13	71	15	20	14	72
			333A	6.0	7.2	14	20	13	71	15	20	14	72
			335A	11.5	13.8	20	25	18	71	22	25	20	72
			336A	14.0	16.8	24	25	22	71	25	30	23	72
			337A	21.5	25.9	36	40	32	71	37	40	33	72
			338A	24.0	28.9	39	40	36	71	41	45	37	72
		HIGH	NONE	—	—	15	20	14	72	16	20	15	73
			333A	6.0	7.2	15	20	14	72	16	20	15	73
			335A	11.5	13.8	21	25	19	72	23	25	20	73
			336A	14.0	16.8	25	25	23	72	26	30	24	73
			337A	21.5	25.9	36	40	33	72	38	40	34	73
			338A	24.0	28.9	40	40	37	72	41	45	38	73
	575-3-60	STD	NONE	—	—	11	15	10	59	13	15	12	61
			340A	15.0	14.4	21	25	19	59	23	25	21	61
			341A	25.0	24.1	33	35	30	59	35	35	32	61
		MED	NONE	—	—	11	15	10	60	13	15	12	62
			340A	15.0	14.4	21	25	19	60	23	25	21	62
			341A	25.0	24.1	33	35	30	60	35	40	32	62
		HIGH	NONE	—	—	11	15	11	61	13	15	13	63
			340A	15.0	14.4	22	25	19	61	24	25	22	63
			341A	25.0	24.1	34	35	31	61	36	40	33	63

Electrical data (cont)

50FC**07 MCA MOCP ELECTRICAL DATA (cont)

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER			w/ POWERED CONVENIENCE OUTLET							
						NO POWER EXHAUST				w/ POWER EXHAUST (powered from unit)			
			CRHEATER ***A00	NOM (kW)	FLA	MCA	FUSE OR HACR BRKR	DISCONNECT SIZE		MCA	FUSE OR HACR BRKR	DISCONNECT SIZE	
								FLA	LRA			FLA	LRA
**07	208/230-3-60	STD	NONE	—	—	36	50	36	156	38	50	39	158
			324A	4.9/6.5	13.6/15.6	36/36	50/50	36/36	156/156	38/38	50/50	39/39	158/158
			326A	7.9/10.5	21.9/25.3	44/48	50/50	40/44	156/156	46/50	50/50	42/46	158/158
			328A	12.0/16.0	33.4/38.5	58/64	60/70	53/59	156/156	60/67	60/70	55/61	158/158
			331A	15.8/21.0	43.8/50.5	71/79	80/80	65/73	156/156	73/82	80/90	67/75	158/158
			332A	18.4/24.5	51.1/58.9	80/90	80/90	73/82	156/156	82/92	90/100	75/84	158/158
		MED	NONE	—	—	33	50	33	151	35	50	35	153
			324A	4.9/6.5	13.6/15.6	33/33	50/50	33/33	151/151	35/35	50/50	35/35	153/153
			326A	7.9/10.5	21.9/25.3	39/44	50/50	36/40	151/151	42/46	50/50	38/42	153/153
			328A	12.0/16.0	33.4/38.5	54/60	60/60	49/55	151/151	56/63	60/70	51/57	153/153
			331A	15.8/21.0	43.8/50.5	67/75	70/80	61/69	151/151	69/78	70/80	63/71	153/153
			332A	18.4/24.5	51.1/58.9	76/86	80/90	69/78	151/151	78/88	80/90	72/81	153/153
		HIGH	NONE	—	—	35	50	35	154	37	50	37	156
			324A	4.9/6.5	13.6/15.6	35/35	50/50	35/35	154/154	37/37	50/50	37/37	156/156
			326A	7.9/10.5	21.9/25.3	42/46	50/50	38/42	154/154	44/48	50/50	40/44	156/156
			328A	12.0/16.0	33.4/38.5	56/63	60/70	51/57	154/154	59/65	60/70	53/59	156/156
			331A	15.8/21.0	43.8/50.5	69/78	70/80	63/71	154/154	72/80	80/80	65/73	156/156
			332A	18.4/24.5	51.1/58.9	78/88	80/90	72/81	154/154	81/90	90/100	74/83	156/156
	460-3-60	STD	NONE	—	—	16	20	15	73	17	20	16	74
			333A	6.0	7.2	16	20	15	73	17	20	16	74
			335A	11.5	13.8	23	25	20	73	24	25	22	74
			336A	14.0	16.8	26	30	24	73	28	30	25	74
			337A	21.5	25.9	38	40	34	73	39	40	36	74
			338A	24.0	28.9	42	45	38	73	43	45	39	74
		MED	NONE	—	—	16	20	16	73	17	25	17	74
			333A	6.0	7.2	16	20	16	73	17	25	17	74
			335A	11.5	13.8	23	25	21	73	24	25	22	74
			336A	14.0	16.8	27	30	24	73	28	30	26	74
			337A	21.5	25.9	38	40	35	73	40	40	36	74
			338A	24.0	28.9	42	45	38	73	43	45	39	74
		HIGH	NONE	—	—	17	20	16	74	18	25	18	75
			333A	6.0	7.2	17	20	16	74	18	25	18	75
			335A	11.5	13.8	24	25	22	74	25	25	23	75
			336A	14.0	16.8	28	30	25	74	29	30	26	75
			337A	21.5	25.9	39	40	36	74	40	45	37	75
			338A	24.0	28.9	43	45	39	74	44	45	40	75
	575-3-60	STD	NONE	—	—	12	15	12	61	14	20	14	63
			340A	15.0	14.4	23	25	20	61	25	25	23	63
			341A	25.0	24.1	35	35	32	61	37	40	34	63
		MED	NONE	—	—	12	15	12	61	14	20	14	63
			340A	15.0	14.4	23	25	20	61	25	25	23	63
			341A	25.0	24.1	35	35	32	61	37	40	34	63
		HIGH	NONE	—	—	13	15	13	63	15	20	15	65
			340A	15.0	14.4	24	25	21	63	26	30	24	65
			341A	25.0	24.1	36	40	33	63	38	40	35	65

50FC**04 ELECTRIC HEAT DATA — WITHOUT NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**04	208/230-1-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	040	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	040	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
	208/230-3-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	——	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
	575-3-60	STD	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		MED	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		HIGH	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—

50FC**04 ELECTRIC HEAT DATA — WITH NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**04	208/230-1-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	040	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	040	040	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
	208/230-3-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	037	037
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	037	037
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	037	037
			CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER334A00	8.8	8.1	27.6	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
	575-3-60	STD	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		MED	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		HIGH	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—

50FC**05 ELECTRIC HEAT DATA — WITHOUT NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**05	208/230-1-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
	575-3-60	STD	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		MED	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		HIGH	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—

Electrical data (cont)

50FC**05 ELECTRIC HEAT DATA — WITH NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**05	208/230-1-60	STD	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		MED	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		HIGH	CRHEATER323A00	4.4	3.3/4.0	11.3/13.8	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER330A00	19.2	14.4/17.6	49.2/60.2	038	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
	575-3-60	STD	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		MED	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
		HIGH	CRHEATER339A00	10.0	9.2	31.3	—	—	—	—
			CRHEATER340A00	15.0	13.8	47.0	—	—	—	—

50FC**06 ELECTRIC HEAT DATA — WITHOUT NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**06	208/230-1-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
	575-3-60	STD	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		MED	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		HIGH	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037

Electrical data (cont)

50FC**06 ELECTRIC HEAT DATA — WITH NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**06	208/230-1-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	—	—
			CRHEATER325A00	8.7	6.5/8.0	22.3/27.3	037	037	—	—
			CRHEATER327A00	13.0	9.8/11.9	33.3/40.7	040	040	—	—
			CRHEATER329A00	17.4	13.1/16.0	44.6/54.5	040	040	—	—
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	040	040	—	—
	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
	575-3-60	STD	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		MED	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		HIGH	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037

50FC**07 ELECTRIC HEAT DATA — WITHOUT NON-FUSED DISCONNECT

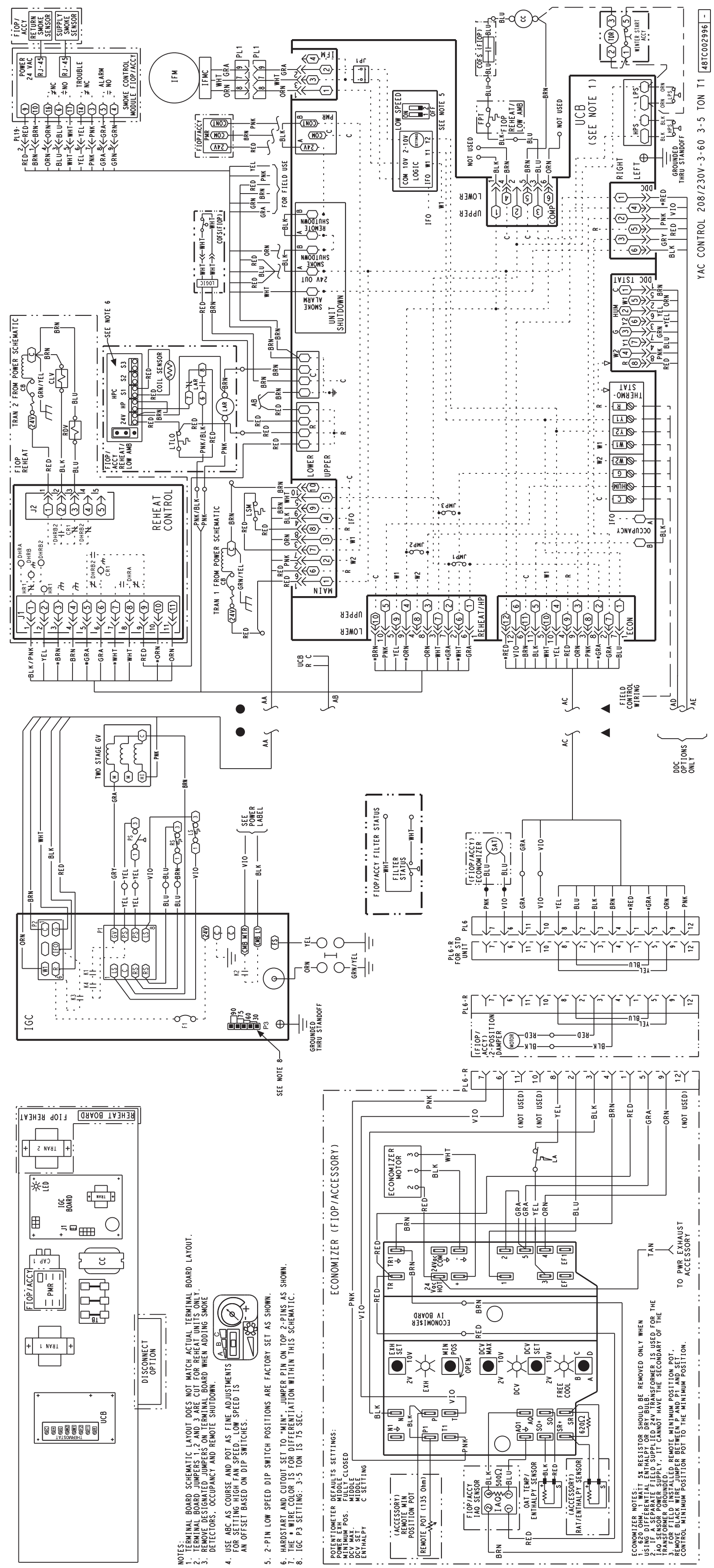
50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**07	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	—	—	—	—
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	—	—	—	—
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
	575-3-60	STD	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		MED	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		HIGH	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037

Electrical data (cont)

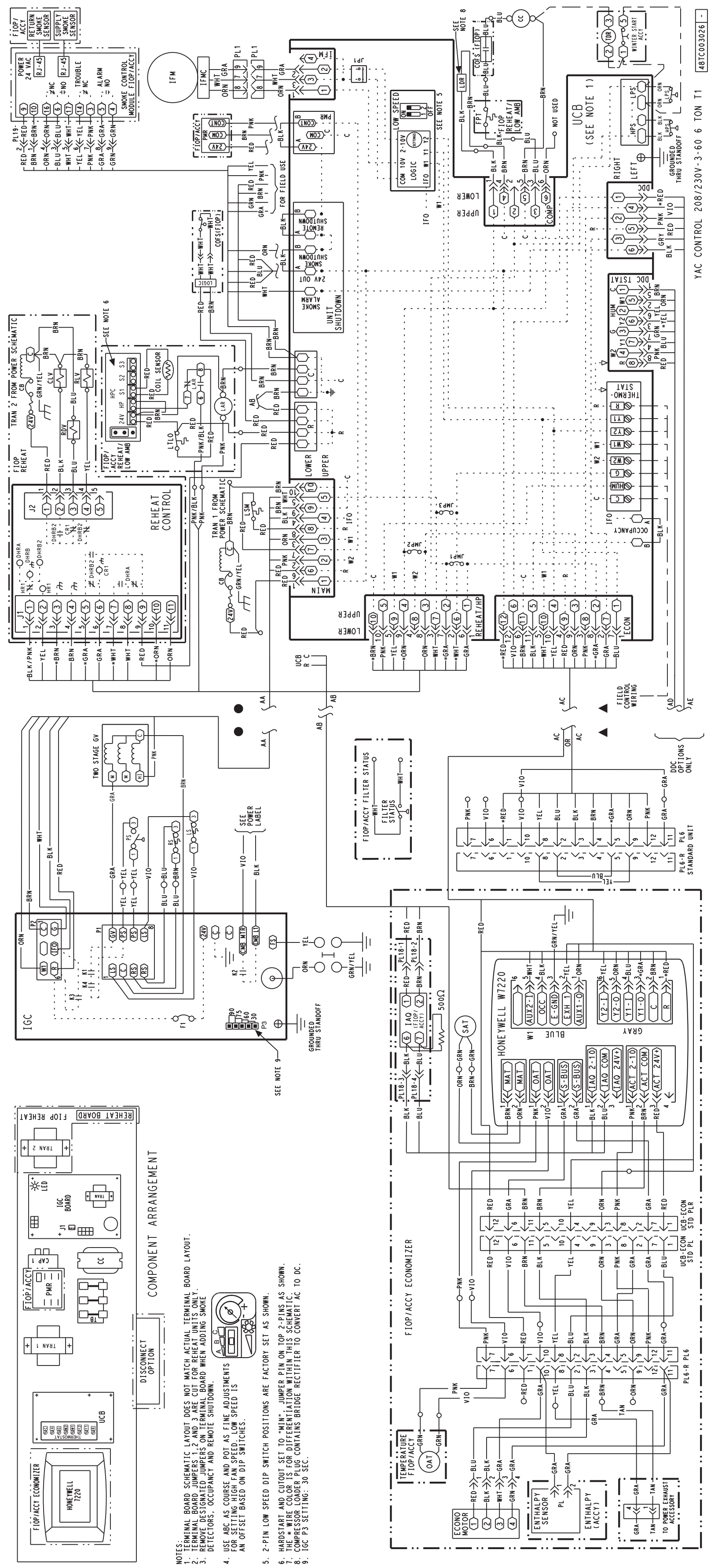
50FC**07 ELECTRIC HEAT DATA — WITH NON-FUSED DISCONNECT

50FC UNIT SIZE	NOM. V-Ph-Hz	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOM (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION PART NUMBER CRSINGLEXXXA00			
							NO C.O. OR UNPOWERED C.O.		w/PWRD C.O.	
							NO P.E.	w/P.E. (pwrd fr/unit)	NO P.E	w/P.E. (pwrd fr/unit)
**07	208/230-3-60	STD	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	038	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		MED	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	037	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
		HIGH	CRHEATER324A00	6.5	4.9/6.0	16.7/20.4	037	037	037	037
			CRHEATER326A00	10.5	7.9/9.6	26.9/32.9	037	037	037	037
			CRHEATER328A00	16.0	12.0/14.7	41.0/50.1	037	037	038	038
			CRHEATER331A00	21.0	15.8/19.3	53.8/65.8	038	038	038	038
			CRHEATER332A00	24.5	18.4/22.5	62.8/76.8	038	038	038	038
	460-3-60	STD	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		MED	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
		HIGH	CRHEATER333A00	6.0	5.5	18.8	—	—	—	—
			CRHEATER335A00	11.5	10.6	36.0	—	—	—	—
			CRHEATER336A00	14.0	12.9	43.9	—	—	—	—
			CRHEATER337A00	21.5	19.7	67.4	037	037	037	037
			CRHEATER338A00	24.0	22.0	75.2	037	037	037	037
	575-3-60	STD	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		MED	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037
		HIGH	CRHEATER340A00	15.0	13.8	47.0	—	—	—	—
			CRHEATER341A00	25.0	23.0	78.3	037	037	037	037

TYPICAL CONTROL WIRING DIAGRAM — 48FC 04-06 208-230/3/60 UNIT
WITH ELECTRO-MECHANICAL CONTROL AND W7212 ECONOMIZER

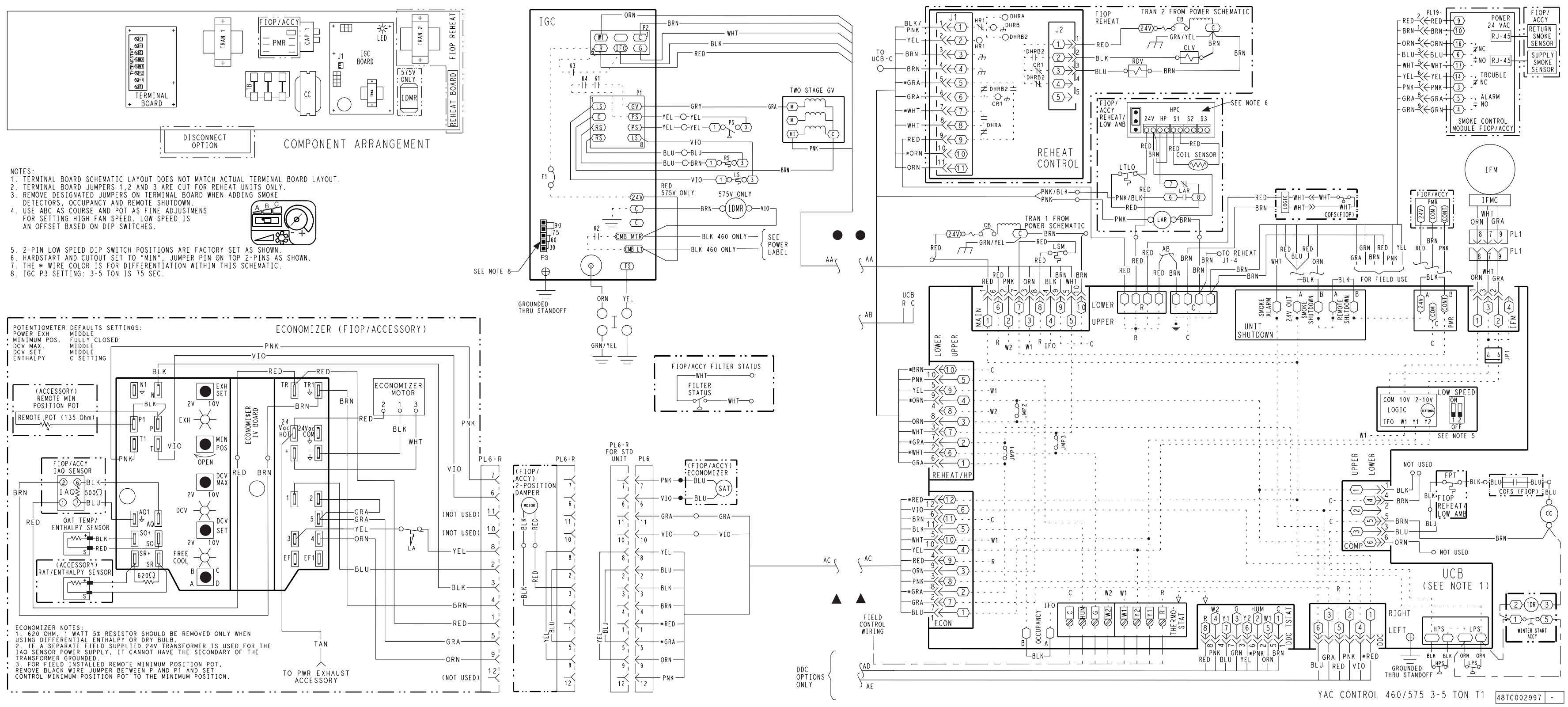


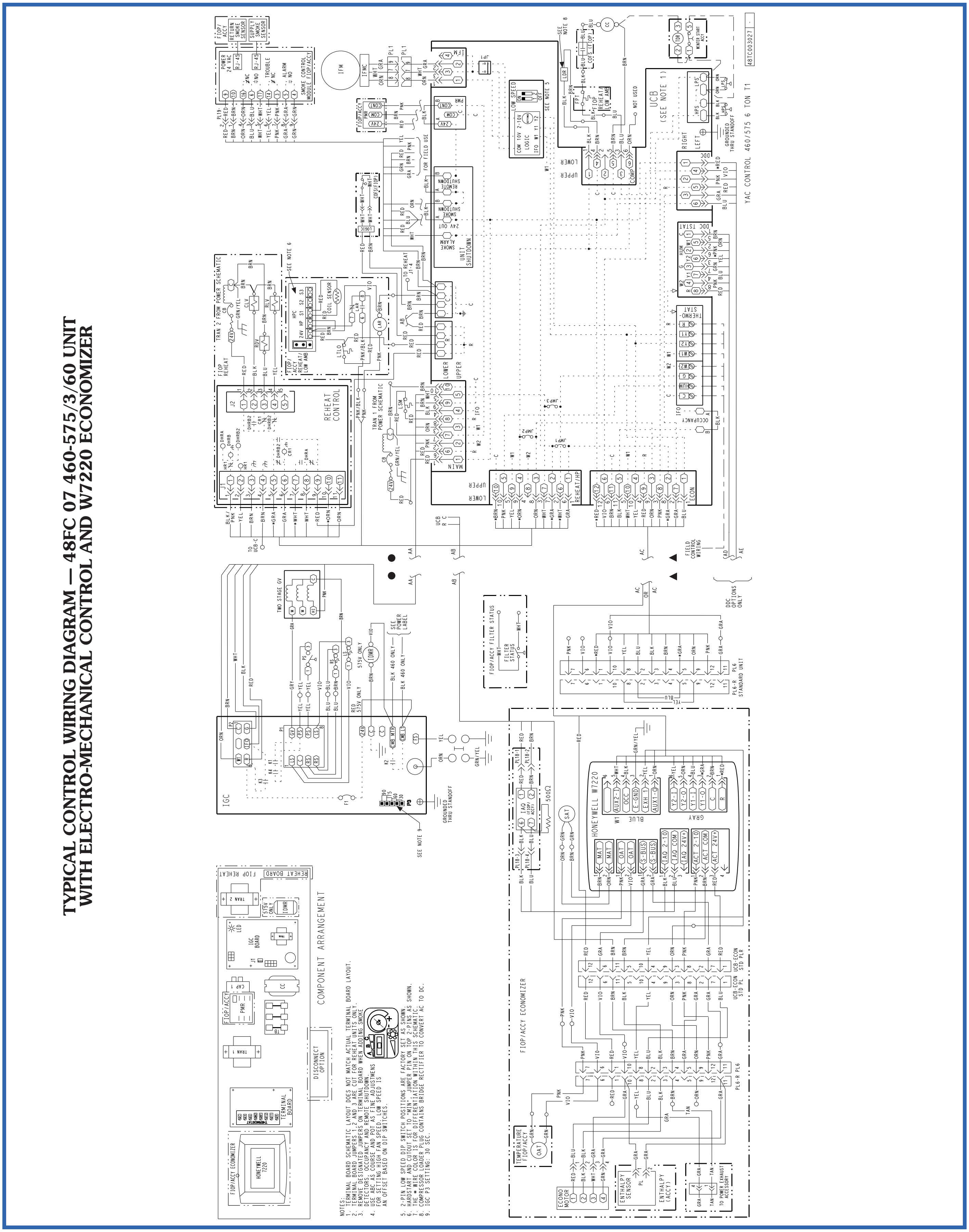
TYPICAL CONTROL WIRING DIAGRAM — 48FC 07 208-230/3/60 UNIT WITH ELECTRO-MECHANICAL CONTROL AND W7220 ECONOMIZER



NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD LAYOUT.
2. TERMINAL BOARD JUMPERS 1,2 AND 3 ARE CUT FOR REHEAT UNITS ONLY.
3. REMOVE DESIGNATED JUMPERS ON TERMINAL BOARD WHEN ADDING SMOKE DETECTORS, OCCUPANCY AND REMOTE SHUTDOWN.
4. USE ABC AS COURSE AND POT AS FINE ADJUSTMENTS FOR SETTING HIGH FAN SPEED. LOW SPEED IS AN OFFSET BASED ON DIP SWITCHES.
5. 2-PIN LOW SPEED DIP SWITCH POSITIONS ARE FACTORY SET AS SHOWN.
6. HARDSTART AND CUTOUT SET TO "MIN", JUMPER PIN ON TOP 2-PINS AS SHOWN.
7. THE * WIRE COLOR IS FOR DIFFERENTIATION WITHIN THIS SCHEMATIC.
8. COMPRESSOR LOADER PLUG CONTAINS BRIDGE RECTIFIER TO CONVERT AC TO DC.
9. IGC P3 SETTING: 30 SEC.

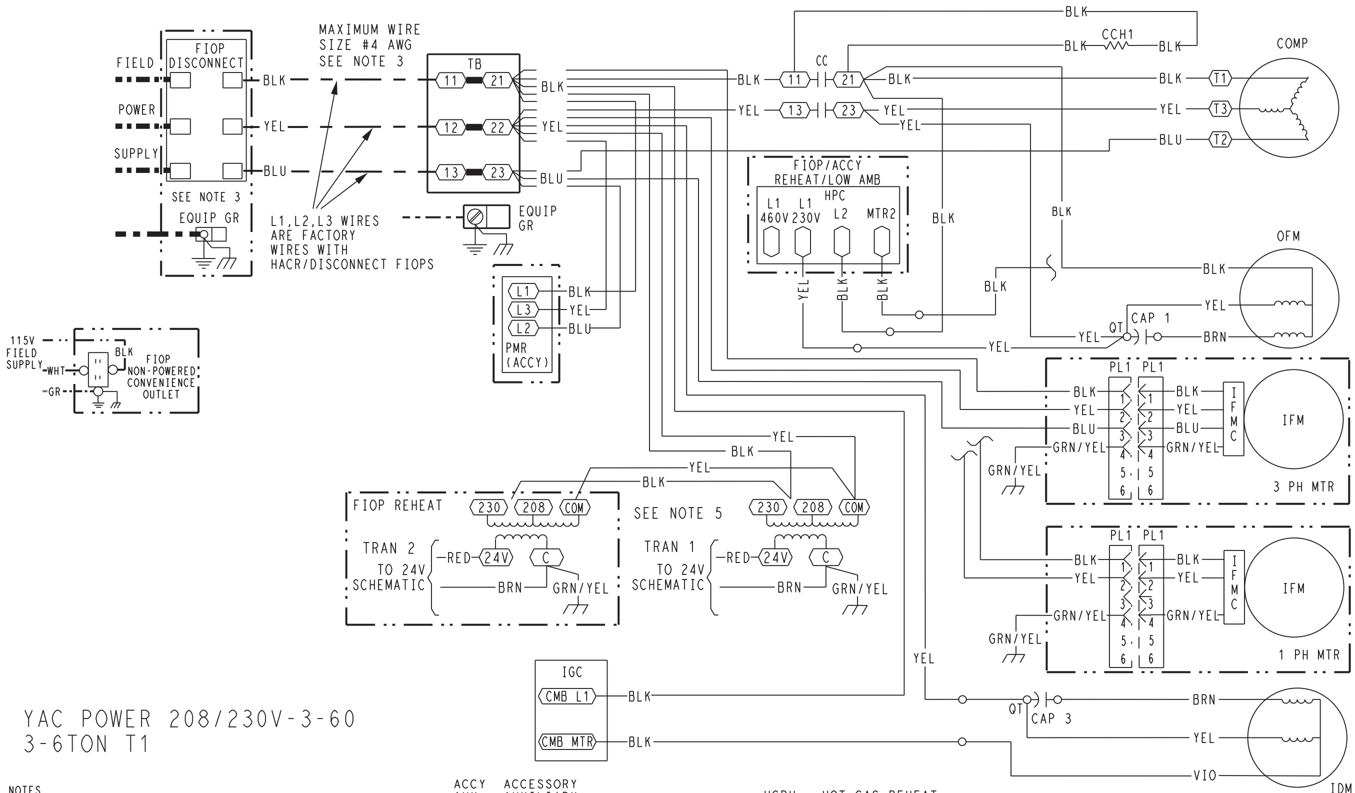
TYPICAL CONTROL WIRING DIAGRAM — 48FC 04-06 460-575/3/60 UNIT WITH ELECTRO-MECHANICAL CONTROL AND W7212 ECONOMIZER





TYPICAL CONTROL WIRING DIAGRAM — 48FC 07 460-575/3/60 UNIT
WITH ELECTRO-MECHANICAL CONTROL AND W7220 ECONOMIZER
COMPONENT ARRANGEMENT
48TC003027

TYPICAL 48FC 04-07 POWER WIRING DIAGRAM, 208-230/3/60 UNIT SHOWN



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90° C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

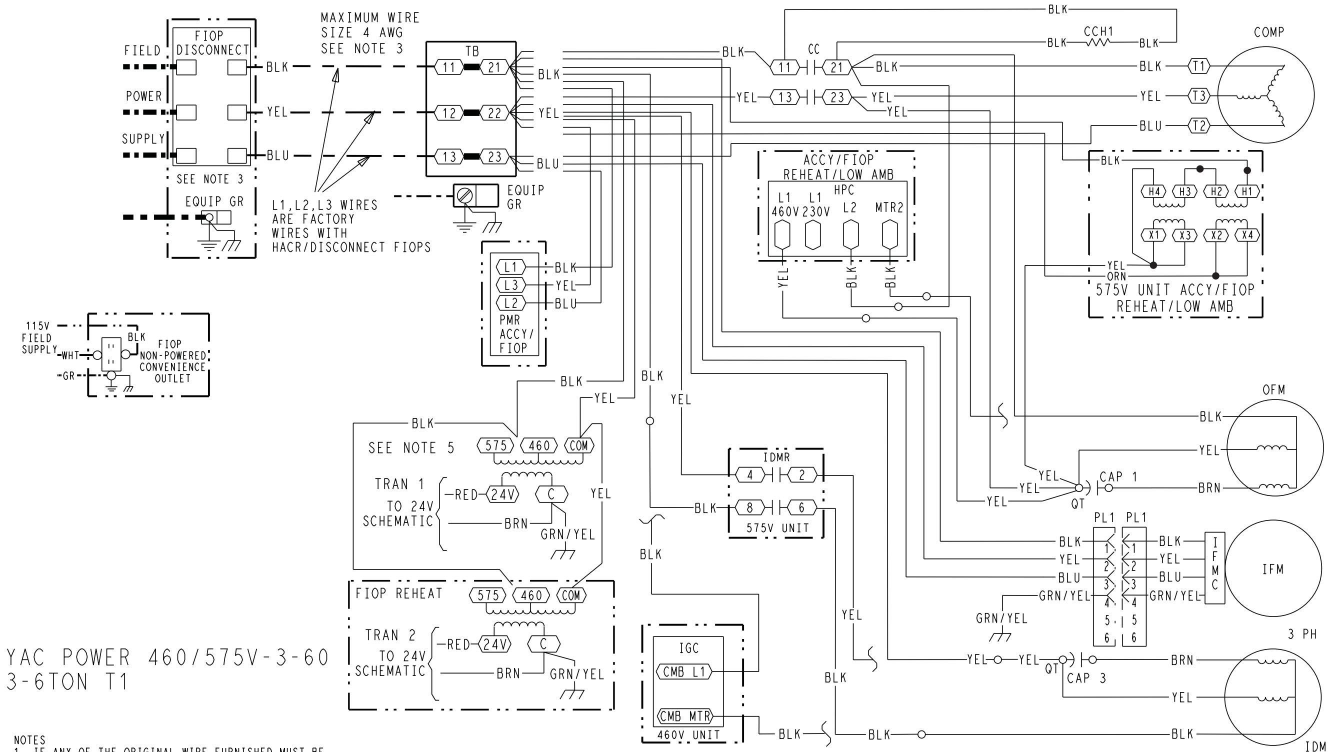
LEGEND

- (X) MARKED WIRE
- (X) TERMINAL (MARKED)
- ○ TERMINAL (UNMARKED)
- [X] TERMINAL BLOCK
- ● SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

ACCY	ACCESSORY
AUX	AUXILIARY
AWG	AMERICAN WIRE GAGE
BA	BUILDING AUTOMATION NETWORK
CC	CONTACTOR,COMPRESSOR
C	COMMON
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH
CLO	COMPRESSOR LOCKOUT
CLV	COOLING LIQUID VALVE
CMB	CENTRIFUGAL MOTOR BLOWER
COFS	CONDENSATE OVERFLOW SWITCH
COM	SIGNAL COMMON
COMP	COMPRESSOR MOTOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
EHR	ELECTRIC HEAT RELAY
ENTH	ENTHALPY
EQUIP	EQUIPMENT
ERV	ENERGY RECOVERY VENTILATOR
ESL	ENTHALPY SENSOR - LOW
FB	FUSE BLOCK
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FS	FLAME SWITCH
FST	FAN HOUSING TEMP SENSOR
FU	FUSE
G	THERMOSTAT FAN CALL
GR(GND)	GROUND
GV	GAS VALVE
HACR	HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER
HGRH	HOT GAS REHEAT
HPC	HEAD PRESSURE CONTROL
HPS	HIGH PRESSURE SWITCH
HR	HEATER RELAY
HUM	HUMIDISTAT
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IDMR	INDUCED DRAFT RELAY
IFM	INDOOR FAN MOTOR
IFMC	INDOOR FAN MOTOR CONTROL
IFO	INDOOR FAN ON SIGNAL
IGC	INTEGRATED GAS CONTROL
I	IGNITOR
IRH	INDOOR RELATIVE HUMIDITY
JMP	JUMPER
L1	LINE 1
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LDR	COMPRESSOR LOADER
LEN	LOCAL EQUIPMENT NETWORK
LOC	LOSS OF CHARGE
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMP LOCKOUT
MBB	MAIN BASE BOARD
MOV	METAL OXIDE VARISTOR
MTR	MOTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PER	POWER EXHAUST RELAY
PH	PHASE
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
PS	PRESSURE SWITCH
PWM	PULSE WIDTH MODULATION
QT	QUADRUPLE TERMINAL
R	THERMOSTAT POWER
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RH	RELATIVE HUMIDITY
RLV	REHEAT LIQUID VALVE
RNET	LOCAL ACCESS NETWORK
RS	ROLLOUT SWITCH
RVS	REVERSING VALVE SOLENOID
SAT	SUPPLY AIR TEMP SENSOR
SDP	SYSTEM DISCHARGE PRESSURE
SPRH	SPACE RELATIVE HUMIDITY
SPT	SPACE TEMPERATURE SENSOR
SPTO	SPACE TEMPERATURE OFFSET
SSP	SYSTEM SUCTION PRESSURE
STD	STANDARD
SW	SWITCH
TB	TERMINAL BLOCK
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
UCB	UNIT CONTROL BOARD
W1	1st STAGE OF HEATING CALL
W2	2nd STAGE OF HEATING CALL
Y1	1st STAGE OF COOLING CALL
Y2	2nd STAGE OF COOLING CALL

48TC002991 | -

TYPICAL 48FC 04-07 POWER WIRING DIAGRAM, 460-575/3/60 UNIT SHOWN



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90° C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.

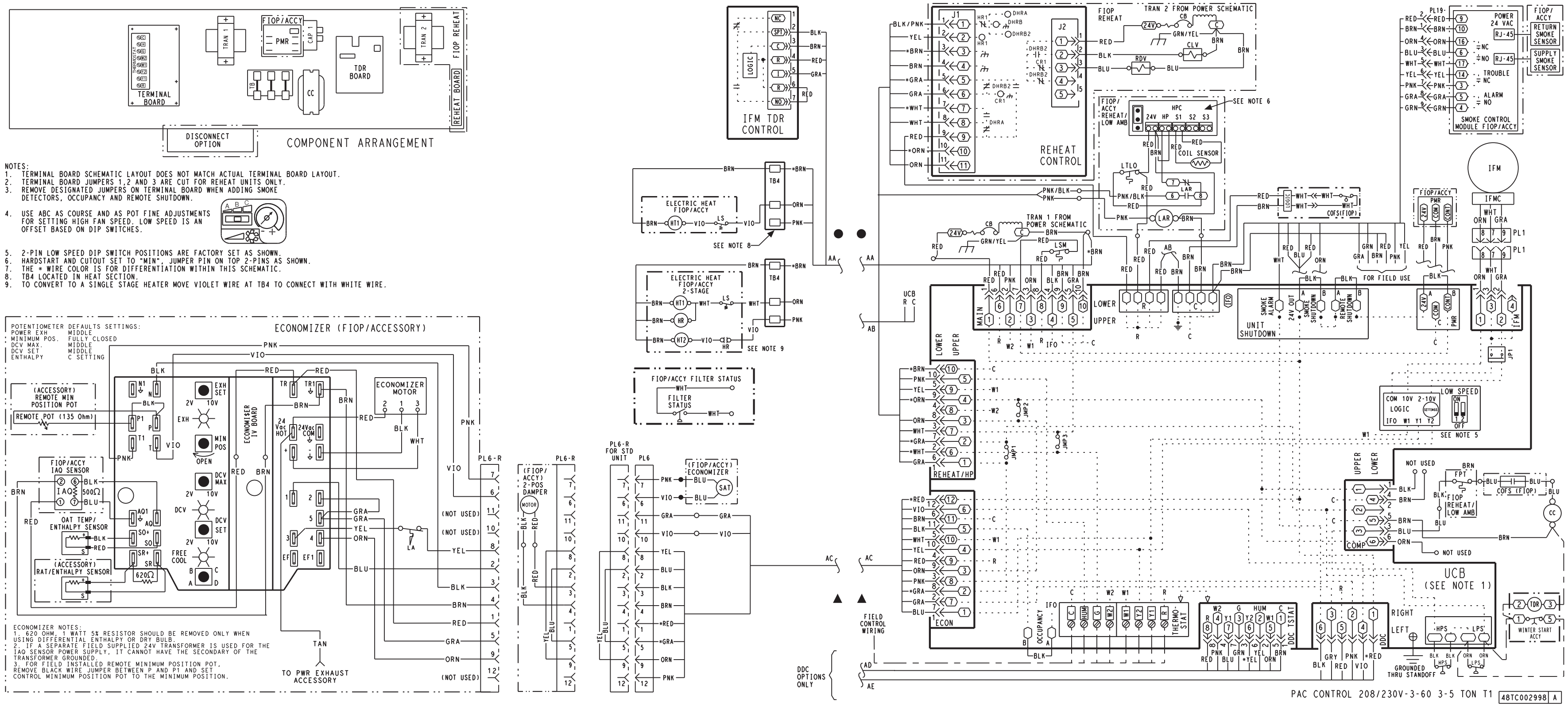
LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

ACCY	ACCESSORY
AUX	AUXILLARY
AWG	AMERICAN WIRE GAGE
BA	BUILDING AUTOMATION NETWORK
CC	CONTACTOR,COMPRESSOR
C	COMMON
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH
CLO	COMPRESSOR LOCKOUT
CLV	COOLING LIQUID VALVE
CMB	CENTRIFUGAL MOTOR BLOWER
COFS	CONDENSATE OVERFLOW SWITCH
COM	SIGNAL COMMON
COMP	COMPRESSOR MOTOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
EHR	ELECTRIC HEAT RELAY
ENTH	ENTHALPY
EQUIP	EQUIPMENT
ERV	ENERGY RECOVERY VENTILATOR
ESL	ENTHALPY SENSOR - LOW
FB	FUSE BLOCK
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FS	FLAME SWITCH
FST	FAN HOUSING TEMP SENSOR
FU	FUSE
G	THERMOSTAT FAN CALL
GR(GND)	GROUND
GV	GAS VALVE
HACR	HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER
HGRH	HOT GAS REHEAT
HPC	HEAD PRESSURE CONTROL
HPS	HIGH PRESSURE SWITCH
HR	HEATER RELAY
HUM	HUMIDISTAT
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IDMR	INDUCED DRAFT RELAY
IFM	INDOOR FAN MOTOR
IFMC	INDOOR FAN MOTOR CONTROL
IFO	INDOOR FAN ON SIGNAL
IGC	INTEGRATED GAS CONTROL
I	IGNITOR
IRH	INDOOR RELATIVE HUMIDITY
JMP	JUMPER
L1	LINE 1
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LDR	COMPRESSOR LOADER
LEN	LOCAL EQUIPMENT NETWORK
LOC	LOSS OF CHARGE
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMP LOCKOUT
MBB	MAIN BASE BOARDMMR
MOV	METAL OXIDE VARISTOR
MTR	MOTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PER	POWER EXHAUST RELAY
PH	PHASE
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
PS	PRESSURE SWITCH
PWM	PULSE WIDTH MODULATION
QT	QUADRUPLE TERMINA
R	THERMOSTAT POWER
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RH	RELATIVE HUMIDITY
RLV	REHEAT LIQUID VALVE
RNET	LOCAL ACCESS NETWORK
RS	ROLLOUT SWITCH
RVS	REVERSING VALVE SOLENOID
SAT	SUPPLY AIR TEMP SENSOR
SDP	SYSTEM DISCHARGE PRESSURE
SPRH	SPACE RELATIVE HUMIDITY
SPT	SPACE TEMPERATURE SENSOR
SPTO	SPACE TEMPERATURE OFFSET
SSP	SYSTEM SUCTION PRESSURE
STD	STANDARD
SW	SWITCH
TB	TERMINAL BLOCK
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
UCB	UNIT CONTROL BOARD
W1	1st STAGE OF HEATING CALL
W2	2nd STAGE OF HEATING CALL
Y1	1st STAGE OF COOLING CALL
Y2	2nd STAGE OF COOLING CALL

48TC002992 | -

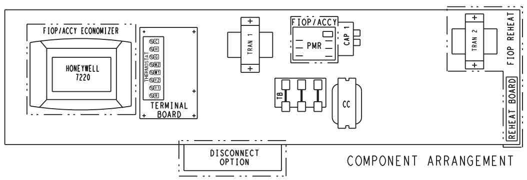
TYPICAL CONTROL WIRING DIAGRAM — 50FC 04-06 208-230/3/60 UNIT WITH ELECTRO-MECHANICAL CONTROL AND W7212 ECONOMIZER



NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD LAYOUT.
2. TERMINAL BOARD JUMPERS 1,2 AND 3 ARE CUT FOR REHEAT UNITS ONLY.
3. REMOVE DESIGNATED JUMPERS ON TERMINAL BOARD WHEN ADDING SMOKE DETECTORS, OCCUPANCY AND REMOTE SHUTDOWN.
4. USE ABC AS COURSE AND AS POT FINE ADJUSTMENTS FOR SETTING HIGH FAN SPEED. LOW SPEED IS AN OFFSET BASED ON DIP SWITCHES.
5. 2-PIN LOW SPEED DIP SWITCH POSITIONS ARE FACTORY SET AS SHOWN.
6. HARDSTART AND CUTOUT SET TO "MIN", JUMPER PIN ON TOP 2-PINS AS SHOWN.
7. THE * WIRE COLOR IS FOR DIFFERENTIATION WITHIN THIS SCHEMATIC.
8. TB4 LOCATED IN HEAT SECTION.
9. TO CONVERT TO A SINGLE STAGE HEATER MOVE VIOLET WIRE AT TB4 TO CONNECT WITH WHITE WIRE.

ECONOMIZER NOTES:
1. 620 OHM, 1 WATT 5% RESISTOR SHOULD BE REMOVED ONLY WHEN USING DIFFERENTIAL ENTHALPY OR DRY BULB.
2. IF A SEPARATE FIELD SUPPLIED 24V TRANSFORMER IS USED FOR THE IAQ SENSOR POWER SUPPLY, IT CANNOT HAVE THE SECONDARY OF THE TRANSFORMER GROUNDED.
3. FOR FIELD INSTALLED REMOTE MINIMUM POSITION POT, REMOVE BLACK WIRE JUMPER BETWEEN P AND P1 AND SET CONTROL MINIMUM POSITION POT TO THE MINIMUM POSITION.

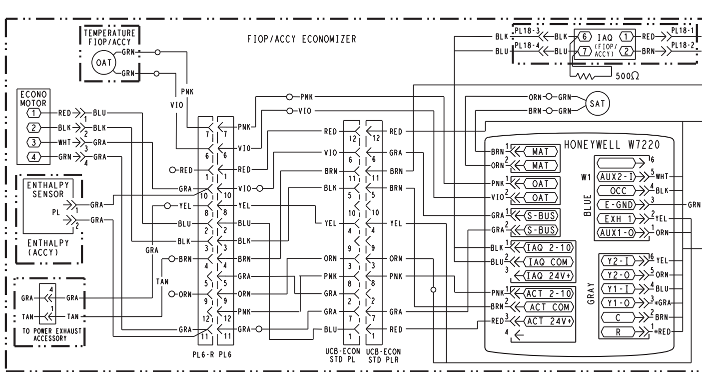
TYPICAL CONTROL WIRING DIAGRAM — 50FC 07 208-230/3/60 UNIT WITH ELECTRO-MECHANICAL CONTROL AND W7220 ECONOMIZER

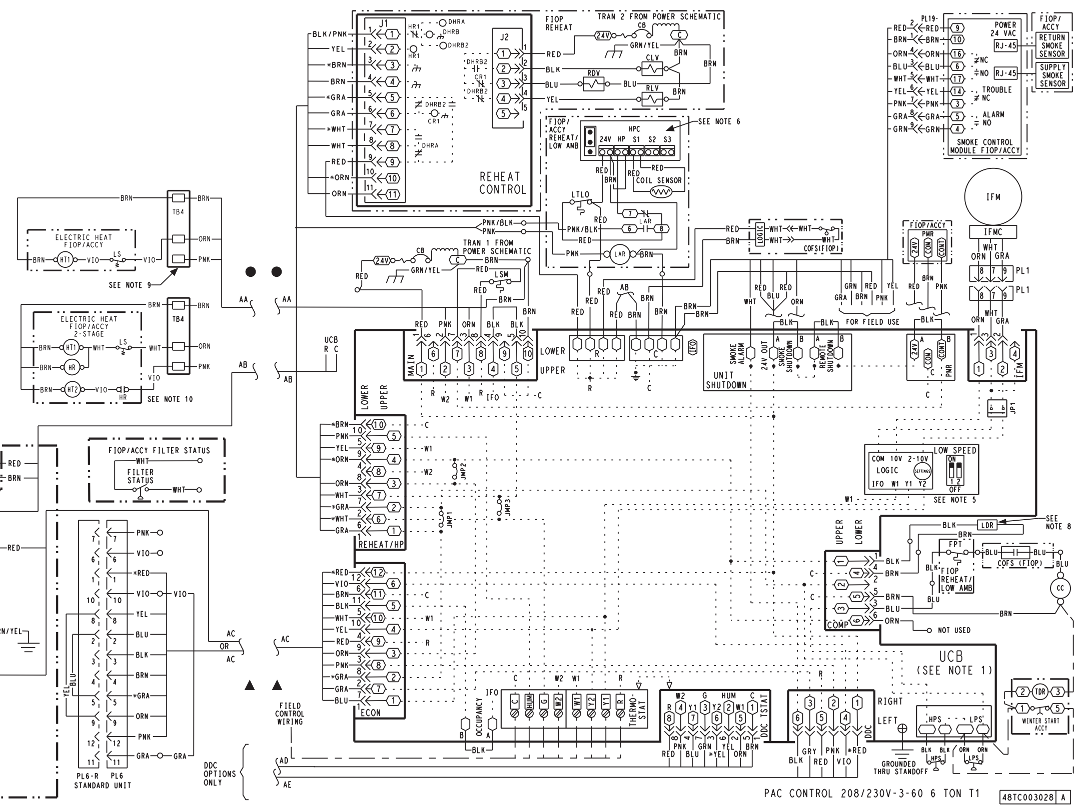


COMPONENT ARRANGEMENT

NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD LAYOUT.
2. TERMINAL BOARD JUMPERS 1,2 AND 3 ARE CUT FOR REHEAT UNITS ONLY.
3. REMOVE DESIGNATED JUMPERS ON TERMINAL BOARD WHEN ADDING SMOKE DETECTORS, OCCUPANCY AND REMOTE SHUTDOWN.
4. USE ABC AS COURSE AND AS POT FINE ADJUSTMENTS FOR SETTING HIGH FAN SPEED. LOW SPEED IS AN OFFSET BASED ON DIP SWITCHES.

5. 2-PIN LOW SPEED DIP SWITCH POSITIONS ARE FACTORY SET AS SHOWN.
6. HARDSTART AND CUTOUT SET TO "MIN", JUMPER PIN ON TOP 2-PINS AS SHOWN.
7. THE * WIRE COLOR IS FOR DIFFERENTIATION WITHIN THIS SCHEMATIC.
8. COMPRESSOR LOADER PLUG CONTAINS BRIDGE RECTIFIER TO CONVERT AC TO DC.
9. TB4 LOCATED IN HEAT SECTION.
10. TO CONVERT TO A SINGLE STAGE HEATER MOVE VIOLET WIRE AT TB4 TO CONNECT WITH WHITE WIRE.

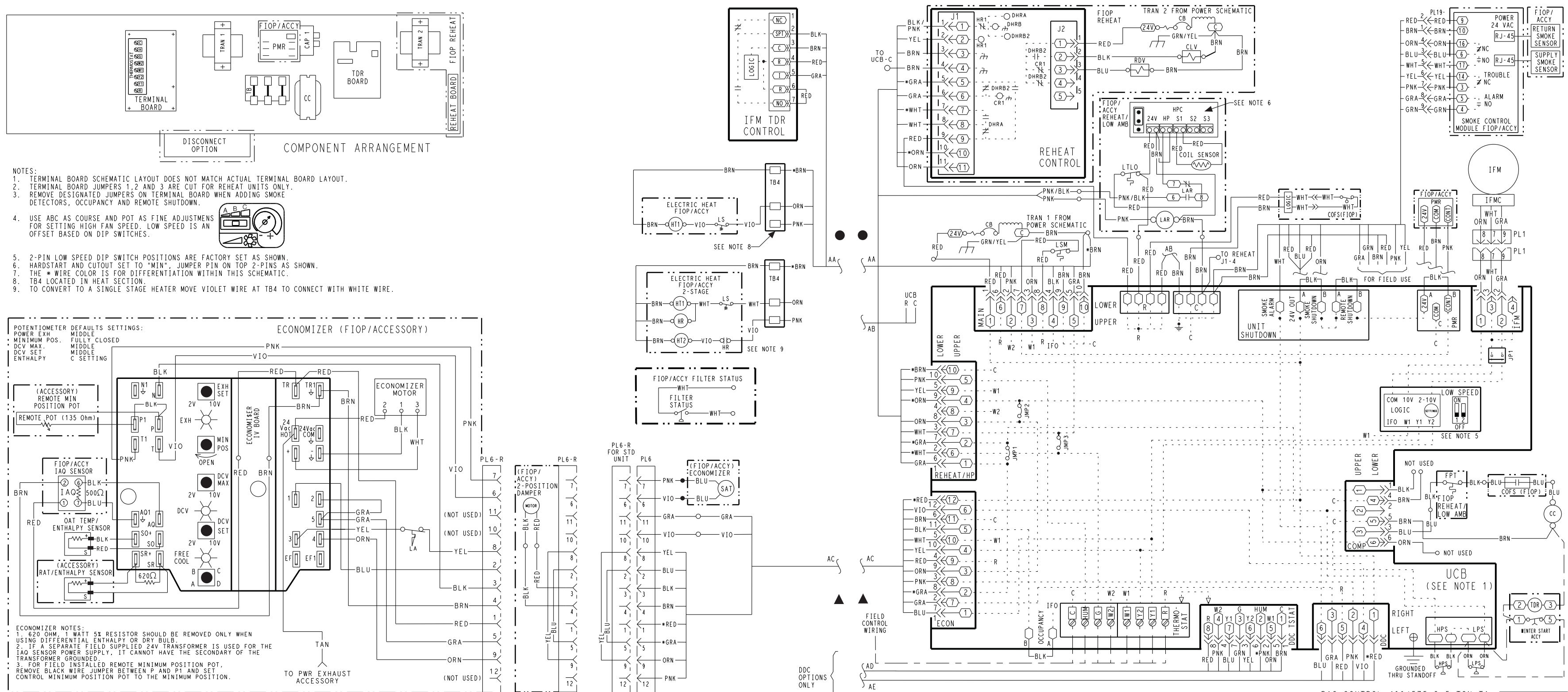


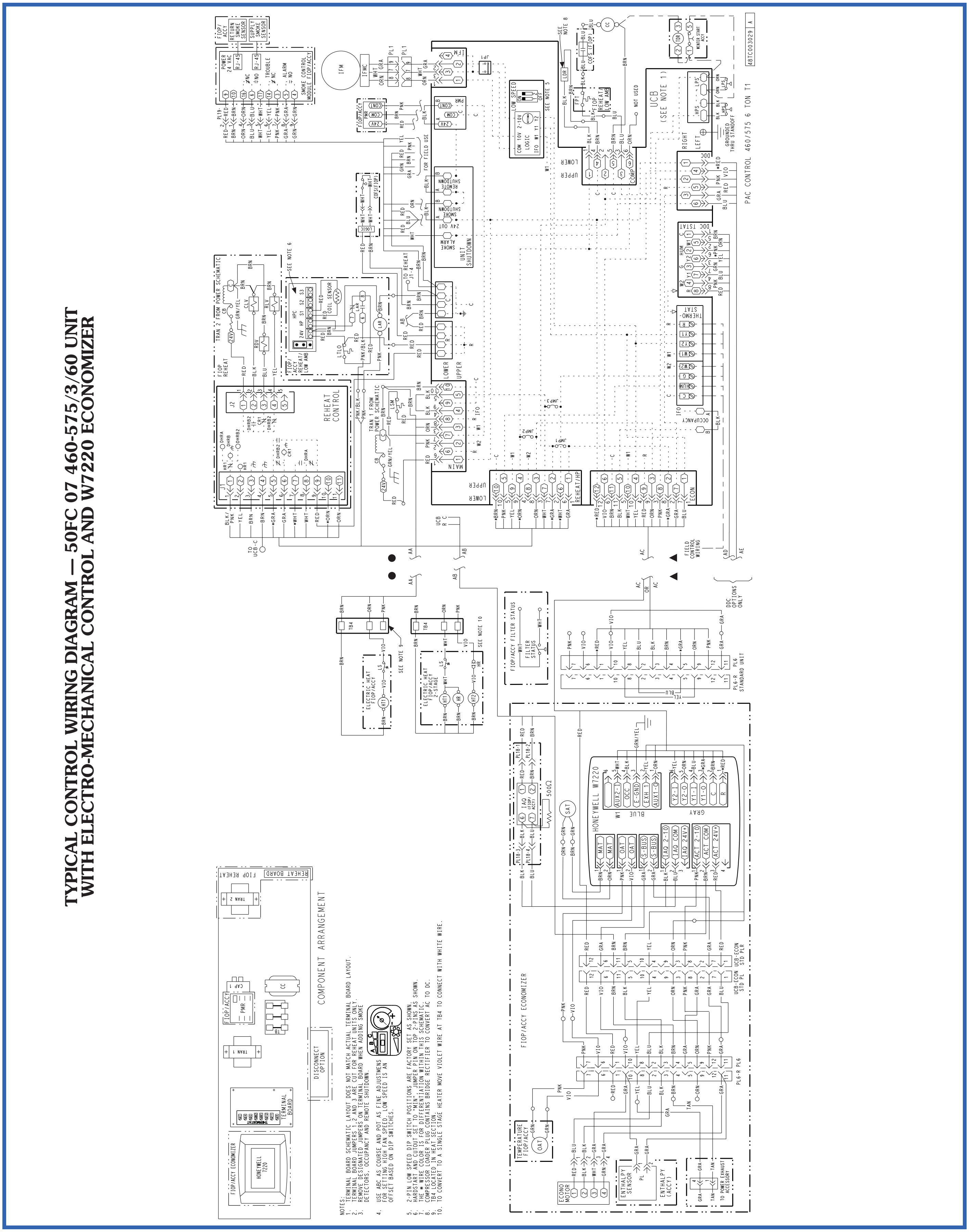


PAC CONTROL 208/230V-3-60 6 TON T1

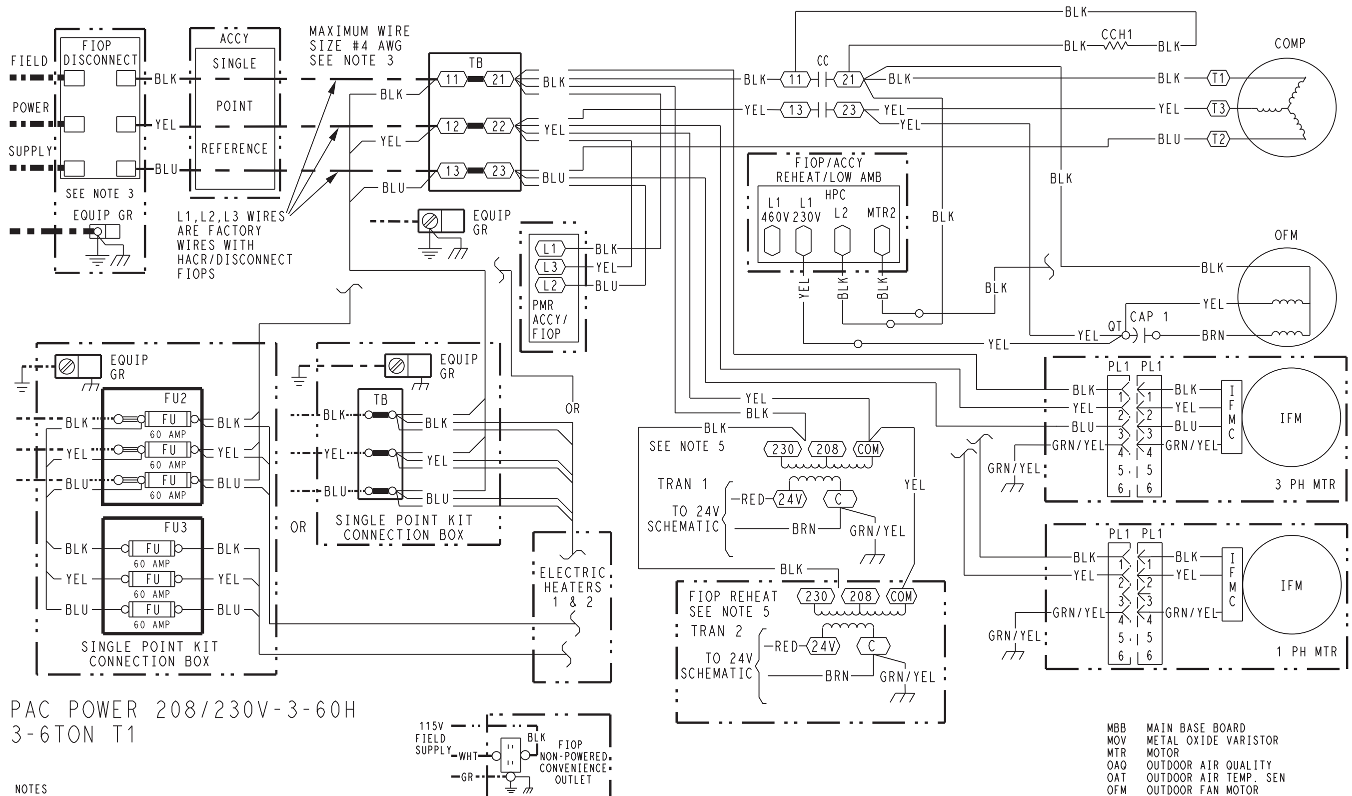
48TC003028 A

TYPICAL CONTROL WIRING DIAGRAM — 50FC 04-06 460-575/3/60 UNIT WITH ELECTRO-MECHANICAL CONTROL AND W7212 ECONOMIZER




TYPICAL CONTROL WIRING DIAGRAM — 50FC 07 460-575/3/60 UNIT
WITH ELECTRO-MECHANICAL CONTROL AND W7220 ECONOMIZER
COMPONENT ARRANGEMENT
NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD LAYOUT.
2. TERMINAL BOARD JUMPERS 1, 2 AND 3 ARE CUT FOR REHEAT UNITS ONLY.
3. REMOVE DESIGNATED JUMPERS ON TERMINAL BOARD WHEN ADDING SMOKE DETECTORS, OCCUPANCY AND REMOTE SHUTDOWN.
4. USE ABC AS COURSE AND POT AS FINE ADJUSTMENS FOR SETTING HIGH FAN SPEED. LOW SPEED IS AN OFFSET BASED ON DIP SWITCHES.
5. 2-PIN LOW SPEED DIP SWITCH POSITIONS ARE FACTORY SET AS SHOWN.
6. HARDSTART AND CUTOUT SET TO "MIN", JUMPER PIN ON TOP 2-PINS AS SHOWN.
7. THE ● WIRE COLOR IS FOR DIFFERENTIATION WITHIN THIS SCHEMATIC.
8. COMPRESSOR LOADER PLUG CONTAINS BRIDGE RECTIFIER TO CONVERT AC TO DC.
9. TB4 LOCATED IN HEATER SECTION.
10. TO CONVERT TO A SINGLE STAGE HEATER MOVE VIOLET WIRE AT TB4 TO CONNECT WITH WHITE WIRE.
48TC003029 A
PAC CONTROL 460/575 6 TON T1

TYPICAL 50FC 04-07 POWER WIRING DIAGRAM, 208-230/3/60 UNIT SHOWN



NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90° C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

ACCY	ACCESSORY
AWG	AMERICAN WIRE GAGE
BAS	BUILDING AUTOMATION NETWORK
CC	CONTACTOR,COMPRESSOR
C	COMMON
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH
CLO	COMPRESSOR LOCKOUT
CLV	COOLING LIQUID VALVE
COFS	CONDENSATE OVERFLOW SWITCH
COM	SIGNAL COMMON
COMP	COMPRESSOR MOTOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
EHR	ELECTRIC HEAT RELAY
ENTH	ENTHALPY
ERV	ENERGY RECOVERY VENTILATOR
ESL	ENTHALPY SENSOR - LOW
FB	FUSE BLOCK
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FST	FAN HOUSING TEMP SENSOR
FU	FUSE

G	THERMOSTAT FAN CALL
GR(GND)	GROUND
HACR	HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER
HR	HEATER RELAY
HGRH	HOT GAS REHEAT
HPC	HEAD PRESSURE CONTROL
HPS	HIGH PRESSURE SWITCH
HUM	HUMIDISTAT
IAQ	INDOOR AIR QUALITY SENSORS
IFM	INDOOR FAN MOTOR
IFMC	INDOOR FAN MOTOR CONTROL
IFO	INDOOR FAN ON SIGNAL
IRH	INDOOR RELATIVE HUMIDITY
JMP	JUMPER
L1	LINE 1
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LDR	COMPRESSOR LOADER
LEN	LOCAL EQUIPMENT NETWORK
LOC	LOSS OF CHARGE
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMP LOCKOUT

MBB	MAIN BASE BOARD
MOV	METAL OXIDE VARISTOR
MTR	MOTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PER	POWER EXHAUST RELAY
PH	PHASE
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
PS	PRESSURE SWITCH
PWM	PULSE WIDTH MODULATION
QT	QUADRUPLE TERMINAL
R	THERMOSTAT POWER
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RH	RELATIVE HUMIDITY
RLV	REHEAT LIQUID VALVE
RNET	LOCAL ACCESS NETWORK
RVS	REVERSING VALVE SOLENOID
SAT	SUPPLY AIR TEMP SENSOR
SDP	SYSTEM DISCHARGE PRESSURE
SPRH	SPACE RELATIVE HUMIDITY
SPT	SPACE TEMPERATURE SENSOR
SPTO	SPACE TEMPERATURE OFFSET
SSP	SYSTEM SUCTION PRESSURE
SW	SWITCH
TB	TERMINAL BLOCK
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
UCB	UNIT CONTROL BOARD
W1	1st STAGE OF HEATING CALL
W2	2nd STAGE OF HEATING CALL
Y1	1st STAGE OF COOLING CALL
Y2	2nd STAGE OF COOLING CALL

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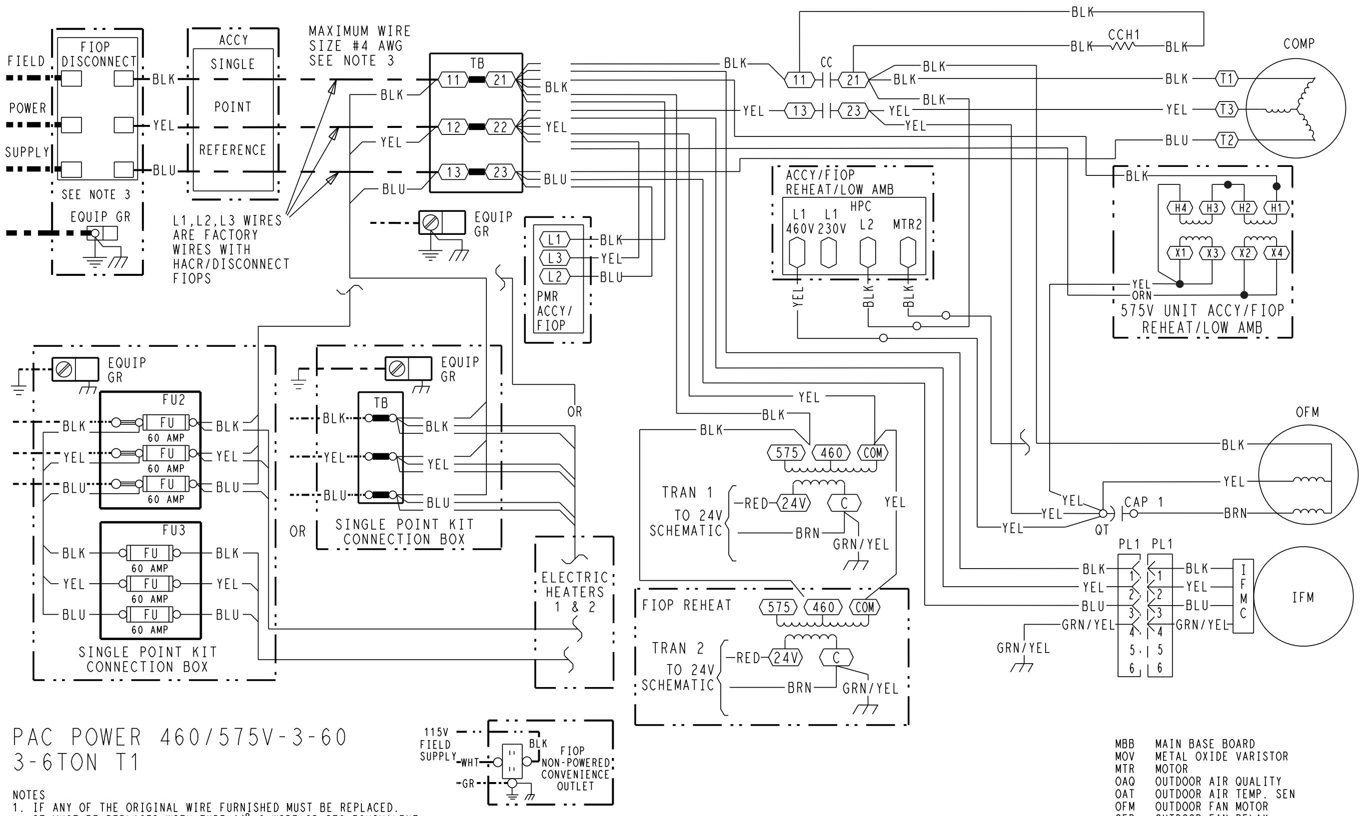
TYPICAL 50FC 04-07 POWER WIRING DIAGRAM, 460-575/3/60 UNIT SHOWN



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90° C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.

LEGEND
- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

ACCY	ACCESSORY
AWG	AMERICAN WIRE GAGE
BAS	BUILDING AUTOMATION NETWORK
CC	CONTACTOR,COMPRESSOR
C	COMMON
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH
CLO	COMPRESSOR LOCKOUT
CLV	COOLING LIQUID VALVE
COFS	CONDENSATE OVERFLOW SWITCH
COM	SIGNAL COMMON
COMP	COMPRESSOR MOTOR
DDC	DIRECT DIGITAL CONTROL
DFB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
EHR	ELECTRIC HEAT RELAY
ENTH	ENTHALPY
ERV	ENERGY RECOVERY VENTILATOR
ESL	ENTHALPY SENSOR - LOW
FB	FUSE BLOCK
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FST	FAN HOUSING TEMP SENSOR
FU	FUSE
G	THERMOSTAT FAN CALL
GR(GND)	GROUND
HACR	HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER
HR	HEATER RELAY
HGRH	HOT GAS REHEAT
HPC	HEAD PRESSURE CONTROL
HPS	HIGH PRESSURE SWITCH
HUM	HUMIDISTAT
IAQ	INDOOR AIR QUALITY SENSORS
IFM	INDOOR FAN MOTOR
IFMC	INDOOR FAN MOTOR CONTROL
IFO	INDOOR FAN ON SIGNAL
IRH	INDOOR RELATIVE HUMIDITY
JMP	JUMPER
L1	LINE 1
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LDR	COMPRESSOR LOADER
LEN	LOCAL EQUIPMENT NETWORK
LOC	LOSS OF CHARGE
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMP LOCKOUT
MBB	MAIN BASE BOARD
MOV	METAL OXIDE VARISTOR
MTR	MOTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PER	POWER EXHAUST RELAY
PH	PHASE
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
PS	PRESSURE SWITCH
PWM	PULSE WIDTH MODULATION
QT	QUADRUPLE TERMINAL
R	THERMOSTAT POWER
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RH	RELATIVE HUMIDITY
RLV	REHEAT LIQUID VALVE
RNET	LOCAL ACCESS NETWORK
RVS	REVERSING VALVE SOLENOID
SAT	SUPPLY AIR TEMP SENSOR
SDP	SYSTEM DISCHARGE PRESSURE
SPRH	SPACE RELATIVE HUMIDITY
SPT	SPACE TEMPERATURE SENSOR
SPTO	SPACE TEMPERATURE OFFSET
SSP	SYSTEM SUCTION PRESSURE
SW	SWITCH
TB	TERMINAL BLOCK
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
UCB	UNIT CONTROL BOARD
W1	1st STAGE OF HEATING CALL
W2	2nd STAGE OF HEATING CALL
Y1	1st STAGE OF COOLING CALL
Y2	2nd STAGE OF COOLING CALL

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Sequence of operation

General

The sequence below describes the sequence of operation for an electro-mechanical unit with and without a factory-installed EconoMi$er® IV (W7212 controller) and X (W7220 controller). For information regarding a direct digital controller, see the start-up, operations, and troubleshooting manual for the applicable controller.

Electro-Mechanical Units with No Economizer

Cooling (single stage units)

When the thermostat calls for cooling, terminals G and Y1 are energized. The indoor fan will run at the user set fan speed and the compressor contactor (CC) is energized causing the compressor and outdoor fan to run.

When the thermostat removes the call for Y1, the compressor contactor will de-energize shutting down the compressor and the outdoor fan. When the thermostat removes the call for G, the indoor fan will turn off after the specific unit fan off delay.

Cooling (two stage units)

When the thermostat calls for cooling, terminals G and Y1 are energized. The indoor fan will run at the low fan speed and the compressor contactor (CC) is energized causing the compressor and outdoor fan to run. The low indoor fan speed is 66% of the user set fan speed and the compressor will run at partial capacity.

If additional cooling is needed, the thermostat will add the call for Y2. This will increase the indoor fan speed to the user set fan speed and energize the compressor loader for full compressor capacity. The outdoor fan is the same speed for Y1 and Y2.

When the thermostat removes the call for Y2 but leaves the Y1, the indoor fan will reduce speed to 66% of the user set fan speed, the compressor loader will turn off, and the outdoor fan will remain on. When the thermostat removes the call for Y1 the compressor contactor will de-energize shutting down the compressor and the outdoor fan. When the thermostat removes the call for G, the indoor fan will turn off after the specific unit fan off delay.

NOTE: Per ASHRAE 90.1-2016 and IECC-2018 standards, during the first stage of cooling operation the Unit Control Board (UCB) will adjust the fan motor speed to provide 66% of the total cfm established for the unit.

Gas Heating (48FC units)

NOTE: WeatherMaker® units have either 1 or 2 stages of gas heat.

When the thermostat calls for heating, power is sent to W on the Integrated Gas Controller (IGC) board. An LED (light-emitting diode) on the IGC board turns on and remains on during normal operation. A check is made to ensure that the roll-out switch and limit switch are closed. If the check was successful, the induced-draft motor is energized, and when its speed is satisfactory, as proven by the flue gas pressure switch, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22 second delay before another 5 second attempt. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24 V power to the thermostat.

When ignition occurs, the IGC board will continue to monitor the condition of the roll-out switch, the limit switches, the flue gas pressure switch, as well as the flame sensor. 45 seconds after ignition occurs, assuming the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will energize (and the outdoor-air dampers will open to their minimum position). If, for some reason, the over-temperature limit opens prior to the start of the indoor fan blower, the unit will shorten the 45 second delay to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once the fan-on delay has been modified, it will not change back to 45 seconds until power is reset to the control. On units with 2 stages of heat, when additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the unit is controlled through a room thermostat set for fan auto, the indoor-fan motor will continue to operate for an additional 45 seconds then stop. A LED indicator is provided on the IGC to monitor operation.

Electric Heating (50FC units)

NOTE: 50FC units are sold as cooling only. If electric heaters are required, use only factory-approved heaters. They will operate as follows.

Units have either 1 or 2 stages of electric heat. When the thermostat calls for heating, power is applied to G and the W1 terminals at the unit. The unit control will energize the indoor fan contactor and the first stage of electric heat. On units with two-stage heating, when additional heating is required, the second stage of electric heat (if equipped) will be energized when power is applied at the W2 terminal on the unit.

IMPORTANT: The thermostat must be configured for Electric Heat so it will energize G with the W1 call.

Electro-mechanical Units with Factory-Installed EconoMi$er

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV and X control to provide a 50°F (10°C) to 55°F (13°C) mixed-air temperature into the zone. As the mixed air temperature fluctuates above 55°F (13°C) or below 50°F (10°C) dampers will be modulated (open or close) to bring the mixed-air temperature back within control. If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F (7°C), then the outdoor-air damper position will be decreased to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48°F (9°C). The power exhaust fans will be energized and de-energized, if installed, as the outdoor-air damper opens and closes.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV and X control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set-point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. For EconoMi$er IV and X operation, there must be a thermostat call for the fan (G). If the unit is occupied and the fan is on, the damper will operate at minimum position. Otherwise, the damper will be closed.

When the EconoMi$er IV and X control is in the occupied mode and a call for cooling exists (Y1 on the thermostat), the control will first check for indoor fan operation. If the fan is not on, then cooling will not be activated. If the fan is on, then the control will open the EconoMi$er IV and X damper to the minimum position.

On the initial power to the EconoMi$er® IV and X control, it will take the damper up to $2^1/_2$ minutes before it begins to position itself. After the initial power-up, further changes in damper position can take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between $1^1/_2$ and $2^1/_2$ minutes. If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed-air temperature set-point at 50°F (10°C) to 55°F (13°C). If there is a further demand for cooling (cooling second stage — Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed-air temperature set-point. The EconoMi$er IV and X damper will be open at maximum position.

2-Speed Note: The EconoMi$er IV and X controller will adjust the damper position as the Indoor Fan Speed changes, per its configured values.

Heating

The sequence of operation for the heating is the same as an electro-mechanical unit with no economizer. The only difference is how the economizer acts. The economizer will stay at the Economizer Minimum Position while the evaporator fan is operating. The outdoor-air damper is closed when the indoor fan is not operating. Refer to Service and Maintenance Manual for further details.

Optional Humidi-MiZer® dehumidification system

Units with the factory equipped Humidi-MiZer system option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle. The Humidi-MiZer system option includes additional valves in the liquid line and discharge line of each refrigerant circuit, a small reheat condenser coil downstream of the evaporator, and variable-speed control of some or all outdoor fans. Operation of the revised refrigerant circuit for each mode is described below.

The Humidi-MiZer system provides three sub-modes of operation: Cool, Reheat1, and Reheat2.

Cool mode — Provides a normal ratio of Sensible and Latent Cooling effect from the evaporator coil.

Reheat1 — Provides increased Latent Cooling while slightly reducing the Sensible Cooling effect.

Reheat2 — Provides normal Latent Cooling but with null or minimum Sensible Cooling effect delivered to the space.

The Reheat1 and Reheat2 modes are available when the unit is not in a Heating mode and when the Low Ambient Lockout switch is closed.

Refer to the following figures for single stage and 2 stage piping flow diagrams.

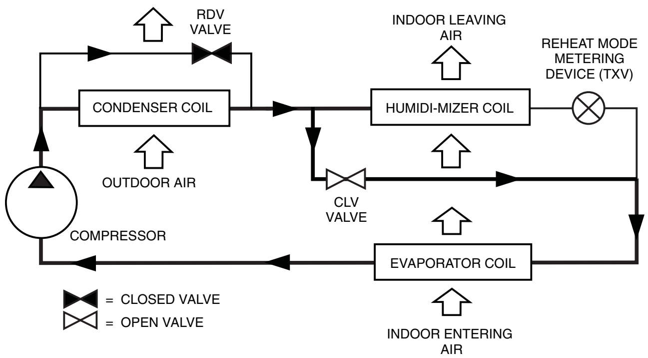
RTU Open controller (factory option)

For details on operating 48/50FC units equipped with the factory-installed RTU Open controller option, refer to Factory Installed RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual.

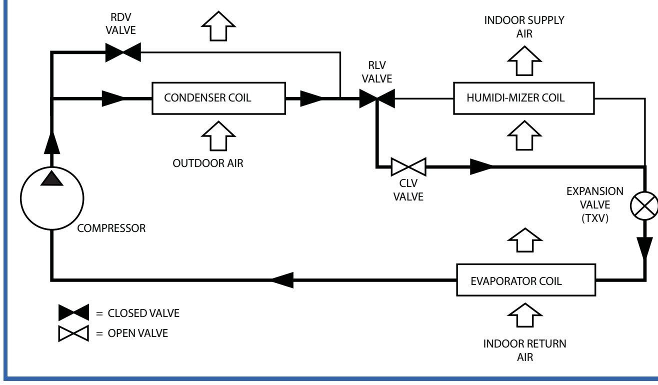
SystemVu™ controller (factory option)

For details on operating 48/50FC units equipped with the factory-installed SystemVu controller option, refer to FC/GC Series Single Package Rooftop Units with SystemVu Controller Controls, Start-Up, Operation and Troubleshooting manual.

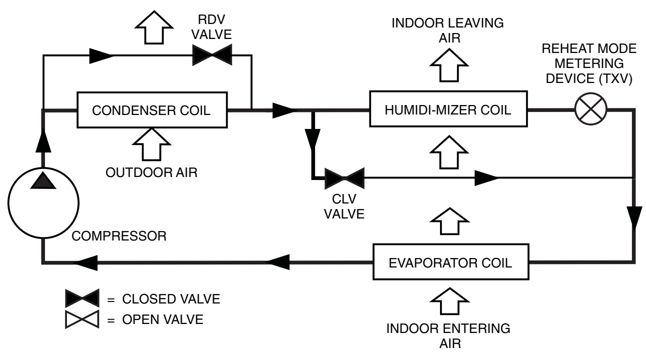
NORMAL COOLING MODE — HUMIDI-MIZER® SYSTEM WITH SINGLE STAGE COOLING



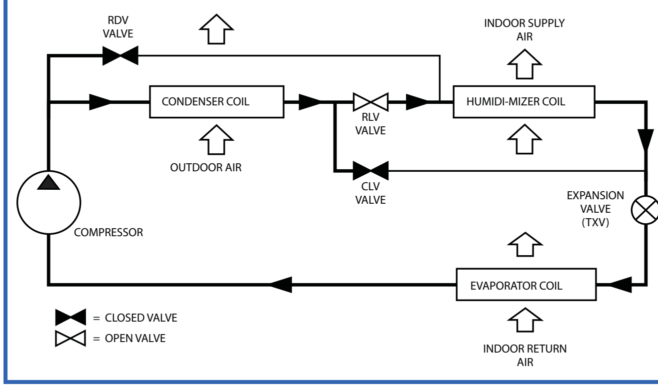
NORMAL COOLING MODE — HUMIDI-MIZER® SYSTEM WITH 2 STAGE COOLING



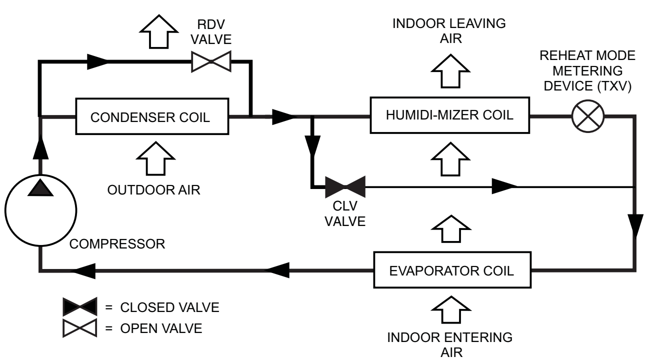
SUBCOOLING MODE (REHEAT 1) — HUMIDI-MIZER SYSTEM WITH SINGLE STAGE COOLING



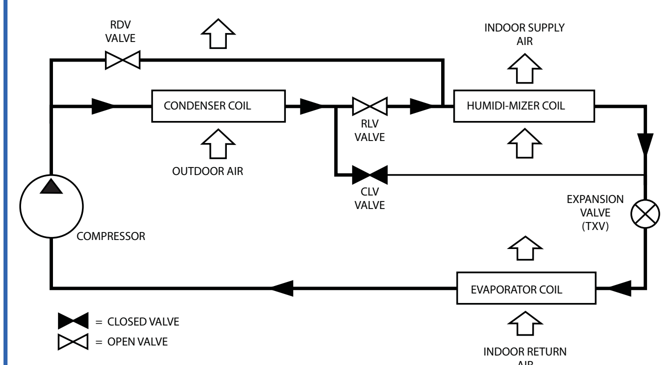
SUBCOOLING MODE (REHEAT 1) — HUMIDI-MIZER SYSTEM WITH 2 STAGE COOLING



HOT GAS REHEAT MODE (REHEAT2) — HUMIDI-MIZER SYSTEM WITH SINGLE STAGE COOLING



HOT GAS REHEAT MODE (REHEAT2) — HUMIDI-MIZER SYSTEM WITH 2 STAGE COOLING



Minimum operating ambient temperature (cooling)

In mechanical cooling mode, your Carrier rooftop unit can safely operate down to an outdoor ambient temperature of 40°F (4°C). It is possible to provide cooling at lower outdoor ambient temperatures by using less outside air, economizers, and/or accessory low ambient kits.

Maximum operating ambient temperature (cooling)

The maximum operating ambient temperature for cooling mode is 115°F (46°C). While cooling operation above 115°F (46°C) may be possible, it could cause either a reduction in performance, reliability, or a protective action by the unit's internal safety devices.

Multiple motor and drive packages

Some applications need larger horsepower motors, some need more airflow, and some need both. Regardless of the case, your Carrier expert has a factory installed combination to meet your application. A wide selection of motors are available, factory installed, to handle nearly any application.

Stainless steel heat exchanger (48FC units only)

The stainless steel heat exchanger option provides the tubular heat exchanger be made out of a minimum 20 gage type 409 stainless steel for applications where the mixed air to the heat exchanger is expected to drop below 45°F (7°C). Stainless steel may be specified on applications where the presence of airborne contaminants require its use (applications such as paper mills) or in area with very high outdoor humidity that may result in severe condensation in the heat exchanger during cooling operation.

Minimum mixed air temperature (heating) (48FC units only)

Using the factory settings, the minimum temperatures for the mixed air (the combined temperature of the warm return air and the cold outdoor air) entering the dimpled, gas heat exchangers are shown in the following table.

MINIMUM TEMPERATURE FOR MIXED AIR TEMPERATURE

ALUMINIZED	STAINLESS STEEL
50°F (10°C) Continuous	40°F (4°C) Continuous
45°F (7°C) Intermittent	35°F (2°C) Intermittent

Operating at lower mixed-air temperatures may be possible, if a field-supplied, outdoor air thermostat initiates both heat stages when the temperature is less than the minimum temperatures listed above. Please contact your local Carrier representative for assistance.

Minimum and maximum airflow (heating and cooling)

To maintain safe and reliable operation of your rooftop, operate within the heating airflow limits during heating mode and cooling airflow limits during cooling mode. Operating above the max may cause blow-off, undesired airflow noise, or airflow related problems with the rooftop unit. Operating below the min may cause problems with coil freeze-up and unsafe heating operation. Heating and cooling limitations differ when evaluating operating CFM, the minimum value is the HIGHER of the cooling and heating minimum CFM values published on page 8 and the maximum value is the LOWER of the cooling and heating minimum values published on page 8.

Heating-to-cooling changeover

Your unit will automatically change from heating to cooling mode when using a thermostat with an auto-changeover feature.

Airflow

All units are draw-though in cooling mode and blow-through in heating mode.

Outdoor air application strategies

Economizers reduce operating expenses and compressor run time by providing a free source of cooling and a means of ventilation to match application changing needs. In fact, they should be considered for most applications. Also, consider the various economizer control methods and their benefits, as well as sensors required to accomplish your application goals. Please contact your local Carrier representative for assistance.

Motor limits, break horsepower (BHP)

Due to internal design of Carrier units, the air path, and specially designed motors, the full horsepower (maximum continuous BHP) band, as listed in the Fan Performance tables, can be used with the utmost confidence. There is no need for extra safety factors, as Carrier motors are designed and rigorously tested to use the entire, listed BHP range without either nuisance tripping or premature motor failure.

Propane heating (48FC units only)

Propane has different physical qualities than natural gas. As a result, propane requires different fuel to air mixture. To optimize the fuel/air mixture for propane, Carrier sells different burner orifices in an easy to install accessory kit. To select the correct burner orifices or determine the heat capacity for a propane application, use either the selection software, or the unit's service manual.

High altitude heating

High altitudes have less oxygen, which affects the fuel/air mixture in heat exchangers. In order to maintain a proper fuel/air mixture, heat exchangers operating in altitudes above 2000 ft (610 m) require different orifices. To select the correct burner orifices or determine the heat capacity for a high altitude application, use either the selection software, or the unit's service manual.

High altitudes have less oxygen, which means heat exchangers need less fuel. The new gas orifices in this field-installed kit make the necessary adjustment for high altitude applications. They restore the optimal fuel to air mixture and maintain healthy combustion on altitudes above 2000 ft (610 m).

NOTE: Typical natural gas heating value ranges from 975 to 1050 Btu/ft^3 at sea level nationally. The heating value goes down approximately 1.7% per every thousand feet elevation. Standard factory orifices can typically be used up to 2000 ft (610 m) elevation without any operational issues.

Sizing a rooftop

Bigger is not necessarily better. While an air conditioner needs to have enough capacity to meet the design loads, it does not need excess capacity. In fact, excess capacity typically results in very poor part load performance and humidity control.

Using higher design temperatures than ASHRAE recommends for your location, adding "safety factors" to the calculated load, are all signs of oversizing air conditioners. Oversizing the air conditioner leads to poor humidity control, reduced efficiency, higher utility bills, larger indoor temperature swings, excessive noise, and increased wear and tear on the air conditioner.

Rather than oversizing an air conditioner, engineers should "right-size" or even slightly "under-size" air conditioners. Correctly sizing an air conditioner controls humidity better; promotes efficiency; reduces utility bills; extends equipment life, and maintains even, comfortable temperatures. Please contact your local Carrier representative for assistance.

Low ambient applications

The optional Carrier economizer can adequately cool your space by bringing in fresh, cool outside air. In fact, when so equipped, accessory low-ambient kit may not be necessary. In low ambient conditions, unless the outdoor air is excessively humid or contaminated, economizer-based "free cooling" is the preferred less costly and energy conscious method. In low ambient applications where outside air might not be desired (such as contaminated or excessively humid outdoor environments), your Carrier rooftop can operate to ambient temperatures down to –20°F (–29°C) using the recommended accessory low ambient controller.

Guide specifications

Note about this specification:

This specification is in the "Masterformat" as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Gas Heat/Electric Cooling Packaged Rooftop

HVAC Guide Specifications

Size Range: **3 to 6 Nominal Tons**

Carrier Model Number: **48FC*04-07**

Part 1 — (23 06 80) Schedules for Decentralized HVAC Equipment

1.01 (23 06 80.13) Decentralized Unitary HVAC Equipment Schedule

A. (23 06 80.13.A.) Rooftop unit (RTU) schedule:

1. Schedule is per the project specification requirements.

Part 2 — (23 07 16) HVAC equipment insulation

2.01 (23 07 16.13) Decentralized, Rooftop Units:

A. (23 07 16.13.A.) Evaporator fan compartment:

1. Interior cabinet surfaces shall be insulated with a minimum $^1/_2$-in. thick, minimum $1^1/_2$-lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

B. (23 07 16.13.B.) Gas Heat Compartment:

1. Aluminum foil-faced fiberglass insulation shall be used.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

Part 3 — (23 09 13) Instrumentation and control devices for HVAC

3.01 (23 09 13.23) Sensors and Transmitters

A. (23 09 13.23.A.) Thermostats

1. Thermostat must
   a. energize both "W" and "G" when calling for heat.
   b. have capability to energize 1 or 2 stages of cooling, and 2 different stages of heating.
   c. include capability for occupancy scheduling.

Part 4 — (23 09 23) Direct Digital Control system for HVAC

4.01 (23 09 23.13) Decentralized, Rooftop Units:

A. (23 09 23.13.A.) SystemVu™ intelligent integrated Direct Digital Control (DDC) shall provide:

1. Integrated unit operation for comfort cooling, heating ventilation as well as all monitoring, recording and reporting capabilities. Controller shall also provide diagnostics and alarms of abnormal unit operation through the controller. Controller shall have an intuitive user display and be able to be used in a standalone operation or via building automation system (BAS).
2. Quick Unit Status LEDs of: Run – meaning all systems are go, ALERT – that indicates there is currently a non-critical issue with the unit, like filters need to be replaced and FAULT – that indicates the unit has a critical issue and will possibly shut down.
3. Six large navigation keys for easy access. Navigation keys shall consist of: TEST, BACK, ENTER, and MENU along with UP and DOWN arrows.
4. Full back lit user display with 4 line by 30 character text capabilities. Display menu shall be designed to provide guided major menus and sub menus main menus provided below:
   a. Shutdown Unit
   b. Run Status
   c. Settings
   d. Alerts/Faults
   e. Service
   f. Inputs
   g. Outputs
   h. USB
5. The capability for standalone operation with conventional thermostat/sensor or use with building automation systems (BAS) of Carrier i-Vu®, BACnet and Carrier Comfort Network® (CCN) systems. No special modules or boards are required for these capabilities. Has the capability to work with Equipment Touch™ and System Touch™ devices and ZS Sensors.
6. The ability to read refrigerant pressures at display or via BAS network of; Discharge Pressure and Suction Pressure. The need for traditional refrigerant gages is not required.
7. USB Data Port for flash drive interaction. This will allow the transfer of data for uploads, downloads, perform software upgrades, backup and restore data and file transfer data such as component number of starts and run hours.
8. Reverse Rotation Protection of compressors if field three phase wiring is misapplied.
9. Provide Service Capabilities of:
   a. Auto run test
   b. Manual run test
   c. Component run hours and starts
   d. Commissioning reports
   e. Data logging
   f. Alarm history

10. Economizer control and diagnostics. Set up economizer operation, receive feedback from actuator. Also meets the most recent California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
11. Unit cooling operation down to 40°F (4°C).
12. Controller shall have easy access connections around the controller perimeter area and consist of Mate-N-Lok, terminal block and RJ style modular jack connections.
13. 365 day real time clock, 20 holiday schedules along with occupied and unoccupied scheduling.
14. Auto-Recognition for easy installation and commissioning of devices like economizers, space sensors etc.
15. A 5°F temperature difference between cooling and heating set points to meet the latest ASHRAE 90.1 Energy Standard.
16. Contain return air sensor, supply air sensor and outdoor air sensor to help monitor and provide data for the unit comfort operation, diagnostic and alarms.
17. Use of Carrier's field accessory hand-held Navigator™ display, Equipment Touch and System Touch devices.
18. Units with the factory-installed Humidi-MiZer® system option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle.
19. Supply Air Tempering control operates the gas or electric heat to maintain a minimum supply air temperature during conditions where very cold outdoor air causes the supply air temperature to fall below the configured Supply Air Tempering Setpoint. This occurs during periods where DCV is active and increasing the amount of outdoor air or in cases where the system is operating at very low airflow and the calculated economizer position has increased to maintain a constant ventilation rate.
20. Demand limiting in SystemVu™ is achieved through set point expansion. The systems heating and cooling set points are expanded in steps or levels. The degree to which the set points may be expanded is defined by the 6 demand level offsets and the 2 commanded demand limit levels.
21. 3-year limited part warranty.

B. (23 09 23.13.B.) RTU Open Protocol, Direct Digital Controller:
1. Shall be ASHRAE 62 compliant.
2. Shall accept 18 - 30VAC, 50 - 60Hz, and consumer 15VA or less power.
3. Shall have an operating temperature range from –40°F (–40°C) to 130°F (54°C), 10% to 90% RH (non-condensing).
4. Shall include built-in protocol for BACnet[1] (MS/TP and PTP modes), Modbus[2] (RTU and ASCII), Johnson N2 and LonWorks[3]. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers.
6. Baud rate controller shall be selectable using a dipswitch.
7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/humidity/remote occupancy.
9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, exhaust, reversing valve/high fan speed.
10. Shall have built-in surge protection circuitry through solid-state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the "trip" condition clears.
11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
12. Shall have built-in support for Carrier technician tool.
13. Shall include an RS-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an RS-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

Part 5 — (23 09 33) Electric and Electronic Control System for HVAC

5.01 (23 09 33.13) Decentralized, Rooftop Units:

A. (23 09 33.13.A.) General:
1. Shall be complete with self-contained low-voltage control circuit protected by a resettable

1. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
2. Modbus is a registered trademark of Schneider Electric.
3. LonWorks is a registered trademark of Echelon Corporation.

circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
2. Shall utilize color-coded wiring.
3. Shall include a Unit Control Board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches. Controller shall also provide an intuitive means to adjust the indoor fan speed through a simple switch and pot adjustment design.
4. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor. See heat exchanger section of this specification.
5. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.

B. (23 09 33.13.B.) Safeties:
1. Compressor over-temperature, over-current. High internal pressure differential.
2. Low pressure switch.
   a. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
3. High pressure switch.
   a. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
4. Automatic reset, motor thermal overload protector.
5. Heating section shall be provided with the following minimum protections:
   a. High temperature limit switches.
   b. Induced draft motor speed sensor.
   c. Flame rollout switch.
   d. Flame proving controls.

Part 6 — (23 09 93) Sequence of Operations for HVAC Controls

6.01 (23 09 93.13) Decentralized, Rooftop Units:

A. (23 09 93.13.A.) INSERT SEQUENCE OF OPERATION

Part 7 — (23 40 13) Panel Air Filters

7.01 (23 40 13.13) Decentralized, Rooftop Units:

A. (23 40 13.13.A.) Standard filter section:
1. Shall consist of factory installed, low velocity, disposable 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through an access panel with "no-tool" removal as described in the unit cabinet section of this specification (23 81 19.13.G).

Part 8 — (23 81 19) Self-Contained Air Conditioners

8.01 (23 81 19.13) Small-Capacity Self-Contained Air Conditioners:

A. (23 81 19.13.A.) General:
1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.
2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
3. Unit shall use Puron® (R-410A) refrigerant.
4. Unit shall be installed in accordance with the manufacturer's instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

B. (23 81 19.13.B.) Quality Assurance:
1. Unit meets ASHRAE 90.1 minimum efficiency requirements.
2. Unit shall be rated in accordance with AHRI Standards 210/240 (04-06 sizes) or 340/360 (07 size).
3. Unit shall be designed to conform to ASHRAE 15.
4. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.
5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
6. Unit casing shall be capable of withstanding 500 hour salt spray exposure per ASTM B117 (scribed specimen).
7. Unit shall be designed in accordance with ISO 9001, and shall be manufactured in a facility registered by ISO 9001:2015.
8. Roof curb shall be designed to conform to NRCA Standards.
9. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
10. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
11. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.

12. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

C. (23 81 19.13.C.) Delivery, Storage, and Handling:
   1. Unit shall be stored and handled per manufacturer's recommendations.
   2. Lifted by crane requires either shipping top panel or spreader bars.
   3. Unit shall only be stored or positioned in the upright position.

D. (23 81 19.13.D.) Project Conditions:
   1. As specified in the contract.

E. (23 81 19.13.E.) Operating Characteristics:
   1. Unit shall be capable of starting and running at 115°F (46°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at ±10% voltage.
   2. Compressor with standard controls shall be capable of operation down to 40°F (4°C), ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures down to 25°F (–4°C).
   3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
   4. Unit shall be factory configured for vertical supply and return configurations.
   5. Unit shall be field convertible from vertical to horizontal airflow on all models. No special kit required.
   6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.

F. (23 81 19.13.F.) Electrical Requirements:
   1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.

G. (23 81 19.13.G.) Unit Cabinet:
   1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a prepainted baked enamel finish on all externally exposed surfaces.
   2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60°F/16°C): 60, Hardness: H-2H Pencil hardness.
   3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 and or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum $^{1}/_{2}$-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
   4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory-installed or field-installed), standard.
   5. Base Rail:
      a. Unit shall have base rails on a minimum of 2 sides.
      b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
      c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
      d. Base rail shall be a minimum of 16 gage thickness.
   6. Condensate pan and connections:
      a. Shall be a sloped condensate drain pan made of a corrosion resistant material.
      b. Shall comply with ASHRAE Standard 62.
      c. Shall use a $^{3}/_{4}$-in. 14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
   7. Top panel:
      a. Shall be a single piece top panel on all sizes.
   8. Gas Connections:
      a. All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).
      b. Thru-the-base capability
         1) Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan.
         2) Optional, factory approved, water-tight connection method must be used for thru-the-base gas connections.
         3) No basepan penetration, other than those authorized by the manufacturer, is permitted.
   9. Electrical Connections:
      a. All unit power wiring shall enter unit cabinet at a single, factory prepared, knockout location.
      b. Thru-the-base capability.
         1) Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
         2) Optional, factory approved, water-tight connection method must be used for thru-the-base electrical connections.
         3) No basepan penetration, other than those authorized by the manufacturer, is permitted.
   10. Component access panels (standard):
      a. Cabinet panels shall be easily removable for servicing.
      b. Unit shall have one factory installed, toolless, removable, filter access panel.

c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have molded composite handles.
d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.
e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

H. (23 81 19.13.H.) Gas Heat:
1. General:
a. Heat exchanger shall be an induced draft design. Positive pressure heat exchanger designs shall not be allowed.
b. Shall incorporate a direct-spark ignition system and redundant main gas valve.
c. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.
2. The heat exchanger shall be controlled by an integrated gas controller (IGC) microprocessor.
a. IGC board shall notify users of fault using an LED (light-emitting diode).
b. The LED shall be visible without removing the control box access panel.
c. IGC board shall contain algorithms that modify evaporator fan operation to prevent future cycling on high temperature limit switch.
d. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication shall be made using an LED.
3. Standard Heat Exchanger construction:
a. Heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
b. Burners shall be of the in-shot type constructed of aluminum-coated steel.
c. Burners shall incorporate orifices for rated heat output up to 2000 ft (610 m) elevation. Additional accessory kits may be required for applications above 2000 ft (610 m) elevation, depending on local gas supply conditions.
d. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.
4. Optional Stainless Steel Heat Exchanger construction:
a. Use energy saving, direct-spark ignition system.
b. Use a redundant main gas valve.
c. Burners shall be of the in-shot type constructed of aluminum-coated steel.
d. All gas piping shall enter the unit cabinet at a single location on side of unit (horizontal plane).
e. The optional stainless steel heat exchanger shall be of the tubular-section type, constructed of a minimum of 20-gage type 409 stainless steel.
f. Type 409 stainless steel shall be used in heat exchanger tubes and vestibule plate.
g. Complete stainless steel heat exchanger allows for greater application flexibility.
5. Optional Low NOx Heat Exchanger construction:
a. Low NOx reduction shall be provided to reduce nitrous oxide emissions to meet California's Air Quality Management District (SCAQMD) low-NOx emissions requirement of 40 nanograms per joule or less.
b. Primary tubes and vestibule plates on low NOx units shall be 409 stainless steel. Other components shall be aluminized steel.
6. Induced draft combustion motor and blower
a. Shall be a direct-drive, single inlet, forward-curved centrifugal type.
b. Shall be made from steel with a corrosion resistant finish.
c. Shall have permanently lubricated sealed bearings.
d. Shall have inherent thermal overload protection.
e. Shall have an automatic reset feature.

I. (23 81 19.13.I.) Coils:
1. Standard Aluminum Fin-Copper Tube Coils:
a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum-fin condenser coils (3 Phase Models Only):
a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.

b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.
c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
d. Corrosion durability of fin stock shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
e. Corrosion durability of fin stock shall be confirmed through testing to have no visible corrosion after 48 hour immersion in a room temperature solution of 5% salt, 1% acetic acid.
f. Fin stock coating shall pass 2000 hours of the following: one week exposure in the prohesion chamber followed by one week of accelerated ultraviolet light testing. Prohesion chamber: the solution shall contain 3.5% sodium chloride and 0.35% ammonium sulfate. The exposure cycle is one hour of salt fog application at ambient followed by one hour drying at 95°F (35°C).

3. Optional Copper-fin evaporator and condenser coils (3 Phase Models Only):
   a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
   b. Galvanized steel tube sheets shall not be acceptable.
   c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
4. Optional E-coated aluminum-fin evaporator and condenser coils (3 Phase Models Only):
   a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
   b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
   c. Color shall be high gloss black with gloss per ASTM D523-89.
   d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
   e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
   f. Impact resistance shall be up to 160 in. lb (ASTM D2794-93).
   g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
   h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

J. (23 81 19.13.J.) Refrigerant Components:
1. Refrigerant circuit shall include the following control, safety, and maintenance features:
   a. Fixed orifice metering system on 04-06 models and TXV on 07 size models shall include a multiple feed distribution system that optimizes coil performance.
   b. Refrigerant filter drier - Solid core design.
   c. Service gage connections on suction and discharge lines.
   d. Pressure gage access through a specially designed access port in the top panel of the unit.
2. There shall be gage line access port in the skin of the rooftop, covered by a black, removable plug.
   a. The plug shall be easy to remove and replace.
   b. When the plug is removed, the gage access port shall enable maintenance personnel to route their pressure gage lines.
   c. This gage access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.
   d. The plug shall be made of a leak proof, UV-resistant, composite material.
3. Compressors:
   a. Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit.
   b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
   c. Compressors shall be internally protected from high discharge temperature conditions.
   d. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.
   e. Compressor shall be factory mounted on rubber grommets.
   f. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
   g. Crankcase heaters shall not be required for normal operating range, unless required by compressor manufacturer due to refrigerant charge limits.
   h. Compressor on 04-06 models shall be of a single stage cooling capacity design and 07 models shall be a two stage cooling capacity design.

K. (23 81 19.13.K.) Filter Section:
1. Filters access is specified in the unit cabinet section of this specification.
2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
3. Shall consist of factory installed, low velocity, throw-away 2-in. thick fiberglass filters.
4. Filters shall be standard, commercially available sizes.
5. Only one size filter per unit is allowed.

L. (23 81 19.13.L.) Evaporator Fan and Motor with EcoBlue™ Technology:
1. Direct Drive Evaporator fan motor:
   a. Shall be a ECM motor design.
   b. Shall have permanently lubricated bearings.
   c. Shall have inherent automatic-reset thermal overload protection.
   d. Shall have slow ramp up to speed capabilities.
   e. Shall require no fan/motor belts for operation, adjustments and or initial fan speed set up.
   f. Fan DC voltage set up on Unit Control Board can eliminate the need of removal of blower access door, required on conventional belt drive systems.
   g. Shall be internally protected from electrical phase reversal and loss.
2. Evaporator Fan:
   a. Shall be easily set with dedicated selection switch and adjustment pot on unit control board or through SystemVu™ controller.
   b. On sizes 04-06 single speed indoor fan operation provided and on 07 size model with two stage cooling capacity control, the indoor fan speed is automatically controlled to meet the code-compliant 66% low fan speed and 100% at full fan speed operation.
   c. Blower fan shall be a Vane Axial fan design with 75% less moving parts than a conventional belt drive system.
   d. Shall be constructed of a cast aluminum stator and high impact composite material on rotor and air inlet casing.
   e. Shall be a patented / pending design with a corrosion resistant material and dynamically balanced.
   f. Shall have slow ramp up to speed capabilities to help reduce sound and comfort issues typically associated with single speed belt drive systems.
   g. Shall be a slide out design with two screw removal.
3. Shall include an easily accessible unit Control Board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches. Controller shall also provide an intuitive means to adjust the indoor fan speed through a simple switch and pot adjustment design.

M. (23 81 19.13.M.) Condenser Fans and Motors:
1. Condenser fan motors:
   a. Shall be a totally enclosed motor.
   b. Shall use permanently lubricated bearings.
   c. Shall have inherent thermal overload protection with an automatic reset feature.
   d. Shall use a shaft-down design on all sizes.
2. Condenser Fans:
   a. Shall be a direct-driven propeller type fan constructed of high impact composite material.
   b. Shall have high impact composite blades completely formed into one piece without blade fasteners or connectors and shall be dynamically balanced.

N. (23 81 19.13.N.) Special Features Options and Accessories:
1. Integrated EconoMi$er® IV, EconoMi$er2, and EconoMi$er X low leak rate models. (EconoMi$er 2, IV and X are factory-installed on 04-06 models. EconoMi$er 2 and X are factory-installed on 07 models. All are field-installed on all 3 and 1 phase models.)
   a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for vertical or horizontal return configuration shall be available. Vertical return modules shall be available as a factory installed option.
   c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
   d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
   e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
   f. Standard leak rate shall be equipped with dampers not to exceed 2% leakage at 1 in. wg pressure differential.

g. Economizer controller on EconoMi$er IV models shall be Honeywell W7212 that provides:
   1) Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
   2) Functions with solid-state analog enthalpy or dry bulb changeover control sensing.
   3) LED indicators for: when free cooling is available, when module is in DCV mode, when exhaust fan contact is closed.
h. Economizer controller on EconoMi$er X models shall be the Honeywell W7220 that provides:
   1) 2-line LCD interface screen for setup, configuration and troubleshooting.
   2) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24, ASHRAE 90.1 and IECC[1].
   3) Sensor failure loss of communication identification.
   4) Automatic sensor detection.
   5) Capabilities for use with multiple-speed or single speed indoor fan systems.
   6) Utilize digital sensors: Dry bulb and Enthalpy.
i. Economizer controller on EconoMi$er 2 models with RTU Open or SystemVu™ controls shall be a 4 to 20mA design controlled directly by the controller. RTU Open and SystemVu meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
j. Shall be capable of introducing up to 100% outdoor air.
k. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements.
l. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
m. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available on factory-installed economizers only. Outdoor air sensor setpoint shall be adjustable and shall range from 40°F to 100°F (4°C to 38°C). Additional sensor options shall be available as accessories.
n. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.

1. IECC is a registered trademark of the International Code Council, Inc.

o. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.
p. Dampers shall be completely closed when the unit is in the unoccupied mode.
q. Economizer controller shall accept a 2 to 10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
r. Compressor lockout temperature on W7220 control is adjustable from –45°F to 80°F, set at a factory default of 32°F. W7212 control opens at 35°F (2°C) and closes at 50°F (10°C).
s. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
t. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

2. Integrated EconoMi$er®2, and EconoMi$er X Ultra Low Leak rate models. (Factory-installed on 3 phase models only. Field-installed on all 3 and 1 phase models.)
   a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for vertical or horizontal return configuration shall be available. Vertical return modules shall be available as a factory installed option.
   c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
   d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
   e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
   f. Ultra Low Leak design meets California Title 24 section 140.4 and ASHRAE 90.1 requirements for 4 cfm per sq.ft on the outside air dampers and 10 cfm per sq. ft on the return dampers.
   g. Economizer controller on EconoMi$er X models shall be the Honeywell W7220 that provides:
      1) 2-line LCD interface screen for setup, configuration and troubleshooting.
      2) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24, ASHRAE 90.1 and IECC.

3) Sensor failure loss of communication identification.
4) Automatic sensor detection.
5) Capabilities for use with multiple-speed indoor fan systems.
6) Utilize digital sensors: Dry bulb and Enthalpy.

h. Economizer controller on EconoMi$er 2 models with RTU Open or SystemVu™ controls shall be a 4-20mA design controlled directly by the controller. RTU Open and SystemVu meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.

i. Shall be capable of introducing up to 100% outdoor air.

j. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements.

k. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.

l. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available on factory-installed economizers only. Outdoor air sensor setpoint shall be adjustable and shall range from 40°F to 100°F (4°C to 38°C). Additional sensor options shall be available as accessories.

m. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.

n. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.

o. Dampers shall be completely closed when the unit is in the unoccupied mode.

p. Economizer controller shall accept a 2 to 10 vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.

q. Compressor lockout temperature on W7220 control is adjustable from –45°F to 80°F, set at a factory default of 32°F. W7212 control opens at 35°F (2°C) and closes at 50°F (10°C).

r. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.

s. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

3. Two-Position Damper (Factory-installed on 3-Phase 04-06 Models Only. Field-installed on all 3 and 1 Phase Models):
   a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
   b. Damper shall include adjustable damper travel from 25% to 100% (full open).
   c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
   d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
   e. Damper will admit up to 100% outdoor air for applicable rooftop units.
   f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
   g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
   h. Outside air hood shall include aluminum water entrainment filter.
4. Manual damper (Field-installed only):
   a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25 or 50% outdoor air for year round ventilation.
5. Humidi-MiZer® Adaptive Dehumidification System (3 Phase Models Only):
   a. The Humidi-MiZer Adaptive Dehumidification System shall be factory installed and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:
      1) Subcooling mode further sub cools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.
      2) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.
      3) Includes low ambient controller.
6. Low Ambient Control Package:
   a. Controller shall control coil head pressure by condenser fan speed modulation or condenser fan cycling and wind baffles.
   b. Shall consist of solid-state control and condenser coil temperature sensor to maintain condensing temperature between 90°F

(32°C) and 110°F (43°C) at outdoor ambient temperatures down to –20°F (–29°C).

7. Propane Conversion Kit:
   a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquefied propane, up to 2000 ft (610m) elevation.
   b. Additional accessory kits may be required for applications above 2000 ft (610m) elevation.
8. Flue Shield:
   a. Flue shield shall provide protection from the hot sides of the gas flue hood.
9. Condenser Coil Hail Guard Assembly (Factory-installed on 3 Phase Models Only. Field-installed on all 3 and 1 Phase Models.)
   a. Shall protect against damage from hail.
   b. Shall be either hood style or louvered.
10. Unit-Mounted, Non-Fused Disconnect Switch (Available on units with MOCPs of 80 amps or less):
    a. Switch shall be factory installed, internally mounted.
    b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
    c. Shall be accessible from outside the unit.
    d. Shall provide local shutdown and lockout capability.
    e. Sized only for the unit as ordered from the factory. Does not accommodate field-installed devices.
11. Convenience Outlet:
    a. Powered convenience outlet.
       (3 Phase Models Only)
       1) Outlet shall be powered from main line power to the rooftop unit.
       2) Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
       3) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
       4) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
       5) Voltage required to operate convenience outlet shall be provided by a factory installed step-down transformer.
       6) Outlet shall be accessible from outside the unit.
       7) Outlet shall include a field installed “Wet in Use” cover.
    b. Factory-Installed Non-Powered convenience outlet.
       1) Outlet shall be powered from a separate 115/120v power source.
       2) A transformer shall not be included.
       3) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
       4) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
       5) Outlet shall be accessible from outside the unit.
       6) Outlet shall include a field installed “Wet in Use” cover.
    c. Field-Installed Non-Powered convenience outlet.
       1) Outlet shall be powered from a separate 115/120v power source.
       2) A transformer shall not be included.
       3) Outlet shall be field-installed and internally mounted with easily accessible 115-v female receptacle.
       4) Outlet shall include 20 amp GFI receptacles. This kit provides a flexible installation method which allows code compliance for height requirements of the GFCI outlet from the finished roof surface as well as the capability to relocate the outlet to a more convenient location.
       5) Outlet shall be accessible from outside the unit.
       6) Outlet shall include a field installed “Wet in Use” cover.
12. Flue Discharge Deflector:
    a. Flue discharge deflector shall direct unit exhaust vertically instead of horizontally.
    b. Deflector shall be defined as a “natural draft” device by the National Fuel and Gas (NFG) code.
13. Thru-the-Base Connectors:
    a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
    b. Minimum of four connection locations per unit.
14. Propeller Power Exhaust:
    a. Power exhaust shall be used in conjunction with an integrated economizer.
    b. Independent modules for vertical or horizontal return configurations shall be available.
    c. Horizontal power exhaust is shall be mounted in return ductwork.
    d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0 to 100% adjustable setpoint on the economizer control.

15. Roof Curbs (Vertical):
    a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.
    b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
    c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.
16. High Altitude Gas Conversion Kit:
    a. Package shall contain all the necessary hardware and instructions to convert a standard natural gas unit to operate from 2000 to 7000 ft (610 to 2134 m) elevation with natural gas or from 0 to 7000 ft (0 to 2134 m) elevation with liquefied propane.
17. Outdoor Air Enthalpy Sensor:
    a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.
18. Return Air Enthalpy Sensor:
    a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.
19. Indoor Air Quality (CO_2) Sensor:
    a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.
    b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.
20. Smoke detectors (factory-installed only):
    a. Shall be a Four-Wire Controller and Detector.
    b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.
    c. Shall use magnet-activated test/reset sensor switches.
    d. Shall have tool-less connection terminal access.
    e. Shall have a recessed momentary switch for testing and resetting the detector.
    f. Controller shall include:
        1) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
        2) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
        3) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
        4) Capable of direct connection to two individual detector modules.
        5) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications.
21. Winter Start Kit:
    a. Shall contain a bypass device around the low pressure switch.
    b. Shall be required when mechanical cooling is required down to 25°F (–4°C).
    c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).
22. Time Guard:
    a. Shall prevent compressor short-cycling by providing a 5-minute delay (±2 minutes) before restarting a compressor after shutdown for any reason.
    b. One device shall be required per compressor.
23. Hinged Access Panels:
    a. Shall provide easy access through integrated quarter turn latches.
    b. Shall be on major panels of: filter, control box, fan motor, and compressor.
24. Condensate overflow switch:
    a. This sensor and related controller monitors the condensate level in the drain pan and shuts down compression operation when overflow conditions occur. It includes:
        1) Indicator light — solid red (more than 10 seconds on water contact – compressors disabled), blinking red (sensor disconnected).
        2) 10 second delay to break — eliminates nuisance trips from splashing or waves in pan (sensor needs 10 seconds of constant water contact before tripping).
        3) Disables the compressor(s) operation when condensate plug is detected, but still allows fans to run for Economizer.
25. MERV-8 Return Air filters:
    a. Factory option to upgrade standard unit filters to MERV-8 filters.
26. Phase Monitor Control:
    a. Shall monitor the sequence of three phase electrical system to provide a phase reversal protection.
    b. Shall monitor the three phase voltage inputs to provide a phase loss protection for the three phase device.

c. Will work on either a Delta or Wye power connection.

27. Horn/Strobe Annunciator:

a. Provides an audible/visual signaling device for use with factory-installed option or field installed accessory smoke detectors.

1) Requires installation of a field-supplied 24-v transformer suitable for 4.2 VA (AC) or 3.0 VA (DC) per horn/strobe accessory.
2) Requires field-supplied electrical box, North American 1-gang box, 2-in. (51 mm) x 4-in. (102 mm).
3) Shall have a clear colored lens.

Note about this specification:

This specification is in the "Masterformat" as published by the Construction Specification Institute. Please feel free to copy this specification directly into your building spec.

Cooling Only/Electric Heat Packaged Rooftop

HVAC Guide Specifications

Size Range: **3 to 6 Nominal Tons**

Carrier Model Number: **50FC*04-07**

Part 1 — (23 06 80) Schedules for Decentralized HVAC Equipment

1.01 (23 06 80.13) Decentralized Unitary HVAC Equipment Schedule:

A. (23 06 80.13.A.) Rooftop unit (RTU) schedule:

1. Schedule is per the project specification requirements.

Part 2 — (23 07 16) HVAC equipment insulation

2.01 (23 07 16.13) Decentralized, Rooftop Units:

A. (23 07 16.13.A.) Evaporator fan compartment:

1. Interior cabinet surfaces shall be insulated with a minimum $^1/_2$-in. thick, minimum $1^1/_2$-lb density, flexible fiberglass insulation bonded with a phenolic binder, neoprene coated on the air side.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

B. (23 07 16.13.B.) Electric Heat Compartment:

1. Aluminum foil-faced fiberglass insulation shall be used.
2. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

Part 3 — (23 09 13) Instrumentation and control devices for HVAC

3.01 (23 09 13.23) Sensors and Transmitters:

A. (23 09 13.23.A.) Thermostats:

1. Thermostat must
   a. energize both "W" and "G" when calling for heat.
   b. have capability to energize 1 or 2 stages of cooling, and 2 different stages of heating.
   c. include capability for occupancy scheduling.

Part 4 — (23 09 23) Direct Digital Control system for HVAC

4.01 (23 09 23.13) Decentralized, Rooftop Units:

A. (23 09 23.13.A.) SystemVu™ intelligent integrated Direct Digital Control (DDC) shall provide:

1. Integrated unit operation for comfort cooling, heating ventilation as well as all monitoring, recording and reporting capabilities. Controller shall also provide diagnostics and alarms of abnormal unit operation through the controller. Controller shall have an intuitive user display and be able to be used in a standalone operation or via building automation system (BAS).
2. Quick Unit Status LEDs of: Run – meaning all systems are go, ALERT – that indicates there is currently a non-critical issue with the unit, like filters need to be replaced and FAULT – that indicates the unit has a critical issue and will possibly shut down.
3. Six large navigation keys for easy access. Navigation keys shall consist of: TEST, BACK, ENTER, and MENU along with UP and DOWN arrows.
4. Full back lit user display with 4 line by 30 character text capabilities. Display menu shall be designed to provide guided major menus and sub menus main menus provided below:
   a. Shutdown Unit
   b. Run Status
   c. Settings
   d. Alerts/Faults
   e. Service
   f. Inputs
   g. Outputs
   h. USB
5. The capability for standalone operation with conventional thermostat/sensor or use with building automation systems (BAS) of Carrier i-Vu®, BACnet and Carrier Comfort Network® (CCN) systems. No special modules or boards are required for these capabilities. Has the capability to work with Equipment Touch™ and System Touch™ devices and ZS Sensors.
6. The ability to read refrigerant pressures at display or via BAS network of; Discharge Pressure and Suction Pressure. The need for traditional refrigerant gages is not required.
7. USB Data Port for flash drive interaction. This will allow the transfer of data for uploads, downloads, perform software upgrades, backup and restore data and file transfer data such as component number of starts and run hours.
8. Reverse Rotation Protection of compressors if field three phase wiring is misapplied.
9. Provide Service Capabilities of:
   a. Auto run test
   b. Manual run test
   c. Component run hours and starts
   d. Commissioning reports
   e. Data logging
   f. Alarm history

10. Economizer control and diagnostics. Set up economizer operation, receive feedback from actuator. Also meets the most recent California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
11. Unit cooling operation down to 40°F (4°C).
12. Controller shall have easy access connections around the controller perimeter area and consist of Mate-N-Lok, terminal block and RJ style modular jack connections.
13. 365 day real time clock, 20 holiday schedules along with occupied and unoccupied scheduling.
14. Auto-Recognition for easy installation and commissioning of devices like economizers, space sensors, etc.
15. A 5°F temperature difference between cooling and heating set points to meet the latest ASHRAE 90.1 Energy Standard.
16. Contain return air sensor, supply air sensor and outdoor air sensor to help monitor and provide data for the unit comfort operation, diagnostic and alarms.
17. Use of Carrier's field accessory hand-held Navigator™ display, Equipment Touch and System Touch devices.
18. Units with the factory-installed Humidi-MiZer® system option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle.
19. Supply Air Tempering control operates the gas or electric heat to maintain a minimum supply air temperature during conditions where very cold outdoor air causes the supply air temperature to fall below the configured Supply Air Tempering Setpoint. This occurs during periods where DCV is active and increasing the amount of outdoor air or in cases where the system is operating at very low airflow and the calculated economizer position has increased to maintain a constant ventilation rate.
20. Demand limiting in SystemVu™ is achieved through set point expansion. The systems heating and cooling set points are expanded in steps or levels. The degree to which the set points may be expanded is defined by the 6 demand level offsets and the 2 commanded demand limit levels.
21. 3-year limited part warranty.

B. (23 09 23.13.B.) RTU Open Protocol, Direct Digital Controller:
1. Shall be ASHRAE 62 compliant.
2. Shall accept 18 - 30VAC, 50 - 60Hz, and consumer 15VA or less power.
3. Shall have an operating temperature range from –40°F (–40°C) to 130°F (54°C), 10% to 90% RH (non-condensing).
4. Shall include built-in protocol for BACnet[1] (MS/TP and PTP modes), Modbus[2] (RTU and ASCII), Johnson N2 and LonWorks[3]. LonWorks Echelon processor required for all Lon applications shall be contained in separate communication board.
5. Shall allow access of up to 62 network variables (SNVT). Shall be compatible with all open controllers.
6. Baud rate controller shall be selectable using a dipswitch.
7. Shall have an LED display independently showing the status of serial communication, running, errors, power, all digital outputs, and all analog inputs.
8. Shall accept the following inputs: space temperature, setpoint adjustment, outdoor air temperature, indoor air quality, outdoor air quality, compressor lock-out, fire shutdown, enthalpy switch, and fan status/filter status/humidity/remote occupancy.
9. Shall provide the following outputs: economizer, fan, cooling stage 1, cooling stage 2, heat stage 1, heat stage 2, exhaust, reversing valve/high fan speed.
10. Shall have built-in surge protection circuitry through solid-state polyswitches. Polyswitches shall be used on incoming power and network connections. Polyswitches will return to normal when the "trip" condition clears.
11. Shall have a battery back-up capable of a minimum of 10,000 hours of data and time clock retention during power outages.
12. Shall have built-in support for Carrier technician tool.
13. Shall include an RS-485 protocol communication port, an access port for connection of either a computer or a Carrier technician tool, an RS-485 port for network communication to intelligent space sensors and displays, and a port to connect an optional LonWorks communications card.
14. Software upgrades will be accomplished by either local or remote download. No software upgrades through chip replacements are allowed.

Part 5 — (23 09 33) Electric and Electronic Control System for HVAC

5.01 (23 09 33.13) Decentralized, Rooftop Units:

A. (23 09 33.13.A.) General:
1. Shall be complete with self-contained low-voltage control circuit protected by a resettable

1. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
2. Modbus is a registered trademark of Schneider Electric.
3. LonWorks is a registered trademark of Echelon Corporation.

circuit breaker on the 24–v transformer side. Transformer shall have 75VA capability.

2. Shall utilize color-coded wiring.
3. Shall include a Unit Control Board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, economizer, thermostat, DDC control options, and low and high pressure switches. Controller shall also provide an intuitive means to adjust the indoor fan speed through a simple switch and pot adjustment design.
4. Unit shall include a minimum of one 8-pin screw terminal connection board for connection of control wiring.

B. (23 09 33.13.B.) Safeties:

1. Compressor over-temperature, over-current. High internal pressure differential.
2. Low pressure switch.
   a. Low pressure switch shall use different color wire than the high pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
3. High pressure switch.
   a. High pressure switch shall use different color wire than the low pressure switch. The purpose is to assist the installer and service technician to correctly wire and or troubleshoot the rooftop unit.
4. Automatic reset, motor thermal overload protector.

Part 6 — (23 09 93) Sequence of Operations for HVAC Controls

6.01 (23 09 93.13) Decentralized, Rooftop Units:

A. (23 09 93.13.A.) INSERT SEQUENCE OF OPERATION

Part 7 — (23 40 13) Panel Air Filters

7.01 (23 40 13.13) Decentralized, Rooftop Units:

A. (23 40 13.13.A.) Standard filter section:

1. Shall consist of factory installed, low velocity, disposable 2-in. thick fiberglass filters of commercially available sizes.
2. Unit shall use only one filter size. Multiple sizes are not acceptable.
3. Filters shall be accessible through an access panel with “no-tool” removal as described in the unit cabinet section of this specification (23 81 19.13.G).

Part 8 — (23 81 19) Self-Contained Air Conditioners

8.01 (23 81 19.13) Small-Capacity Self-Contained Air Conditioners:

A. (23 81 19.13.A.) General:

1. Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and optional electric heat for heating duty.
2. Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and special features required prior to field start-up.
3. Unit shall use Puron® (R-410A) refrigerant.
4. Unit shall be installed in accordance with the manufacturer’s instructions.
5. Unit must be selected and installed in compliance with local, state, and federal codes.

B. (23 81 19.13.B.) Quality Assurance:

1. Unit meets ASHRAE 90.1 minimum efficiency requirements.
2. Unit shall be rated in accordance with AHRI Standards 210/240 (04-06 sizes) or 340/360 (07 size).
3. Unit shall be designed to conform to ASHRAE 15.
4. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.
5. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
6. Unit casing shall be capable of withstanding 500 hour salt spray exposure per ASTM B117 (scribed specimen).
7. Unit shall be designed in accordance with ISO 9001, and shall be manufactured in a facility registered by ISO 9001:2015.
8. Roof curb shall be designed to conform to NRCA Standards.
9. Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.
10. Unit shall be designed in accordance with UL Standard 1995, including tested to withstand rain.
11. Unit shall be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.
12. Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

C. (23 81 19.13.C.) Delivery, Storage, and Handling:
1. Unit shall be stored and handled per manufacturer's recommendations.
2. Lifted by crane requires either shipping top panel or spreader bars.
3. Unit shall only be stored or positioned in the upright position.

D. (23 81 19.13.D.) Project Conditions:
1. As specified in the contract.

E. (23 81 19.13.E.) Operating Characteristics:
1. Unit shall be capable of starting and running at 115°F (46°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at ±10% voltage.
2. Compressor with standard controls shall be capable of operation down to 40°F (4°C), ambient outdoor temperatures. Accessory winter start kit is necessary if mechanically cooling at ambient temperatures down to 25°F (–4°C).
3. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.
4. Unit shall be factory configured for vertical supply and return configurations.
5. Unit shall be field convertible from vertical to horizontal airflow on all models. No special kit required.
6. Unit shall be capable of mixed operation: vertical supply with horizontal return or horizontal supply with vertical return.

F. (23 81 19.13.F.) Electrical Requirements:
1. Main power supply voltage, phase, and frequency must match those required by the manufacturer.

G. (23 81 19.13.G.) Unit Cabinet:
1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a prepainted baked enamel finish on all externally exposed surfaces.
2. Unit cabinet exterior paint shall be: film thickness, (dry) 0.003-in. minimum, gloss (per ASTM D523, 60°F/16°C): 60, Hardness: H-2H Pencil hardness.
3. Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 and or 340/360 minimum exterior sweat criteria. Interior surfaces shall be insulated with a minimum $^1/_2$-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the heat compartment.
4. Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory-installed or field-installed), standard.
5. Base Rail:
   a. Unit shall have base rails on a minimum of 2 sides.
   b. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
   c. Holes shall be provided in the base rail for moving the rooftop by fork truck.
   d. Base rail shall be a minimum of 16 gage thickness.
6. Condensate pan and connections:
   a. Shall be a sloped condensate drain pan made of a corrosion resistant material.
   b. Shall comply with ASHRAE Standard 62.
   c. Shall use a $^3/_4$-in. 14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer's recommendations.
7. Top panel:
   a. Shall be a single piece top panel on all sizes.
8. Electrical Connections:
   a. All unit power wiring shall enter unit cabinet at a single, factory prepared, knockout location.
   b. Thru-the-base capability.
      1) Standard unit shall have a thru-the-base electrical location(s) using a raised, embossed portion of the unit basepan.
      2) Optional, factory approved, water-tight connection method must be used for thru-the-base electrical connections.
      3) No basepan penetration, other than those authorized by the manufacturer, is permitted.
9. Component access panels (standard):
   a. Cabinet panels shall be easily removable for servicing.
   b. Unit shall have one factory installed, toolless, removable, filter access panel.
   c. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have molded composite handles.
   d. Handles shall be UV modified, composite. They shall be permanently attached, and recessed into the panel.
   e. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars.
   f. Collars shall be removable and easily replaceable using manufacturer recommended parts.

H. (23 81 19.13.H.) Coils:

1. Standard Aluminum Fin-Copper Tube Coils:
   a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
   b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig.
   c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.
2. Optional Pre-coated aluminum-fin condenser coils (3 Phase Models Only):
   a. Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments.
   b. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube.
   c. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
   d. Corrosion durability of fin stock shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.
   e. Corrosion durability of fin stock shall be confirmed through testing to have no visible corrosion after 48 hour immersion in a room temperature solution of 5% salt, 1% acetic acid.
   f. Fin stock coating shall pass 2000 hours of the following: one week exposure in the prohesion chamber followed by one week of accelerated ultraviolet light testing. Prohesion chamber: the solution shall contain 3.5% sodium chloride and 0.35% ammonium sulfate. The exposure cycle is one hour of salt fog application at ambient followed by one hour drying at 95°F (35°C).
3. Optional Copper-fin evaporator and condenser coils (3 Phase Models Only):
   a. Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets.
   b. Galvanized steel tube sheets shall not be acceptable.
   c. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan.
4. Optional E-coated aluminum-fin evaporator and condenser coils (3 Phase Models Only):
   a. Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
   b. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
   c. Color shall be high gloss black with gloss per ASTM D523-89.
   d. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
   e. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
   f. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
   g. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92).
   h. Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90.

I. (23 81 19.13.I.) Refrigerant Components:

1. Refrigerant circuit shall include the following control, safety, and maintenance features:
   a. Fixed orifice metering system on 04-06 models and TXV on 07 size models shall include a multiple feed distribution system that optimizes coil performance.
   b. Refrigerant filter drier - Solid core design.
   c. Service gage connections on suction and discharge lines.
   d. Pressure gage access through a specially designed access port in the top panel of the unit.
2. There shall be gage line access port in the skin of the rooftop, covered by a black, removable plug.
   a. The plug shall be easy to remove and replace.
   b. When the plug is removed, the gage access port shall enable maintenance personnel to route their pressure gage lines.
   c. This gage access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on.
   d. The plug shall be made of a leak proof, UV-resistant, composite material.
3. Compressors:
   a. Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit.
   b. Compressor motors shall be cooled by refrigerant gas passing through motor windings.
   c. Compressors shall be internally protected from high discharge temperature conditions.

d. Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.
e. Compressor shall be factory mounted on rubber grommets.
f. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection.
g. Crankcase heaters shall not be required for normal operating range, unless required by compressor manufacturer due to refrigerant charge limits.
h. Compressor on 04-06 models shall be of a single stage cooling capacity design and 07 models shall be a two stage cooling capacity design.

J. (23 81 19.13.J.) Filter Section:
1. Filters access is specified in the unit cabinet section of this specification.
2. Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
3. Shall consist of factory installed, low velocity, throw-away 2-in. thick fiberglass filters.
4. Filters shall be standard, commercially available sizes.
5. Only one size filter per unit is allowed.

K. (23 81 19.13.K.) Evaporator Fan and Motor with EcoBlue™ Technology:
1. Direct Drive Evaporator fan motor:
a. Shall be a ECM motor design.
b. Shall have permanently lubricated bearings.
c. Shall have inherent automatic-reset thermal overload protection.
d. Shall have slow ramp up to speed capabilities.
e. Shall require no fan/motor belts for operation, adjustments and or initial fan speed set up.
f. Fan DC voltage set up on Unit Control Board can eliminate the need of removal of blower access door, required on conventional belt drive systems.
g. Shall be internally protected from electrical phase reversal and loss.
2. Evaporator Fan:
a. Shall be easily set with dedicated selection switch and adjustment pot on unit control board or through SystemVu™ controller.
b. On sizes 04-06 single speed indoor fan operation provided and on 07 size model with two stage cooling capacity control, the indoor fan speed is automatically controlled to meet the code-compliant 66% low fan speed and 100% at full fan speed operation.
c. Blower fan shall be a Vane Axial fan design with 75% less moving parts than a conventional belt drive system.
d. Shall be constructed of a cast aluminum stator and high impact composite material on rotor and air inlet casing.
e. Shall be a patented / pending design with a corrosion resistant material and dynamically balanced.
f. Shall have slow ramp up to speed capabilities to help reduce sound and comfort issues typically associated with single speed belt drive systems.
g. Shall be a slide out design with two screw removal.
3. Shall include an easily accessible unit Control Board to conveniently and safely provide connection points for vital control functions such as: smoke detectors, phase monitor, gas controller, economizer, thermostat, DDC control options, and low and high pressure switches. Controller shall also provide an intuitive means to adjust the indoor fan speed through a simple switch and pot adjustment design.

L. (23 81 19.13.L.) Condenser Fans and Motors:
1. Condenser fan motors:
a. Shall be a totally enclosed motor.
b. Shall use permanently lubricated bearings.
c. Shall have inherent thermal overload protection with an automatic reset feature.
d. Shall use a shaft-down design on all sizes.
2. Condenser Fans:
a. Shall be a direct-driven propeller type fan constructed of high impact composite material.
b. Shall have high impact composite blades completely formed into one piece without blade fasteners or connectors and shall be dynamically balanced.

M. (23 81 19.13.M.) Special Features Options and Accessories:
1. Integrated EconoMi$er® IV, EconoMi$er2, and EconoMi$er X low leak rate models. (EconoMi$er 2, IV and X are factory-installed on 04-06 models. EconoMi$er 2 and X are factory-installed on 07 models. All are field-installed on all 3 and 1 phase models.)
a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
b. Independent modules for vertical or horizontal return configuration shall be available. Vertical return modules shall be available as a factory installed option.

c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.
f. Standard leak rate shall be equipped with dampers not to exceed 2% leakage at 1 in. wg pressure differential.
g. Economizer controller on EconoMi$er IV models shall be Honeywell W7212 that provides:
   1) Combined minimum and DCV maximum damper position potentiometers with compressor staging relay.
   2) Functions with solid-state analog enthalpy or dry bulb changeover control sensing.
   3) Contain LED indicates for: when free cooling is available, when module is in DCV mode, when exhaust fan contact is closed.
h. Economizer controller on EconoMi$er X models shall be the Honeywell W7220 that provides:
   1) 2-line LCD interface screen for setup, configuration and troubleshooting.
   2) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24, ASHRAE 90.1 and IECC[1].
   3) Sensor failure loss of communication identification.
   4) Automatic sensor detection.
   5) Capabilities for use with multiple-speed or single speed indoor fan systems.
   6) Utilize digital sensors: Dry bulb and Enthalpy.
i. Economizer controller on EconoMi$er 2 models with RTU Open or SystemVu™ controls shall be a 4 to 20mA design controlled directly by the controller. RTU Open and SystemVu meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.
j. Shall be capable of introducing up to 100% outdoor air.
k. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements.
l. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.
m. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available on factory installed only. Outdoor air sensor setpoint shall be adjustable and shall range from 40°F to 100°F (4°C to 38°C). Additional sensor options shall be available as accessories.
n. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.
o. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.
p. Dampers shall be completely closed when the unit is in the unoccupied mode.
q. Economizer controller shall accept a 2 to 10 vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
r. Compressor lockout temperature on W7220 control is adjustable from –45°F to 80°F, set at a factory default of 32°F. W7212 control opens at 35°F (2°C) and closes at 50°F (10°C).
s. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.
t. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

2. Integrated EconoMi$er®2, and EconoMi$er X Ultra Low Leak rate models. (Factory-installed on 3 phase models only. Field-installed on all 3 and 1 phase models.)
   a. Integrated, gear driven opposing modulating blade design type capable of simultaneous economizer and compressor operation.
   b. Independent modules for vertical or horizontal return configuration shall be available. Vertical return modules shall be available as a factory-installed option.
   c. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable.
   d. Shall include all hardware and controls to provide free cooling with outdoor air when temperature and/or humidity are below setpoints.
   e. Shall be equipped with gear driven dampers for both the outdoor ventilation air and the return air for positive air stream control.

1. IECC is a registered trademark of the International Code Council, Inc.

f. Ultra Low Leak design meets California Title 24 section 140.4 and ASHRAE 90.1 requirements for 4 cfm per sq.ft. on the outside air dampers and 10 cfm per sq. ft. on the return dampers.

g. Economizer controller on EconoMi$er X models shall be the Honeywell W7220 that provides:
   1) 2-line LCD interface screen for setup, configuration and troubleshooting.
   2) On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24, ASHRAE 90.1 and IECC.
   3) Sensor failure loss of communication identification.
   4) Automatic sensor detection.
   5) Capabilities for use with multiple-speed indoor fan systems.
   6) Utilize digital sensors: Dry bulb and Enthalpy.

h. Economizer controller on EconoMi$er 2 models with RTU Open or SystemVu™ controls shall be a 4-20mA design controlled directly by the controller. RTU Open and SystemVu meet California Title 24, ASHRAE 90.1 and IECC Fault Detection and Diagnostic (FDD) requirements.

i. Shall be capable of introducing up to 100% outdoor air.

j. Shall be equipped with a barometric relief damper capable of relieving up to 100% return air and contain seals that meet ASHRAE 90.1 requirements.

k. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor.

l. Dry bulb outdoor air temperature sensor shall be provided as standard. Enthalpy sensor is also available on factory installed only. Outdoor air sensor setpoint shall be adjustable and shall range from 40°F to 100°F (4°C to 38°C). Additional sensor options shall be available as accessories.

m. The economizer controller shall also provide control of an accessory power exhaust unit function. Factory set at 100%, with a range of 0% to 100%.

n. The economizer shall maintain minimum airflow into the building during occupied period and provide design ventilation rate for full occupancy.

o. Dampers shall be completely closed when the unit is in the unoccupied mode.

p. Economizer controller shall accept a 2 to 10 vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.

q. Compressor lockout temperature on W7220 control is adjustable from –45°F to 80°F, set at a factory default of 32°F. W7212 control opens at 35°F (2°C) and closes at 50°F (10°C).

r. Actuator shall be direct coupled to economizer gear. No linkage arms or control rods shall be acceptable.

s. Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.

3. Two-Position Damper (Factory-installed on 3 Phase 04-06 Models Only. Field-installed on all 3 and 1 Phase Models)
   a. Damper shall be a Two-Position Damper. Damper travel shall be from the full closed position to the field adjustable %-open setpoint.
   b. Damper shall include adjustable damper travel from 25% to 100% (full open).
   c. Damper shall include single or dual blade, gear driven dampers and actuator motor.
   d. Actuator shall be direct coupled to damper gear. No linkage arms or control rods shall be acceptable.
   e. Damper will admit up to 100% outdoor air for applicable rooftop units.
   f. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power.
   g. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
   h. Outside air hood shall include aluminum water entrainment filter.

4. Manual damper (field-installed only):
   a. Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25% or 50% outdoor air for year round ventilation.

5. Humidi-MiZer Adaptive Dehumidification System (3 Phase Models Only):
   a. The Humidi-MiZer® Adaptive Dehumidification System shall be factory installed and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations in addition to its normal design cooling mode:
      1) Subcooling mode further sub cools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.
      2) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create

a two-phase heat transfer in the system, resulting in a neutral leaving air temperature when only humidity in the space is not satisfied.

3) Includes low ambient controller.

6. Low Ambient Control Package:
   a. Controller shall control coil head pressure by condenser fan speed modulation or condenser fan cycling and wind baffles.
   b. Shall consist of solid-state control and condenser coil temperature sensor to maintain condensing temperature between 90°F (32°C) and 110°F (43°C) at outdoor ambient temperatures down to –20°F (–29°C).
7. Condenser Coil Hail Guard Assembly (Factory-installed on 3 Phase Models Only. Field-installed on all 3 and 1 Phase Models.)
   a. Shall protect against damage from hail.
   b. Shall be either hood style or louvered.
8. Unit-Mounted, Non-Fused Disconnect Switch (Available on units with MOCPs of 80 amps or less):
   a. Switch shall be factory installed, internally mounted.
   b. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff.
   c. Shall be accessible from outside the unit.
   d. Shall provide local shutdown and lockout capability.
   e. Sized only for the unit as ordered from the factory. Does not accommodate field-installed devices.
9. Convenience Outlet:
   a. Powered convenience outlet.
      (3 Phase Models Only)
      1) Outlet shall be powered from main line power to the rooftop unit.
      2) Outlet shall be powered from line side or load side of disconnect by installing contractor, as required by code. If outlet is powered from load side of disconnect, unit electrical ratings shall be UL certified and rated for additional outlet amperage.
      3) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      4) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      5) Voltage required to operate convenience outlet shall be provided by a factory installed step-down transformer.
      6) Outlet shall be accessible from outside the unit.
      7) Outlet shall include a field installed “Wet in Use” cover.
   b. Factory-Installed Non-Powered convenience outlet.
      1) Outlet shall be powered from a separate 115/120v power source.
      2) A transformer shall not be included.
      3) Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle.
      4) Outlet shall include 15 amp GFI receptacles with independent fuse protection.
      5) Outlet shall be accessible from outside the unit.
      6) Outlet shall include a field installed “Wet in Use” cover.
   c. Field-Installed Non-Powered convenience outlet.
      1) Outlet shall be powered from a separate 115/120v power source.
      2) A transformer shall not be included.
      3) Outlet shall be field-installed and internally mounted with easily accessible 115-v female receptacle.
      4) Outlet shall include 20 amp GFI receptacles. This kit provides a flexible installation method which allows code compliance for height requirements of the GFCI outlet from the finished roof surface as well as the capability to relocate the outlet to a more convenient location.
      5) Outlet shall be accessible from outside the unit.
      6) Outlet shall include a field installed “Wet in Use” cover.
10. Thru-the-Base Connectors:
    a. Kits shall provide connectors to permit gas and electrical connections to be brought to the unit through the unit basepan.
    b. Minimum of four connection locations per unit.
11. Propeller Power Exhaust:
    a. Power exhaust shall be used in conjunction with an integrated economizer.
    b. Independent modules for vertical or horizontal return configurations shall be available.
    c. Horizontal power exhaust is shall be mounted in return ductwork.
    d. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0 to 100% adjustable setpoint on the economizer control.
12. Roof Curbs (Vertical):
    a. Full perimeter roof curb with exhaust capability providing separate air streams for energy recovery from the exhaust air without supply air contamination.

b. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.

c. Permits installation and securing of ductwork to curb prior to mounting unit on the curb.

13. Outdoor Air Enthalpy Sensor:

    a. The outdoor air enthalpy sensor shall be used to provide single enthalpy control. When used in conjunction with a return air enthalpy sensor, the unit will provide differential enthalpy control. The sensor allows the unit to determine if outside air is suitable for free cooling.

14. Return Air Enthalpy Sensor:

    a. The return air enthalpy sensor shall be used in conjunction with an outdoor air enthalpy sensor to provide differential enthalpy control.

15. Indoor Air Quality (CO_2) Sensor:

    a. Shall be able to provide demand ventilation indoor air quality (IAQ) control.

    b. The IAQ sensor shall be available in duct mount, wall mount, or wall mount with LED display. The setpoint shall have adjustment capability.

16. Smoke detectors (factory-installed only):

    a. Shall be a four-wire controller and detector.

    b. Shall be environmental compensated with differential sensing for reliable, stable, and drift-free sensitivity.

    c. Shall use magnet-activated test/reset sensor switches.

    d. Shall have tool-less connection terminal access.

    e. Shall have a recessed momentary switch for testing and resetting the detector.

    f. Controller shall include:

        1) One set of normally open alarm initiation contacts for connection to an initiating device circuit on a fire alarm control panel.
        2) Two Form-C auxiliary alarm relays for interface with rooftop unit or other equipment.
        3) One Form-C supervision (trouble) relay to control the operation of the Trouble LED on a remote test/reset station.
        4) Capable of direct connection to two individual detector modules.
        5) Can be wired to up to 14 other duct smoke detectors for multiple fan shutdown applications.

17. Winter Start Kit:

    a. Shall contain a bypass device around the low pressure switch.

    b. Shall be required when mechanical cooling is required down to 25°F (–4°C).

    c. Shall not be required to operate on an economizer when below an outdoor ambient of 40°F (4°C).

18. Time Guard:

    a. Shall prevent compressor short-cycling by providing a 5 minute delay (±2 minutes) before restarting a compressor after shutdown for any reason.

    b. One device shall be required per compressor.

19. Hinged Access Panels:

    a. Shall provide easy access through integrated quarter turn latches.

    b. Shall be on major panels of: filter, control box, fan motor, and compressor.

20. Condensate overflow switch:

    a. This sensor and related controller monitors the condensate level in the drain pan and shuts down compression operation when overflow conditions occur. It includes:

        1) Indicator light — solid red (more than 10 seconds on water contact – compressors disabled), blinking red (sensor disconnected).
        2) 10 second delay to break — eliminates nuisance trips from splashing or waves in pan (sensor needs 10 seconds of constant water contact before tripping).
        3) Disables the compressor(s) operation when condensate plug is detected, but still allows fans to run for Economizer.

21. MERV-8 Return Air filters:

    a. Factory option to upgrade standard unit filters to MERV-8 filters.

22. Phase Monitor Control:

    a. Shall monitor the sequence of three phase electrical system to provide a phase reversal protection.

    b. Shall monitor the three phase voltage inputs to provide a phase loss protection for the three phase device.

    c. Will work on either a Delta or Wye power connection.

23. Horn/Strobe Annunciator:

    a. Provides an audible/visual signaling device for use with factory-installed option or field installed accessory smoke detectors.

        1) Requires installation of a field-supplied 24-v transformer suitable for 4.2 VA (AC) or 3.0 VA (DC) per horn/strobe accessory.
        2) Requires field-supplied electrical box, North American 1-gang box, 2-in. (51 mm) x 4-in. (102 mm).

3) Shall have a clear colored lens.

24. Electric Heat:
    a. Heating Section:
        1) Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
        2) Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga galvanized steel) attached to end of heater assembly.

Pg 158 Catalog No. 04-52480064-01 Printed in U.S.A. Form 48/50FC-4-7-02PD
Replaces: 48/50FC-4-7-01PD

FLL LED
FLOODLIGHT

Cat.#		
Job	Type	Approvals

HUBBELL Outdoor Lighting

Fixture Replacement: LED Architectural Flood/Spot (25 - 150W): 150 W

SPECIFICATIONS

Intended Use:
Large LED flood with beam distribution for lighting applications such as safety/security, facade, area, or signs

Construction:
- Corrosion resistant, rugged die-cast aluminum housing with powder coat paint finish
- Tempered glass lens protects LEDs and allows for cleaning/debris removal
- Vented housing isolates LED module from driver, maximizing product life and performance
- Visor, louver and vandal accessories available

LED:
- 28 high power LED's (Stock/MTO)
- 42 high power LED's (MTO)
- 140 high power LED's (Stock)
- Ambient operating temperature -35°C to 40°C
- Stock Versions: 4000K and 5000K CCT
- MTO Versions: 3000K nominal with 80 CRI, 4000K and 5000K CCT nominal with 70 CRI

Optical/Electrical:
- Variety of NEMA distributions - N (3x3), M (4x4), RM (5x4) and W (6x6) - for wide range of lighting applications; Stock version Wide (6x6) only
- 120-277V operation, 50/60Hz, 95W, 1050mA, 100 LPW (Stock/MTO - 28LED)
- 120-277V operation, 50/60Hz, 150W, 158mA, 98 LPW (Stock only - 140LED)

Optical/Electrical (Cont.)
- 120-277V, 347V, and 480V operation, 50/60Hz, 95W, 700mA, up to 119 LPW (MTO only - 42LED)
- IP65 fixture, Driver IP66 and RoHS compliant
- 10KV surge protector comes standard
- 0-10V dimming driver standard, continuous dimming option to have leads pulled out for easy connection

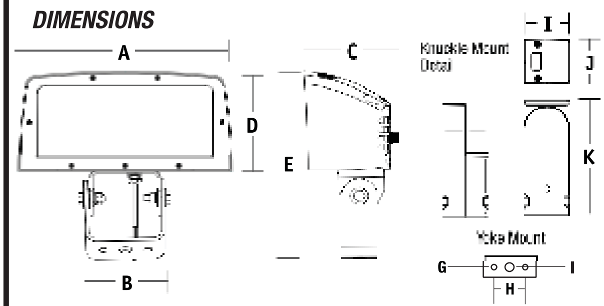
Installation:
- Knuckle mount 15' aiming angle increments for precise aiming and control, fits 2-3/8" tenons or pipes
- Heavy duty steel yoke with adjustable stainless steel hardware, mounting holes for one center - 3/4" bolt or two side - 3/8" bolts
- 3' SEOOW cord with yoke mount

Listings:
- IP65, Listed to UL1598 for use in wet locations.
- DLC Qualified (4000K and 5000K models only); Consult DLC website for more details: https://www.designlights.org/QPL
- EPA = 1.0ft^2

Warranty:
For more information visit:
http://www.hubbelllighting.com/resources/warranty/

PRODUCT IMAGE(S)

DIMENSIONS



A	B	C	D	E	F	G	H	I	J	K
14.9"	5.5"	6.0"	7.0	14.57"	17/32"	7/8"	3-1/8"	3.0"	2.9"	7.57"
378mm	140mm	152mm	177mm	370mm	14mm	22mm	79mm	77mm	75mm	192mm

SHIPPING INFORMATION

Catalog Number	G.W(kg)/CTN	Carton Dimensions Length Inch (cm)	Width Inch (cm)	Height Inch (cm)
FLL (Single Carton)	25 (12.3) lbs	17.72" (45)	13.0" (33)	10.00" (25.5)

Carton dimensions for shipping purposes only

CERTIFICATIONS/LISTINGS

IP65

ORDERING INFORMATION - STOCK VERSION

Catalog Number	Mount	Max Candle Power	Beam Pattern	Wattage	# Drivers/ Current	Voltage	Color Temperature/ CRI	Lumens	LPW	Weight lbs. (kg)	Finish
FLL-95-Y	Yoke	7789	Wide	98w	1@1050mA	120-277V	5000K/70	10536	108	20 (9.0)	Bronze
FLL-28L4K	Yoke	7560	Wide	98w	1@1050mA	120-277V	4000K/70	10291	105	20 (9.0)	
FLL-150-4K-U-Y	Yoke	5627	Wide	150w	1@158mA	120-277V	4000K/80	14665	98	20 (9.0)	
FLL-150L5K-U-Y	Yoke	5731	Wide	150w	1@158mA	120-277V	5000K/80	14764	98.4	20 (9.0)	
FLL-K-140L4K-U	Knuckle	5627	Wide	150w	1@158mA	120-277V	4000K/80	14665	98	20 (9.0)	
FLL-150-5K-U-K	Knuckle	5731	Wide	150w	1@158mA	120-277V	5000K/80	14764	98.4	20 (9.0)	

ORDERING INFORMATION - MADE TO ORDER

FLL - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___

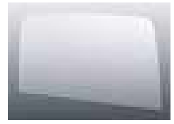
FAMILY	# LEDS	WATTS	CCT	DISTRIBUTION	VOLTAGE	MOUNTING	FINISH	CONTROL OPTION	OPTIONS
FLL FACTOR Flood Large	**28L** 28 LED	**95** 95W	**3K** 3000K	**N** 3x3	**U** 120V-277V	**K** Knuckle	**DB** Bronze	**PC** Photocontrol (voltage specified and determined by voltage field)	**F** Fusing 120 or 277V only (determined by voltage field)
	42L 42 LED		**4K** 4000K	**M** 4x4	**1** 120V	**Y** Yoke	**BL** Black	**CD** Continuous dimming	
			5K 5000K	**RM** 5x4	**2** 208V		**WH** White		
				W 6x6	**3** 240V		**GR** Gray		
					4 277V		**PS** Platinum silver		
					5[1] 480V		**CC** Custom Color		
					F[1] 347V				

[1] 42L only

ACCESSORIES & REPLACEMENT PARTS - Order Separately

Catalog Number	Description
FLL-VISOR-DB	Bronze top visor (Tap holes in lens frame for field installation)
93053186	FLL28, 95w, 120-277V Dimming driver, 1050mA (1 Qty)
93053187	FLL140, 95w, 120-277V Dimming driver, 700mA (1 Qty)
FLL-LOUVER-BL	Black adjustable louver
ARF-SPC	Polycarbonate vandal shield
4024C	Steel slipfitter for 2" pipe, 2 3/8" OD yoke mount, bronze finish
4040	Heavy-duty steel wall/pole bracket; bronze Lektrocote®

FLL-LOUVER-BL



ARF-SPC

FLL-VISOR-XX

PERFORMANCE DATA - Stock

				4K (4000K nominal)				5K (5000K nominal)		
# OF LEDS	DRIVE CURRENT (MILLIAMPS	SYSTEM WATTS	DISTRIBUTION TYPE	NEMA	LUMENS	LPW	MAX BEAM CANDLEPOWER	LUMENS	LPW	MAX BEAM CANDLEPOWER
28	1050mA	95W	W	6 x 6	8992	94.5	6805	9557	100.6	6935
140	158mA	150W	W	7 x 7	14665	98	5627	14764	98.4	5731

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown.
Actual performance may differ as a result of end-user environment, application and inherent performance tolerances of the electrical components.

PERFORMANCE DATA - MTO

						5K (5000K nominal, 70 CRI)			4K (4000K nominal, 70 CRI)			3K (3000K nominal, 80 CRI)		
# OF LEDS	DRIVE CURRENT	SYSTEM WATTS	DIST. TYPE	NEMA	FIELD ANGLE H° X V°	LUMENS	LPW[1]	MAX BEAM CANDLEPOWER	LUMENS	LPW[1]	MAX BEAM CANDLEPOWER	LUMENS	LPW[1]	MAX BEAM CANDLEPOWER
28	1050mA	95W	W	6 x 6	107° x 107°	9557	100.6	6935	8992	94.5	6805			
42	700mA	95W	N	3 x 3	32° x 32°	10860	114	91770	10263	108	85000	7473	80	63093
			M	4 x 4	53° x 53°	11400	119	46836	10335	108	33566	7654	81	26201
			RM	5 x 5	84° x 86°	9806	102	17388	8889	93	14733	6702	71	11395
			W	6 x 6	107° x 107°	10967	113	8024	10173	105	7265	7694	79	5475

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown. Actual performance may differ as a result of end-user environment and application.

PROJECTED LUMEN MAINTENANCE

	OPERATING HOURS – FLL-28L					
AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.94	0.91	0.88	0.79	>149,000
40°C / 104°F	1.00	0.92	0.90	0.87	0.76	>132,000

Nichia 219B, 1080mA, 85°C

	OPERATING HOURS – FLL-42L					
AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°F	1.00	0.98	0.96	0.96	0.94	>625,000
40°C / 104°F	1.00	0.96	0.94	0.93	0.90	>435,000

	OPERATING HOURS – FLL-140L					
AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.96	0.94	0.93	0.89	>331,000
40°C / 104°F	1.00	0.95	0.92	0.90	0.85	>237,000

Nichia NFSL757DT-V1, 150mA, 85°C

ELECTRICAL DATA

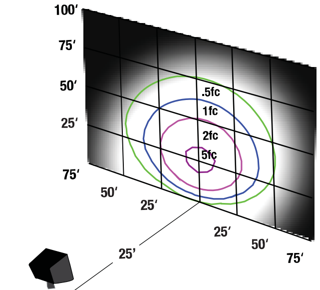
# OF LEDS	NUMBER OF DRIVERS	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	CURRENT (Amps)	SYSTEM POWER (W)
28	1	1050mA	120	0.82	95
			277	0.36	95
42	1	700mA	120	.80	96
			277	.35	96
140	1	158mA	120	1.25	150
			277	0.54	150

LUMINAIRE AMBIENT TEMPERATURE FACTOR (LATF)

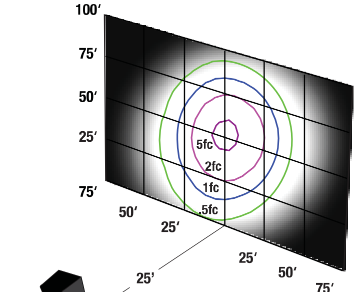
AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	1.00
40°C	104°F	0.99

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

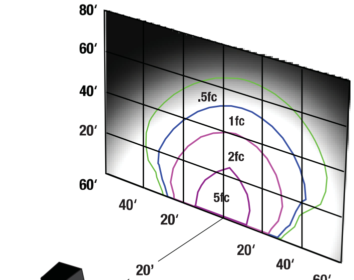
PHOTOMETRICS For additional photometric information and IES downloads, visit our web site at www.hubbelloutdoor.com



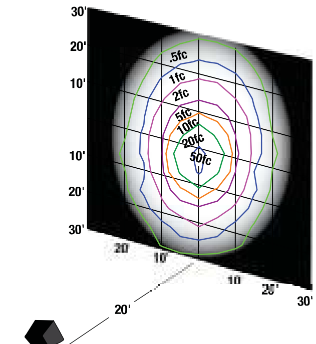
FLL140L,
6x6 Wide



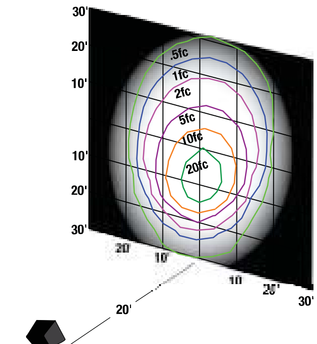
FLL140L,
6x6 Wide



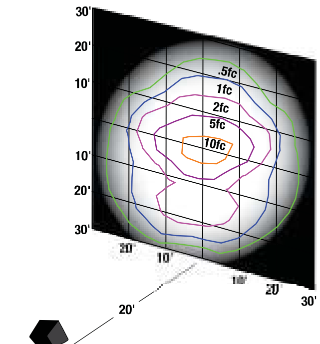
FLL28L,
6x6 Wide



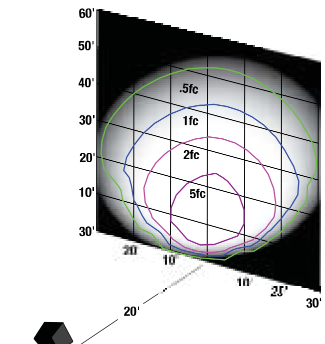
FLL42L
3x3 Narrow



FLL42L
4x4 Medium



FLL42L
5x5 Rectangular Medium



FLL42L
6x6 Wide

Model# **FLL-150-5K-U-[K,Y]**

Manufacturer: Hubbell Lighting
Brand: Hubbell Outdoor Lighting
Technical Requirements Version: 4.2
Date Qualified: 05/30/2017
Product ID: PAUTD214

Categorization

Main: Outdoor Luminaires
General Application: High Output
Primary Use: Architectural Flood and Spot Luminaires

Classification: Standard
Is Parent Product: No
DLC Family Code: CCCEGS
Dimming Status: NotDimmable
Listing Status: Listed

View Notes

Reported Data | Zonal Lumens | Spacing Criteria | Version History | Family Data

Light Output: 16537 lm
Wattage: 148.2 W
Efficacy: 111.59 lm/W
Power Factor: 0.88
CCT: 5000 K
CRI: 70
Total Harmonic Distortion: 11.4 %

KEYSTONE SINCE 1945 | DIRECTDRIVE LED
LINE VOLTAGE T8 TUBES

Relamp: Dir Line LED-1-Lamp-4-Foot-Prem-10.5W

KT-LED10.5T8-48G-840-D

T8 LED LAMP

DESCRIPTION

10.5W T8 LED | 4000K | >83 CRI | High Efficiency

RoHS Compliant | 5 YEAR WARRANTY

LAMP TYPE: Linear	
BULB TYPE: T8 LED	
BASE TYPE: G13 (Medium Bi-Pin)	
WATTAGE: 10.5W	
COLOR TEMPERATURE: 4000K	
COLOR RENDERING INDEX (CRI): >83	
WARRANTY: 5 Years	

PRODUCT FEATURES

- Replacement for Conventional Fluorescent Lamp
- 50,000+ Hour Lifetime
- Approximately 40% More Energy Efficient that Standard F32T8 Lamps
- Environmentally Friendly: No Mercury Used
- UL Classified
- Operating Temperature: -20°C/-4°F to 45°C/113°F
- Listed on DLC Qualified Product List
- Integral Driver (Isolated), Eliminates the Need for External Driver or Ballast
- 100+ Lumens per Watt
- Instant Startup
- Frosted Lens Eliminates Pixelation

OPERATING SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Input Voltage	Power Consumption	Power Factor	Input Current
120-277Vac	10.5W	>0.9	.094A @ 120V .040A @ 277V

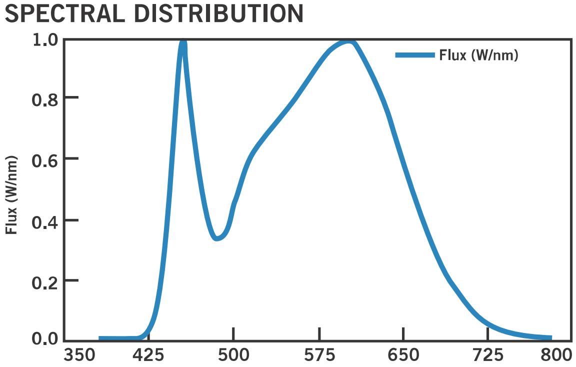
RATED LIFE

L70 (Hours)	50,000

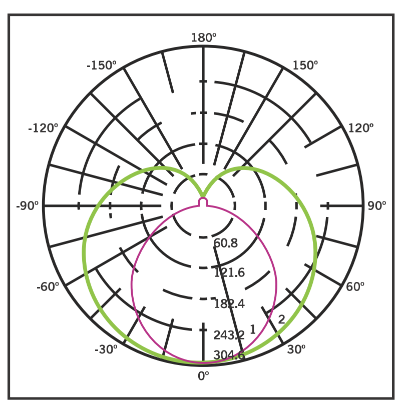
PHOTOMETRIC CHARACTERISTICS

Color Temperature (CCT)	4000K
Luminous Flux	1730 lm
Color Rendering Index (CRI)	>83
Efficacy	160 lm/W
Beam Angle	240°
Visible Light Area	325°

SPECTRAL DISTRIBUTION



POLAR CANDELA DISTRIBUTION



Maximum Candela = 1248.55
Located at Horizontal Angle = 0, Vertical Angle 0

1. **Violet** Vertical Plane through Horizontal Angles (90-270)
2. **Green** Vertical Plane through Horizontal Angles (0-180)

KEYSTONE SINCE 1945 | DIRECTDRIVE LED LINE VOLTAGE T8 TUBES

KT-LED10.5T8-48G-840-D

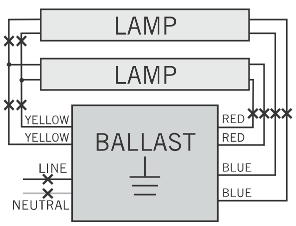
T8 LED LAMP

WIRING DIAGRAMS

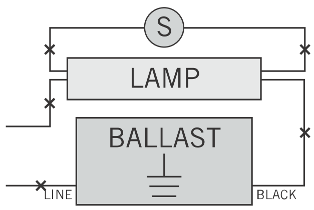
1. Cut all existing connections to ballast as shown below and remove ballast.

Typical Ballast Configurations:

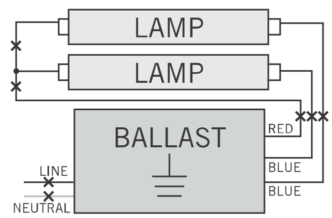
PROGAM START



PREHEAT WITH STARTER

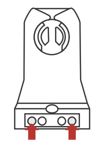


INSTANT START



CAUTION: INSTANT START BALLAST WITH SHUNTED SOCKETS.

Typical Non-Shunted Lampholder



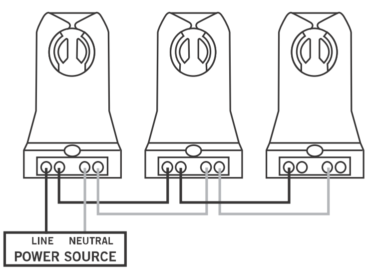
Connect wires directly to these terminals

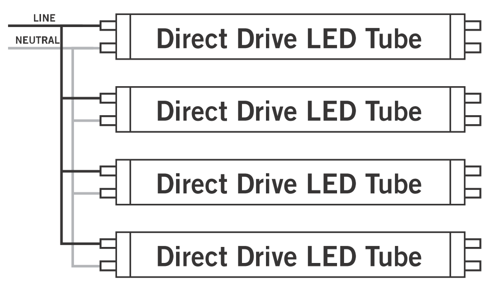
CAUTION: Use only non-shunted lampholders.

Do not install product in a fixture with shunted lampholders (found in all fixtures using instant start ballasts). If the current lampholders are shunted, remove them and replace them with non-shunted lampholders. Make new connections directly to terminals as indicated above.

Keystone can provide any style replacement lampholders. Call us at 800-464-2680.

2. Re-wire fixture as shown below.

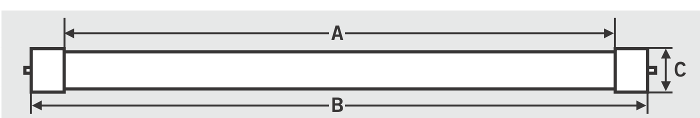




No Live Connection

PHYSICAL CHARACTERISTICS

LAMP DIMENSIONS



A (Illuminated Length)	44.38"
B (Body Length)	47.15"
C (Diameter)	1.10"

NOMINAL LENGTH: 48" **BASE TYPE:** G13 (Medium Bi-Pin)

ORDERING INFORMATION

ORDER CODE	PACKAGING STYLE	PACK QTY.	ITEM STATUS
KT-LED10.5T8-48G-840-D-CP	Carton Pack (Egg Crate Packaging)	25	Quick Ship

CATALOG NUMBER BREAKDOWN

KT-LED10.5T8-48G-840-D-CP

KT	LED	10.5	T8	48	G	8	40	D	CP
Keystone Technologies	LED Lamp	Wattage	Lamp Type	Nominal Length (Inches)	Glass	800 Series	Color Temp.	Direct Drive Series	Packaging Style

Model# KT-LED10.5T8-48G-840-D

Manufacturer: Keystone Technologies
Brand: KEYSTONE
Technical Requirements Version: 4.4
Date Qualified: 01/09/2018
Product ID: PLJQREE0QJIS

Categorization

Main: Linear Replacement Lamp
General Application: T8 Four-Foot
Primary Use: Internal Driver/Line Voltage (UL Type B) Lamps
System Type: AC

Classification: standard
Is Parent Product: No
DLC Family Code: NANOOE
Listing Status: Listed

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1700 lm
Wattage: 10.5 W
Efficacy (AC): 162 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

LED Dimmable A-Lamps

15,000 Hour • Omni-Directional

Relamp: LED - A-Lamp (3 - 25W): 9 W

High efficiency A-Lamps. Light output in all directions to suit many applications.

Limitless options for the following applications:

- General Lighting
- Floor Lamps
- Ceiling Fixtures
- Table Lamps
- Sconces

Great features and benefits:

- Energy efficient: up to 85% more efficient than incandescent alternatives
- Smooth, uniform dimming
- Long life: 15,000 hours
- Similar look and feel as incandescent alternative
- Excellent color consistency
- Available in 2700K, 3000K, 4000K and 5000K
- Fits any installations where a standard A-lamp is used

A19 A21

TCP®
325 Campus Dr. | Aurora, Ohio 44202 | P: 800-324-1496 | tcpi.com

ENERGY STAR PARTNER

TCP

LED Dimmable A-Lamps

15,000 Hour • Omni-Directional

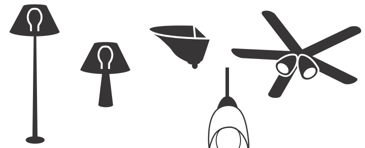
LED	15,000 hours average rated life, 120 volts

Catalog Number	
Notes	Type

Applications:

Ideal for applications where uniform multi-directional light output is required.

- Table Lamps
- Floor Lamps
- Sconces
- Ceiling Fixtures
- Decorative Fixtures



Features	Benefits
Up to 85% less energy than halogen alternatives	Instant energy savings
Long life	Minimizes replacement and maintenance costs
Very low heat generation	Perfect for sensitive display lighting such as art galleries
Excellent color consistency and CRI	Enhances colors of focal point while maintaining uniformity throughout lighting installation from lamp to lamp
UL approved for damp location	Can be used outdoors when protected from elements—withstands humidity indoors/outdoors
Shatter resistant	Lower the risk of injury and breakage
ANSI construction compliant	Fits all A-lamp installations
9W rated for totally enclosed fixtures	Can be used in totally enclosed luminaires

Specifications

Input Line Voltage: .... 120 VAC
Input Power .... See Chart
Input Line Frequency 50/60HZ
Lamp Life (Rated) .... 15,000 hrs
Minimum Starting Temp .... -30ºC
Maximum Operating Temp 40ºC
CRI 80

A19 A-Lamp A21 A-Lamp

Warranty	Item #	Description	Energy Star® RATED	Voltage	Wattage	Incandescent/Halogen Wattage Comparison	Lumens	LPW	CCT	CRI	M.O.L. (inches)	Diameter (inches)	Enclosed/ Recessed Luminaire
3 YEAR WARRANTY	**LED A19 Lamps**												
	L9A19D1527K	LED 9W A19 DIM 2700K	*	120	9	60	800	88.9	2700K	80	4.2	2.4	Y
	L9A19D1530K	LED 9W A19 DIM 3000K	*	120	9	60	825	91.7	3000K	80	4.2	2.4	Y
	L9A19D1541K	LED 9W A19 DIM 4000K	*	120	9	60	850	94.4	4000K	80	4.2	2.4	Y
	L9A19D1550K	LED 9W A19 DIM 5000K	*	120	9	60	850	94.4	5000K	80	4.2	2.4	Y
	LED A21 Lamps												
	LED15A21D27K	LED 15W A21 DIM 2700K	*	120	15	100	1600	106.7	2700K	80	5.2	2.7	N
	LED15A21D30K	LED 15W A21 DIM 3000K	*	120	15	100	1625	108.3	3000K	80	5.2	2.7	N
	LED15A21D41K	LED 15W A21 DIM 4000K	*	120	15	100	1650	110.0	4000K	80	5.2	2.7	N
	LED15A21D50K	LED 15W A21 DIM 5000K	*	120	15	100	1650	110.0	5000K	80	5.2	2.7	N

For the most up-to-date specs, please visit www.tcpi.com

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ENERGY STAR PARTNER

LED Dimmable A-Lamps

15,000 Hour • Omni-Directional

LED Dimmer Compatibility

								OMNI	OMNI
NO #	BRAND	FAMILY	MODEL #	LOAD TYPE	LOAD TYPE	RATED LOAD	CUT PHASE	A19 60WE	A19 100WE
1	Leviton	Sureslide	06674-POB	LED and CFL/600-Watt Incandescent Dimmer	R/L/C	150W	Forward Phase	①	①
2	Leviton	Sureslide	06672-1LT	LED/CFL Incandescent Slide-To-Off Dimmer	R/L/C	150W	Forward Phase	③	①
3	Leviton	Sureslide	06631-1LT	Single-Pole Incandescent Slide Dimmer	R	600W	Forward Phase	①	①
4	Leviton	Sureslide	06633-PLI	Preset Incandescent Dimmer, Single Pole or 3-Way	R	600W	Forward Phase	①	①
5	Leviton	Vizia	VPI06-1LZ	120 VAC LED Locator Single-Pole and 3-Way IllumaTech Preset Slide Dimmer	C	600W	Forward Phase	①	①
6	Leviton	Decora Sureslide	IPL06	LED/CFL Universal Dimmer	R/L/C	150W	Forward Phase	①	①
7	Lutron	Diva	DVCL-153P	CFL/LED Dimmer	R/C	150W	Forward Phase	①	①
8	Lutron	Skylark	SCL-153PR	CFL/LED Dimmer	R/C	150W	Forward Phase	①	①
9	Lutron	Maestro	MACL-153M	CFL/LED Digital Dimmer	R/C	150W	Forward Phase	①	①
10	Lutron	Contour	TGCL-153PM	CFL/LED Dimmer	R/C	150W	Forward Phase	①	①
11	Lutron	Contour	DV-600P	Incandescent	R	600W	Forward Phase	①	①
12	Lutron	Diva	DVLV-600P	Incandescent	R	600W	Forward Phase	①	①
13	Lutron	Diva	DVELV-303P	Incandescent	R	300W	Forward Phase	③	①
14	Lutron	Contour	CTCL-153PDH-WH	CFL/LED	R/C	150W	Forward Phase	①	①
15	Lutron	Skylark	S-600P-WH	Incandescent	R	600W	Forward Phase	①	①
16	Cooper	ASPIRE	ASPIRE-9530	Incandescent	R	600W	Forward Phase	①	①
17	Cooper	ASPIRE	9573	LED/CFL/INC Full Slide Dimmer	R/L/C	300W	Forward Phase	①	①

① Professional, full range has perfect performance
② Good, has issue in some points but likely not an issue to typical consumer
③ Underperforming, flicker and buzzing

LOAD TYPE

R type load: GLS, HV Halogen
L type load: LV Halogen with magnetic transformer
C type load: LV Halogen with electronic transformer

*Information above is to be considered as guidance

Visit www.tcpi.com for the most up-to-date dimmer caompatibility.

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ENERGY STAR PARTNER

CREATING BEAUTY

TCP has a 20-year history in energy-efficient lighting. Thanks to our cutting edge technology and manufacturing expertise, we have shipped billions of high quality lamps. Our integrated technology and manufacturing provides expedited time-to-market. With TCP, you can count on unique lighting products designed to meet very specific needs—lighting that transforms your surroundings and envelopes you in warmth—lighting that generates beauty with every flip of the switch.

LED

For more information on the quality and care TCP can deliver, call us at 800.324.1496 or visit tcpi.com

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ENERGY STAR CERTIFIED
Light Bulbs

TCP : L9A19D1527K

Specifications

ENERGY STAR Partner:	Technical Consumer Products, Inc. (TCP)
Brand Name:	TCP
Model Number:	L9A19D1527K
Product Finder Bulb Type:	General Purpose Replacement
Base Type:	E26 (Medium)
Lamp Category:	Omnidirectional
Technology:	LED
Warranty (years):	3
Energy Used (watts):	9.0
Efficacy (lumens/watt):	88.9
Wattage Equivalency (watts):	60
Maximum Overall Length (mm):	103.3
Maximum Overall Diameter (mm):	60.0
Life (hrs):	15000
Brightness (lumens):	800
Power Factor:	0.7
Light Appearance (Kelvin):	2700
Color Quality (CRI):	81
R9:	3
Connected Lamp:	No
Dimmable:	Dimmable
Dims Down to %:	17
Three Way:	No
Lamp Rated for Enclosed Fixtures:	Yes
Special Features:	Damp Location Rated
Date Qualified:	2018-11-29
Date Available on Market:	2018-11-20
Markets:	United States, Canada
ENERGY STAR Certified:	Yes

Additional Model Information

KEYSTONE SINCE 1945 | DIRECTDRIVE LED
LINE VOLTAGE T8 TUBES

Relamp: Dir Line LED-4-Lamp-4-Foot-Prem-10.5W

KT-LED10.5T8-48G-840-D

T8 LED LAMP

DESCRIPTION

10.5W T8 LED | 4000K | >83 CRI | High Efficiency

RoHS Compliant · 5 YEAR WARRANTY

LAMP TYPE: Linear	
BULB TYPE: T8 LED	
BASE TYPE: G13 (Medium Bi-Pin)	
WATTAGE: 10.5W	
COLOR TEMPERATURE: 4000K	
COLOR RENDERING INDEX (CRI): >83	
WARRANTY: 5 Years	

PRODUCT FEATURES

- Replacement for Conventional Fluorescent Lamp
- 50,000+ Hour Lifetime
- Approximately 40% More Energy Efficient that Standard F32T8 Lamps
- Environmentally Friendly: No Mercury Used
- UL Classified
- Operating Temperature: -20°C/-4°F to 45°C/113°F
- Listed on DLC Qualified Product List
- Integral Driver (Isolated), Eliminates the Need for External Driver or Ballast
- 100+ Lumens per Watt
- Instant Startup
- Frosted Lens Eliminates Pixelation

OPERATING SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Input Voltage	Power Consumption	Power Factor	Input Current
120-277Vac	10.5W	>0.9	.094A @ 120V .040A @ 277V

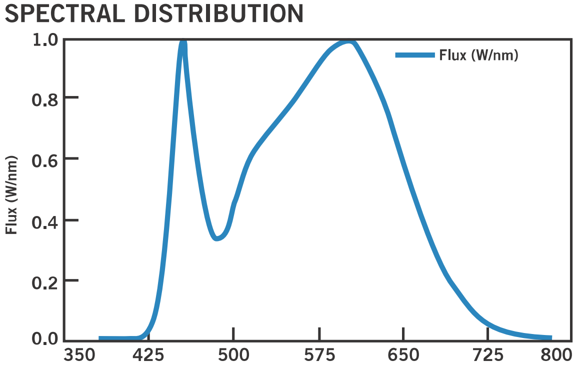
RATED LIFE

L70 (Hours)	50,000

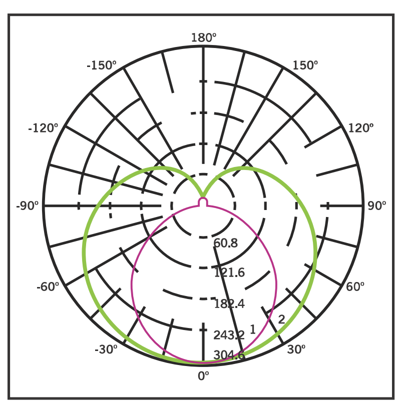
PHOTOMETRIC CHARACTERISTICS

Color Temperature (CCT)	4000K
Luminous Flux	1730 lm
Color Rendering Index (CRI)	>83
Efficacy	160 lm/W
Beam Angle	240°
Visible Light Area	325°

SPECTRAL DISTRIBUTION



POLAR CANDELA DISTRIBUTION



Maximum Candela = 1248.55
Located at Horizontal Angle = 0, Vertical Angle 0

1. **Violet** Vertical Plane through Horizontal Angles (90-270)
2. **Green** Vertical Plane through Horizontal Angles (0-180)

KEYSTONE SINCE 1945 | DIRECT DRIVE LED
LINE VOLTAGE T8 TUBES

KT-LED10.5T8-48G-840-D

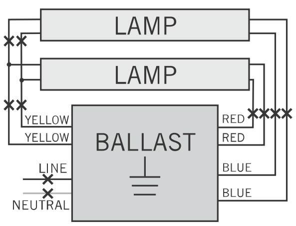
T8 LED LAMP

WIRING DIAGRAMS

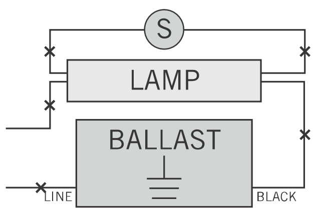
1. Cut all existing connections to ballast as shown below and remove ballast.

Typical Ballast Configurations:

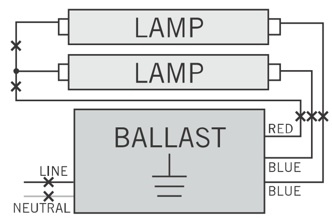
PROGAM START



PREHEAT WITH STARTER

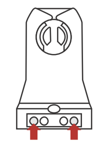


INSTANT START



CAUTION: INSTANT START BALLAST WITH SHUNTED SOCKETS.

Typical Non-Shunted Lampholder



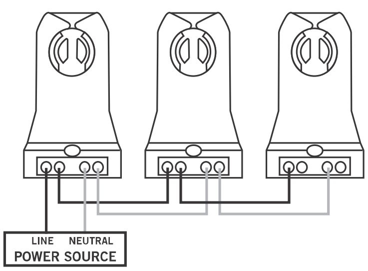
Connect wires directly to these terminals

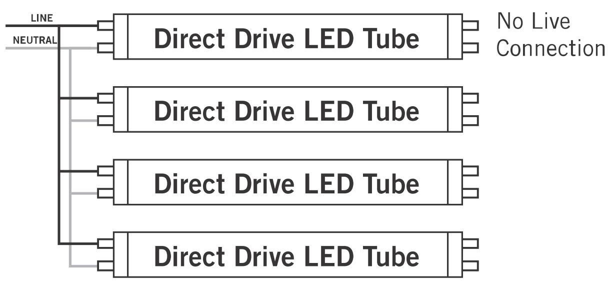
CAUTION: Use only non-shunted lampholders.

Do not install product in a fixture with shunted lampholders (found in all fixtures using instant start ballasts). If the current lampholders are shunted, remove them and replace them with non-shunted lampholders. Make new connections directly to terminals as indicated above.

Keystone can provide any style replacement lampholders. Call us at 800-464-2680.

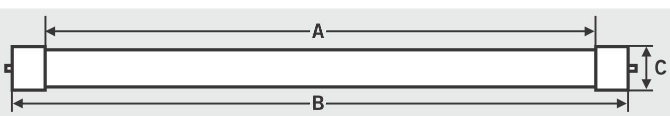
2. Re-wire fixture as shown below.





PHYSICAL CHARACTERISTICS

LAMP DIMENSIONS



A (Illuminated Length)	44.38”
B (Body Length)	47.15”
C (Diameter)	1.10”

NOMINAL LENGTH: 48” **BASE TYPE:** G13 (Medium Bi-Pin)

ORDERING INFORMATION

ORDER CODE	PACKAGING STYLE	PACK QTY.	ITEM STATUS
KT-LED10.5T8-48G-840-D-CP	Carton Pack (Egg Crate Packaging)	25	Quick Ship

CATALOG NUMBER BREAKDOWN

KT-LED10.5T8-48G-840-D-CP

- KT — Keystone Technologies
- LED — LED Lamp
- 10.5 — Wattage
- T8 — Lamp Type
- 48 — Nominal Length (Inches)
- G — Glass
- 8 — 800 Series
- 40 — Color Temp.
- D — Direct Drive Series
- CP — Packaging Style

Model# KT-LED10.5T8-48G-840-D

Manufacturer: Keystone Technologies
Brand: KEYSTONE
Technical Requirements Version: 4.4
Date Qualified: 01/09/2018
Product ID: PLJQREE0QJIS

Categorization

Main: Linear Replacement Lamp
General Application: T8 Four-Foot
Primary Use: Internal Driver/Line Voltage (UL Type B) Lamps
System Type: AC

Classification: standard
Is Parent Product: No
DLC Family Code: NANOGE
Listing Status: Listed

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1700 lm
Wattage: 10.5 W
Efficacy (AC): 162 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

LNC SERIES

Cat.#		Approvals
Job	Type	

HUBBELL Outdoor Lighting

SPECIFICATIONS

Intended Use:
The compact LED LNC is designed for entry/perimeter illumination for safety, security and identity. Typical mounting height is up to 12 feet with 40ft fixture spacing (without acrylic diffuser) and 30ft spacing with acrylic diffuser installed. Photocontrol option is available to provide dusk-to-dawn control for additional energy savings.

Construction:
Decorative die-cast aluminum housing and door. Rugged design protects internal components and provides excellent thermal management for long life – 60,000 hours minimum LED life at L96 rating per IESNA TM-21-11. Powder paint finishes provide lasting appearance in outdoor environments.

Optics/Electrical
LED:
Drivers are 120-277V, 50/60Hz Type II, III and Type IV lenses provide wide lateral spread.
0-10V dimming 120-277V only.

- LNC5L – 5 LEDs, Types II, III or IV available, see page 2 for electrical details
- LNC7L – 7 LEDs, Type II, III or IV available, see page 2 for electrical details
- LNC9L – 9 LEDs, Types II, III or IV available, see page 2 for electrical details
- 3000K - 80 CRI, 4000K - 70 CRI, and 5000K - 70 CRI, CCT nominal
- Minimum operating temperature is -40°C/-40°F
- Drivers have greater than .90 power factor and less than 20% Total Harmonic Distortion

Lenses:
Full cut-off distribution; Ambient diffuser included, use for applications near enterences or locations where reduced brightness is desired.

Installation:
Quick mount adapter provides quick installation, designed for recessed box 4" square junction box.

Listings:
Listed and labeled to UL 1598 for wet locations, 25° C ambient environments. Some models meet DesignLights Consortium (DLC) qualifications, consult DLC website for more details: http://www.designlights.org/QPL

• IES Progress Award Winner - 2012

Warranty:
Five year limited warranty (for more information visit: http://www.hubbelloutdoor.com/resources/warranty/

PRODUCT IMAGE(S)

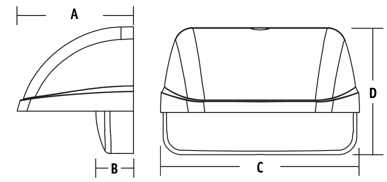

LNC-5L


LNC-7L


LNC-9L


With diffuser

DIMENSIONS



A	B	C	D
4.81" (122 mm)	1.55" (39 mm)	8.22" (209 mm)	5.25" (133 mm)

SHIPPING INFORMATION

Catalog Number	G.W(kg)/ CTN	Carton Dimensions Length Inch (cm)	Width Inch (cm)	Height Inch (cm)	Carton Qty. per Master Pack
LNC-5LU	9.6 (4.36)	14.5 (37)	9.6 (24.5)	6.8 (17.5)	2
LNC-7LU	9.6 (4.36)	14.5 (37)	9.6 (24.5)	6.8 (17.5)	2
LNC-9LU	9.6 (4.36)	14.5 (37)	9.6 (24.5)	6.8 (17.5)	2

CERTIFICATIONS/LISTINGS

*3000K and warmer CCTs only

ORDERING INFORMATION

ORDERING EXAMPLE: LNC-9LU-5K-3-1-PC1

LNC - ☐ - ☐ - ☐ - ☐ - ☐

SERIES
- LNC — LNC zero uplight

NUMBER OF LEDS/SOURCE/VOLTAGE
- 5LU[3] — 5 LEDs, Universal voltage 120-277V
- 7LU[3] — 7 LEDs, Universal voltage 120-277V
- 9LU[3] — 9 LEDs, Universal voltage 120-277V

CCT
- 3K — 3000K nominal, 70 CRI
- 4K — 4000K nominal, 70 CRI
- 5K[3] — 5000K nominal
- AM[2] — Amber (590 µm available for "Turtle Friendly"/ observatory applications, 350 mA (consult factory)

IES DISTRIBUTION
- 2 — Type II
- 3[3] — Type III
- 4[3] — Type IV

FINISH
- 1 — Bronze
- 2 — Black
- 3 — Gray
- 4 — White
- 5 — Platinum

OPTIONS
- PC(X)[1] — Button photocontrol, replace X with voltage, specify 1-120V, 2-208V, 3-240V, 4-277V

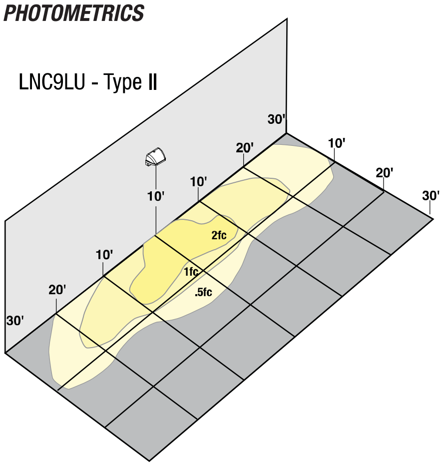
1 When PC is ordered, input must match PC voltage
2 Amber LEDs only available on 7LU and 9LU configurations, 350 mA only
3 DesignLights Consortium (DLC) qualified 5/7/9 models 5K only: LNC-9LU-5K-4, LNC-9LU-5K-3, LNC-7LU-5K-4, LNC-7LU-5K-3, LNC-5LU-5K

REPLACEMENT PART

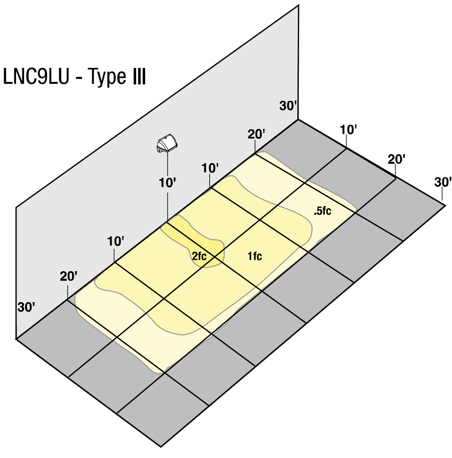
CATALOG NUMBER	DESCRIPTION
93039574	Frosted comfort shield, improved uniformity with only 5% reduction

PHOTOMETRICS

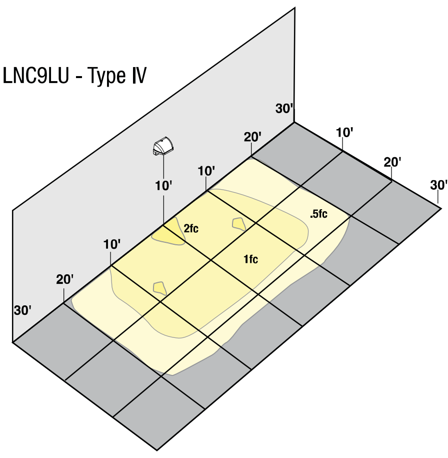
LNC9LU - Type II



LNC9LU - Type III



LNC9LU - Type IV



PERFORMANCE DATA

				5K (5000K nominal, 70 CRI)		4K (4000K nominal, 70 CRI)		3K (3000K nominal, 80 CRI)		AM (<580 nm wave-length)		
# OF LEDS	DRIVE CURRENT	SYSTEM WATTS	DIST. TYPE	LUMENS	LPW[1]	LUMENS	LPW[1]	LUMENS	LPW[1]	LUMENS	SYSTEM WATTS	LPW[1]
5	STD. (700mA) AM (350mA)	13W	2	1,150	88.5	1,052	81	883	68			
			3	1,132	87	1,077	83	833	64			
			4	1,146	88	1,053	81	849	65			
7		17W	2	1,515	89	1,369	80.5	1,272	75			
			3	1,500	88	1,539	90.5	1,392	82	268	6.6	59
			4	1,557	91.5	1,535	90	1,425	84			
9		22W	2	2,069	94	2,033	92	1,588	72			
			3	2,024	92	1,989	90	1,623	74			
			4	2,095	95	2,059	93.5	1,680	76	382	8.3	46

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown. Actual performance may differ as a result of end-user environment and application. Please consult IES files for BUG ratings.

PROJECTED LUMEN MAINTENANCE

	OPERATING HOURS					
Ambient Temp.	0	25,000	50,000	TM-21-11[1] L96 60,000	100,000	L70 (hours)
25°C / 77°F	1.00	0.98	0.97	0.96	0.95	>791,000
40°C / 104°F	0.99	0.98	0.96	0.96	0.94	>635,000

1. Projected per IESNA TM-21-11 * (Nichia 219B, 700mA, 85°C Ts, 10,000hrs)
Data references the extrapolated performance projections for the LNC-12LU-5K base model in a 40°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.

LUMINAIRE AMBIENT TEMPERATURE FACTOR (LATF)

AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0° C	32° F	1.02
10° C	50° F	1.01
20° C	68° F	1.00
25° C	77° F	1.00
30° C	86° F	1.00
40° C	104° F	0.99
50° C	122° F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-50°C (32-122°F).

ELECTRICAL DATA

# OF LEDS	DRIVE CURRENT (mA)	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	CURRENT (Amps)	SYSTEM POWER (w)
5	1	STD. (700mA)	120	0.11	13
			277	0.05	13
7	1	STD. (700mA)	120	0.14	17
			277	0.07	17
9	1	STD. (700mA)	120	0.17	22
			277	0.09	22

Model # LNC-9L[U,1,2,3,4]-5K-3-X

Manufacturer: Hubbell Lighting
Brand: Hubbell Outdoor Lighting
Technical Requirements Version:
Date Qualified: 05/04/2012
Product ID: P00000UVP

Categorization

Main: Outdoor Luminaires
General Application: Low Output
Primary Use: Outdoor Full-Cutoff Wall-Mounted Area Luminaires

Classification: Standard
Is Parent Product: No
DLC Family Code: AAAAYD
Dimming Status: Dimmable
Listing Status: Listed

View Notes

Reported Data | Family Data

Light Output: 2024 lm
Wattage: 22 W
Efficacy: 92 lm/W
Power Factor: 0.94
CCT: 5000 K
CRI: 70
Total Harmonic Distortion: 15.1 %

KEYSTONE SINCE 1945 | DIRECTDRIVE LED
LINE VOLTAGE T8 TUBES

Relamp: Dir Line LED-2-Lamp-4-Foot-Prem-10.5W

KT-LED10.5T8-48G-840-D

T8 LED LAMP

DESCRIPTION

10.5W T8 LED | 4000K | >83 CRI | High Efficiency

DLC | UL Classified | c UL us | RoHS Compliant | 5 YEAR WARRANTY

LAMP TYPE: Linear	
BULB TYPE: T8 LED	
BASE TYPE: G13 (Medium Bi-Pin)	
WATTAGE: 10.5W	
COLOR TEMPERATURE: 4000K	
COLOR RENDERING INDEX (CRI): >83	
WARRANTY: 5 Years	

PRODUCT FEATURES

- Replacement for Conventional Fluorescent Lamp
- 50,000+ Hour Lifetime
- Approximately 40% More Energy Efficient that Standard F32T8 Lamps
- Environmentally Friendly: No Mercury Used
- UL Classified
- Operating Temperature: -20°C/-4°F to 45°C/113°F
- Listed on DLC Qualified Product List
- Integral Driver (Isolated), Eliminates the Need for External Driver or Ballast
- 100+ Lumens per Watt
- Instant Startup
- Frosted Lens Eliminates Pixelation

OPERATING SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Input Voltage	Power Consumption	Power Factor	Input Current
120-277Vac	10.5W	>0.9	.094A @ 120V .040A @ 277V

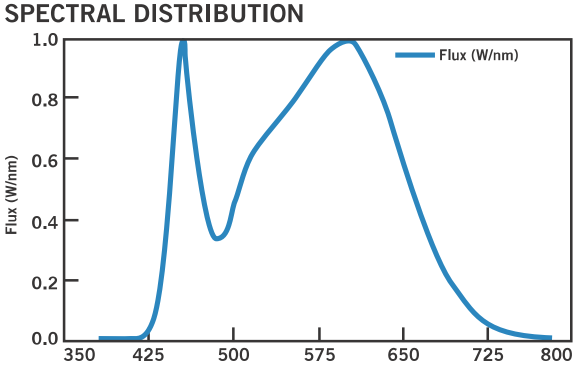
RATED LIFE

L70 (Hours)	50,000

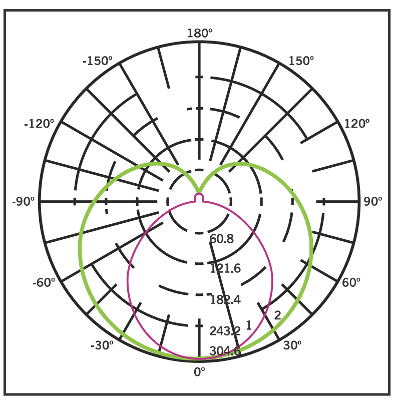
PHOTOMETRIC CHARACTERISTICS

Color Temperature (CCT)	4000K
Luminous Flux	1730 lm
Color Rendering Index (CRI)	>83
Efficacy	160 lm/W
Beam Angle	240°
Visible Light Area	325°

SPECTRAL DISTRIBUTION



POLAR CANDELA DISTRIBUTION



Maximum Candela = 1248.55
Located at Horizontal Angle = 0,
Vertical Angle 0

1. Violet Vertical Plane through Horizontal Angles (90-270)

2. Green Vertical Plane through Horizontal Angles (0-180)

KEYSTONE SINCE 1945 | DIRECT DRIVE LED
LINE VOLTAGE T8 TUBES

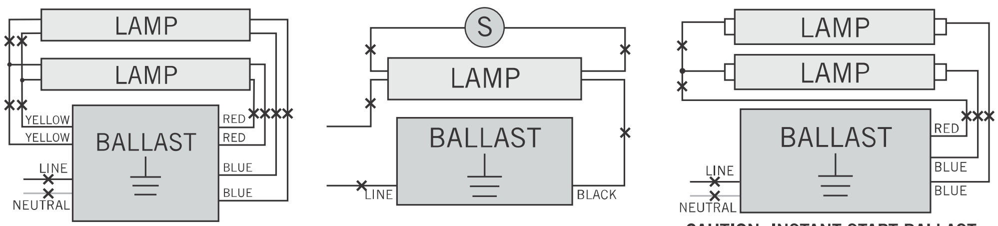
KT-LED10.5T8-48G-840-D
T8 LED LAMP

WIRING DIAGRAMS

1. Cut all existing connections to ballast as shown below and remove ballast.

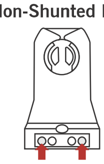
Typical Ballast Configurations:

PROGAM START | PREHEAT WITH STARTER | INSTANT START



CAUTION: INSTANT START BALLAST WITH SHUNTED SOCKETS.

Typical Non-Shunted Lampholder

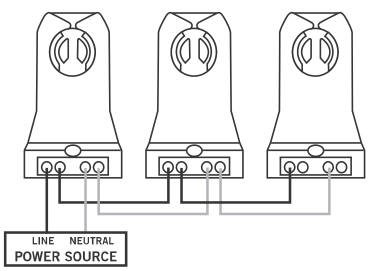


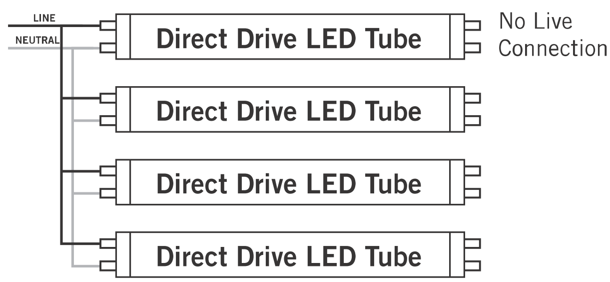
Connect wires directly to these terminals

CAUTION: Use only non-shunted lampholders.
Do not install product in a fixture with shunted lampholders (found in all fixtures using instant start ballasts). If the current lampholders are shunted, remove them and replace them with non-shunted lampholders. Make new connections directly to terminals as indicated above.

Keystone can provide any style replacement lampholders.
Call us at 800-464-2680.

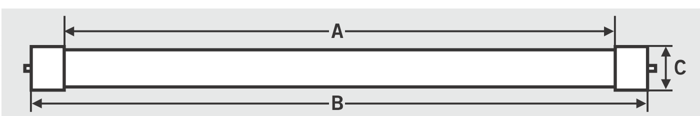
2. Re-wire fixture as shown below.





PHYSICAL CHARACTERISTICS

LAMP DIMENSIONS



A (Illuminated Length)	44.38”
B (Body Length)	47.15”
C (Diameter)	1.10”

NOMINAL LENGTH: 48” **BASE TYPE:** G13 (Medium Bi-Pin)

ORDERING INFORMATION

ORDER CODE	PACKAGING STYLE	PACK QTY.	ITEM STATUS
KT-LED10.5T8-48G-840-D-CP	Carton Pack (Egg Crate Packaging)	25	Quick Ship

CATALOG NUMBER BREAKDOWN

KT-LED10.5T8-48G-840-D-CP

- KT — Keystone Technologies
- LED — LED Lamp
- 10.5 — Wattage
- T8 — Lamp Type
- 48 — Nominal Length (Inches)
- G — Glass
- 8 — 800 Series
- 40 — Color Temp.
- D — Direct Drive Series
- CP — Packaging Style

Model# KT-LED10.5T8-48G-840-D

Manufacturer: Keystone Technologies
Brand: KEYSTONE
Technical Requirements Version: 4.4
Date Qualified: 01/09/2018
Product ID: PLJQREE0QJI8

Categorization

Main: Linear Replacement Lamp
General Application: T8 Four-Foot
Primary Use: Internal Driver/Line Voltage (UL Type B) Lamps
System Type: AC

Classification: standard
Is Parent Product: No
DLC Family Code: NANOGE
Listing Status: Listed

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1700 lm
Wattage: 10.5 W
Efficacy (AC): 162 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

MaxLite® A NEW WAVE OF LIGHT

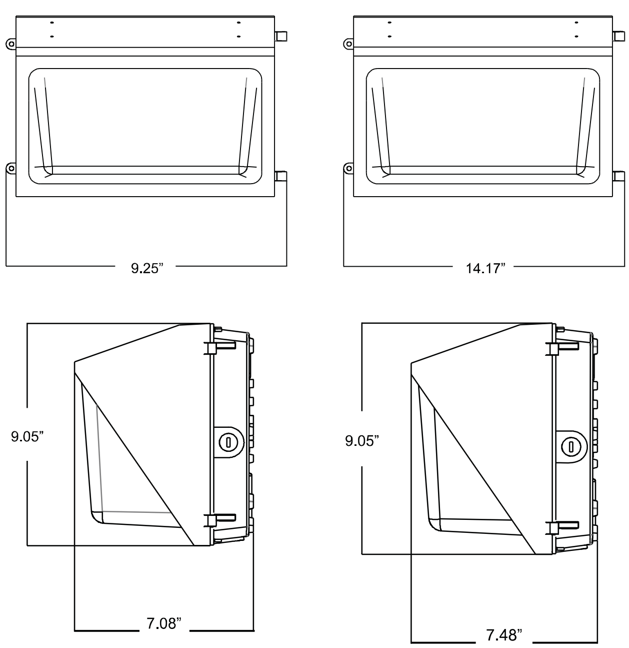
WALLMAX™ OPEN FACE

WP-OP Series

DIMENSIONS:

SIZE 1 - 28W & 40W

SIZE 2 - 50W, 80W & 120W



PRODUCT DESCRIPTION:

WallMax™ Open Face Wall Packs are ideal for brightly-lit outdoor environments in parking garages, entrances, public areas, schools, hospitals, hotels and outdoor walkways nationwide. The 28-, 40-, 50-, 80-, and 120-watt LED fixtures are energy-efficient replacements for up to 400-watt metal halide fixtures. The fixtures are rebatable, save energy, generate lower maintenance costs, and prevent light pollution.

FEATURES:

- Heavy-duty cast aluminum housing is polyester powder coated to be rust and corrosion proof
- High-quality shatter-resistant glass
- Sealed fixture is dirt and bug free
- Multiple knockouts for mounting convenience
- 0-10V dimming driver standard
- 6kV integral surge suppression standard
- Multiple knockouts for mounting convenience with four ½ NPS knockouts available for mounting convenience
- 10 Year Limited Warranty

CONTROLS:

120-277VAC Photocontrol:

- Power the fixture when light levels reach 20 lux or below
- Turn off the fixture at 30 lux or higher
- Operating temperature: 30°F-120°F

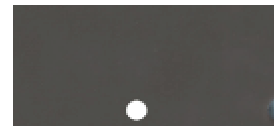
PIR Outdoor Daylight/Motion Sensor:

- Sensor provides multi-level control based on motion and/or daylight contribution for 0-10V DC Drivers
- All control parameters are adjustable remotely
- At least one FSIR-100 remote control must be ordered per project to be able to adjust factory settings for daylight / motion sensor
- For more information, please see supplementary datasheet for sensor, MaxLite model MSWSFSP221B

MODEL SELECTION Typical order example: WP-OP28U-50B

WP-OP			-		B	
FAMILY	**WATTAGE**	**VOLTAGE**	**-**	**CCT**	**FINISH**	**OPTION**
WP-OP= Open Face Wall Pack	**28=** 28W, 150W MH replacement **40=** 40W, 175W MH replacement **50=** 50W, 250W MH replacement **80=** 80W, 400W MH replacement **120=** 120W, 400W MH replacement	**U=** 120-277V **H=** 347-480V	-	**40=** 4000K **50=** 5000K	**B=** Bronze	**(OMIT)=** None **PC=** 120-277V Integral Photocontrol **MS¹=** PIR Daylight/Motion Sensor **EM²=** Battery Backup

1. Motion Sensor is external and provided with Lens type L3.
2. Rated 10 C. Available with 50, 80 and 120W, in size 2 housing dimensions. Lumen output in battery mode is approximately 2000lm for 90 minutes.

ACCESSORIES			
ORDER CODE	**MODEL NUMBER**	**DESCRIPTION**	**ACCESSORIES IMAGE**
100679	WP-OP-S1PLATE-B	Beauty Plate, 18.0” x 8.7” x .10”, Size 1, Bronze, 28W and 40W Models	
100461	WP-OP-S2PLATE-B	Beauty Plate, 18.0” x 8.7” x .10”, Size 2, Bronze, 50W, 80W, and 120W Models	
102184	FSIR-100	Remote Control for daylight / motion sensor	
100821	WP-OP-S1VISOR-B	Cutoff Visor, Size 1, Bronze, 28W and 40W models	
102184	WP-OP-S2VISOR-B	Cutoff Visor, Size 2, Bronze, 50W, 80W and 120W models	

SPECIFICATIONS:

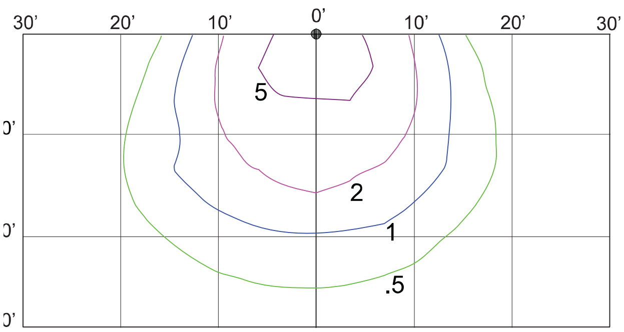
		28W	**40W**	**50W**	**80W**	**120W**
ITEM	**SPECIFICATION**	**DETAILS**				
GENERAL PERFORMANCE	Input Power (W)	28	40	50	80	120
	Lumens Delivered (lm)	3,640	5,540	7,065	11,375	16,945
	Efficacy (lm/W)	130	135	135	140	140
	CRI	≥80				
	Lumen Maintenance (L85, TM-21 @ 25°C)	>100,000 hours				
	Color Temperature	4000K, 5000K				
	Spacing Criteria	Available upon request				
ELECTRICAL	Input Voltage	120-277V standard; 347-480V available				
	Power Factor	>90%				
	THD	<15%				
PHYSICAL	Housing	Die-Cast Polyester Aluminum				
	Mounting	Fits electrical box or mount directly				
QUALIFICATION	Qualification	DLC Premium, ETL, IP65				
	Environment	Outdoor, wet location				
	Warranty	10 Years				
	Operating Temperature	-40°F ~104°F (-40°C ~ 40°C)				
	Humidity	10%-90% RH, non-condensing				

Lighting layouts and spacing criteria available upon request.

WALLMAX™ OPEN FACE
WP-OP Series

LAYOUTS:

WP-OP 28W:

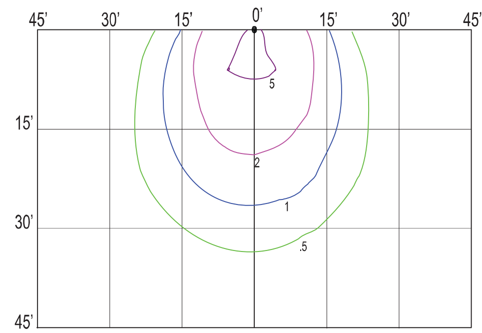


28W
3,640 LUMENS
10’ MOUNTING HEIGHT

FOOT-CANDLE CORRECTION FACTOR:

NEW HEIGHT:	10’	15’	20’	25’
MULTIPLY BY:	1	0.67	0.50	0.40

WP-OP 40W:

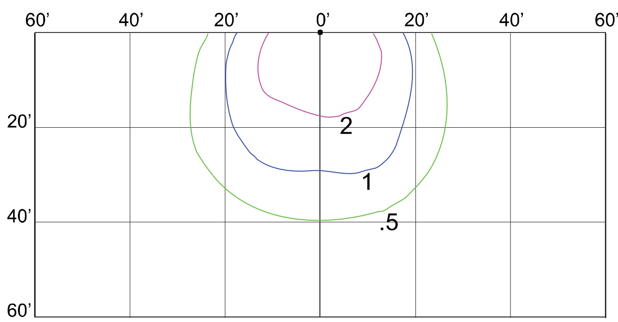


40W
5,540 LUMENS
15’ MOUNTING HEIGHT

FOOT-CANDLE CORRECTION FACTOR:

NEW HEIGHT:	10’	15’	20’	25’
MULTIPLY BY:	1.50	1	0.75	0.60

WP-OP 50W:

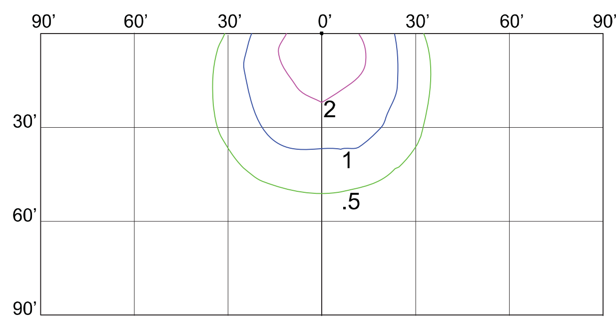


50W
7,065 LUMENS
20’ MOUNTING HEIGHT

FOOT-CANDLE CORRECTION FACTOR:

NEW HEIGHT:	10’	15’	20’	25’
MULTIPLY BY:	2	1.33	1	0.80

WP-OP 80W:

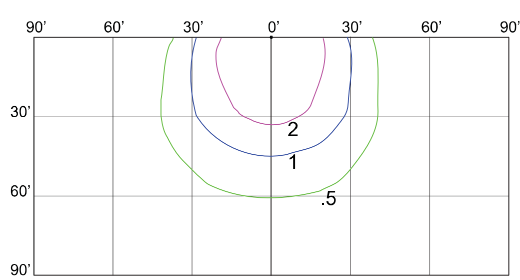


80W
11,375 LUMENS
30’ MOUNTING HEIGHT

FOOT-CANDLE CORRECTION FACTOR:

NEW HEIGHT:	10’	15’	20’	25’	30’
MULTIPLY BY:	3	2	1.50	1.2	1

WP-OP 120W:



120W
16,945 LUMENS
30’ MOUNTING HEIGHT

FOOT-CANDLE CORRECTION FACTOR:

NEW HEIGHT:	10’	15’	20’	25’	30’
MULTIPLY BY:	3	2	1.50	1.2	1

Model# **WP-OP50U-50[B,L,W][Blank,PC,EM,MS][Blank,SS]**

Manufacturer: MaxLite Inc.
Brand: Maxlite
Technical Requirements Version: 4.3
Date Qualified: 02/13/2018
Product ID: PLWIQZLF52QW

Categorization

Main: Outdoor Luminaires
General Application: Mid Output
Primary Use: Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires

Classification: Premium
Is Parent Product: No
DLC Family Code: YYYCQN
Listing Status: Listed

View Notes

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 7068.6 lm
Wattage: 50.8 W
Efficacy: 138.9 lm/W
Power Factor: 0.94
CCT: 4800 K
CRI: 80.9
Total Harmonic Distortion: 14.2 %

RL/RB: Plug & Play LED-2-Lamp-4-Foot-Prem-10.5W

MaxLite
A NEW WAVE OF LIGHT

NOTES:_____ FIXTURE SCHEDULE:_____

L10.5-T8-DF-4-40-GA

LED T8 - DIRECTFIT
4FT GLASS SERIES
UL TYPE-A

PRODUCT DESCRIPTION:

MaxLite DirectFit LED T8 lamp is the ideal plug and play solution that works straight out of the box. Designed to deliver up to 2,200 lumens, these energy-saving LED lamps are quick, easy and safe to install into existing linear fluorescent fixtures without any extra effort or re-wiring. MaxLite DirectFit LED T8 lamps utilize the existing T8 instant-start electronic ballasts, thus minimizing maintenance and labor costs.

FEATURES:

- Lumens: 1800 and 2200 lumens
- Input Voltage: 120-277V, determined by fluorescent ballast
- UL Type-A, compatible with most electronic instant-start, T8 ballasts
- Instant on
- All glass construction with plastic end caps
- Beam Angle: 320°
- Color Rendering Index (CRI): ≥80
- THD <20%
- Power Factor: ≥0.90
- Suitable for use in dry and damp locations
- Suitable for use in enclosed fixture
- Not for use with T12 magnetic or electronic ballasts
- Not for use with T8 magnetic or HO ballasts
- Not for use or to be wired to “mains voltage”
- 50,000 hour life (L70 standards)

WARRANTY:

5-year standard warranty
(further details available at www.maxlite.com/warranties)
Product may be eligible for a warranty extension to 10 years, for an additional fee. Contact MaxLite for details.

4FT MODEL SELECTION (Full list of order codes on pg. 2) — Typical order example: L10.5T8DF435-GA

L10.5	T8	DF	4	
FAMILY	**LAMP TYPE**	**OPERATION**	**LENGTH**	**CCT**
L10.5= LED Linear, 10.5 Watt	**T8=** T8 tube, Bi-Pin G13	**DF=** Direct Fit	**4=** 4 FT	**40-GA=** 4000K, Glass with Plastic End Caps

4FT MODEL SELECTION (Full list of order codes on pg. 2) — Typical order example: L14T8DF440-GA2

L14	T8	DF	4	
FAMILY	**LAMP TYPE**	**OPERATION**	**LENGTH**	**CCT**
L14= LED Linear, 14 Watt	**T8=** T8 tube, Bi-Pin G13	**DF=** Direct Fit	**4=** 4 FT	**40-GA2=** 4000K, Glass with Plastic End Caps

NOTES:
1. See page 3 for a list of compatible ballasts

LED T8 - DIRECTFIT
4FT COATED GLASS SERIES
UL TYPE-A

SPECIFICATIONS:

ITEM	SPECIFICATION	4FT - DETAILS L10.5T8DF4XX-GA	4FT - DETAILS L14T8DF4XX-GA2
GENERAL PERFORMANCE	Bare Lamp Wattage (W)	10.5W	14W
	Lumens Delivered* (lm)	1,800	2,200
	Color Temperature (CCT)	4000K	
	CRI	≥ 0.80	
	Beam Angle	320°	
	Lumen Maintenance (L70)	50,000 Hours	
ELECTRICAL	Power Factor	≥ 0.90	
	Input Voltage	120-277V, ballast dependent	
PHYSICAL	Operating Temperature	-4ºF to 113ºF	
	Lens	Opal (Frosted)	
	Dimension (W" x MOL")	1.05" x 47.78"	
CERTIFICATION	Certification	UL listed	
	Material Usage	RoHS compliant, no mercury	
	Environment	Dry, Damp	
	Warranty	5 Years	
QUALIFICATION	DesignLight Consortium	DLC Standard	

*** Operating with normal ballast factor (.88) ballast**

ORDERING:

ITEM NUMBER	MODEL NUMBER	WATTAGE	CCT
L10.5 4FT T8			
L10.5T8DF440-GA	103331	10.5	4000K
L14 4FT T8			
L14T8DF440-GA2	103334	14	4000K

COMPATIBLE BALLASTS-INSTANT START

MANUFACTURE	BRAND	MODEL NUMBER	# OF LAMPS	1 LAMP LOAD		2 LAMPS LOAD		3 LAMPS LOAD		4 LAMPS LOAD	
				INPUT VOLTAGE		INPUT VOLTAGE		INPUT VOLTAGE		INPUT VOLTAGE	
				120V	277V	120V	277V	120V	277V	120V	277V
FULHAM	FULHAM	WHSG4-UNV-T8-IS	4	-	-	-	-	GOOD	GOOD	GOOD	GOOD
GE	ULTRAMAX	GE432MAX-G-N	4	-	-	-	-	GOOD	GOOD	GOOD	GOOD
		GE259MAX-G-N	2	GOOD	GOOD	GOOD	GOOD	-	-	-	-
		GE232MAX-G-N	2	GOOD	GOOD	GOOD	GOOD	-	-	-	-
		GE132MAXP-N/ULTRA	1	GOOD	GOOD	-	-	-	-	-	-
		GE432MAX-G-L	4	-	-	-	-	GOOD	GOOD	GOOD	GOOD
		GE332MAX-G-N	3	-	-	GOOD	GOOD	GOOD	GOOD	-	-
		GE332MAX-G-L	3	-	-	GOOD	GOOD	GOOD	GOOD	-	-
		GE432MAXP-H/ULTRA	4	-	-	-	-	-	-	GOOD	GOOD
HATCH	HATCH	HL232BIS/UV/HE/W	2	GOOD	GOOD	GOOD	GOOD	-	-	-	-
HATCH	HATCH	HL432BIS/UV/HE/W	4	-	-	-	-	GOOD	GOOD	GOOD	GOOD
OSRAM	QUICKTRONIC	QHE4*32T8/UNVISN-SC	4	-	-	-	-	-	-	GOOD	GOOD
SUNLITE	SUNLITE	40155-SU.SB/232/MV	2	GOOD	GOOD	GOOD	GOOD	-	-	-	-
UNIVERSAL LIGHTING TECHNOLOGIES	TRIAD	B132UNVHP-N	1	GOOD	-	-	-	-	-	-	-

COMPATIBLE BALLASTS RAPID/PROGRAM START

MANUFACTURE	BRAND	MODEL NUMBER	# OF LAMPS	1 LAMP LOAD		2 LAMPS LOAD		3 LAMPS LOAD		4 LAMPS LOAD	
				INPUT VOLTAGE		INPUT VOLTAGE		INPUT VOLTAGE		INPUT VOLTAGE	
				120V	277V	120V	277V	120V	277V	120V	277V
GE	ULTRASTART	GE232-MVPS-L	2	GOOD	GOOD	GOOD	GOOD	-	-	-	-

Please contact MaxLite for questions about third party ballasts that are not on this list.

Phone: 1-800-555-5629 | **Fax:** 973-244-7333 | **Web:** www.maxlite.com | **E-mail:** info@maxlite.com

Model# L10.5T8DF440-GA

Manufacturer: MaxLite Inc.
Brand: Maxlite
Technical Requirements Version: 4.4
Date Qualified: 08/02/2019
Product ID: PII5QWGD

Categorization

Main: Linear Replacement Lamp
General Application: T8 Four-Foot
Primary Use: Replacement Lamps (plug and play) (UL Type A)
System Type: AC

Classification: standard
Is Parent Product: No
DLC Family Code: MMMRVH
Listing Status: Listed

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1800 lm
Wattage: 13 W
Voltage Range: 277 V
Efficacy (AC): 138 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

Universal Lighting Technologies

TRIAD®

B232IUNVHP-N

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency electronic ballast for (2/1) F32T8, (2/1) F32T8ES-30W, (2/1) F32T8ES-25W, (2/1) F25T8ES-22W (2/1) F28T8, (2/1) F25T8, (2/1) F17T8, (2/1) F15T8, (2/1) F11T8 and (1) F40T8. Also equivalent U-shaped lamps.

- Line Voltage: 108vac - 305vac, 50/60Hz
- Parallel Lamp Operation
- Also operates on 125VDC input, (+)L (-)N
- Instant Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Input Watts	Nominal Line Amps	Power Factor	Ballast Factor	Ballast Efficacy Factor	Harmonic Total	Crest Factor
F32T8	**2**	**120**	**55**	**0.46**	**> .99**	**.88**	**1.60**	**< 10%**	**< 1.7**
F32T8	**2**	**277**	**53**	**0.19**	**> .99**	**.88**	**1.66**	**< 10%**	**< 1.7**
F32T8	1	120	36	0.30	> .99	1.04	2.89	< 10%	< 1.7
F32T8	1	277	36	0.13	> .99	1.04	2.89	< 10%	< 1.7
F32T8ES (30W)	2	120	54	0.45	> .99	.88	1.63	< 10%	< 1.7
F32T8ES (30W)	2	277	52	0.19	> .99	.88	1.69	< 10%	< 1.7
F32T8ES (30W)	1	120	34	0.28	> .99	1.05	3.09	< 10%	< 1.7
F32T8ES (30W)	1	277	33	0.12	> .98	1.05	3.18	< 10%	< 1.7
F32T8ES (25W)	2	120	45	0.38	> .99	.89	1.98	< 10%	< 1.7
F32T8ES (25W)	2	277	44	0.16	> .99	.89	2.02	< 10%	< 1.7
F32T8ES (25W)	1	120	28	0.24	> .99	1.05	3.75	< 10%	< 1.7
F32T8ES (25W)	1	277	28	0.10	> .98	1.05	3.75	< 10%	< 1.7
F28T8	2	120	48	0.40	> .99	.88	1.83	< 10%	< 1.7
F28T8	2	277	47	0.17	> .99	.88	1.87	< 10%	< 1.7
F28T8	1	120	30	0.25	> .99	1.05	3.50	< 10%	< 1.7
F28T8	1	277	30	0.11	> .98	1.05	3.50	< 10%	< 1.7
F25T8	2	120	45	0.37	> .99	.90	2.00	< 10%	< 1.7
F25T8	2	277	44	0.16	> .99	.90	2.05	< 10%	< 1.7
F25T8	1	120	28	0.24	> .99	1.05	3.75	< 10%	< 1.7
F25T8	1	277	28	0.10	> .98	1.05	3.75	< 10%	< 1.7
F25T8ES (22W)	2	120	37	0.31	> .99	.89	2.43	< 10%	< 1.7
F25T8ES (22W)	2	277	36	0.13	> .99	.89	2.46	< 10%	< 1.7
F25T8ES (22W)	1	120	24	0.20	> .99	1.14	4.74	< 10%	< 1.7
F25T8ES (22W)	1	277	24	0.09	> .98	1.14	4.74	< 10%	< 1.7
F17T8	2	120	32	0.27	> .99	.89	2.78	< 10%	< 1.7
F17T8	2	277	32	0.12	> .98	.89	2.78	< 10%	< 1.7
F17T8	1	120	21	0.18	> .99	1.07	5.10	< 15%	< 1.7
F17T8	1	277	21	0.08	> .97	1.07	5.10	< 15%	< 1.7
F15T8	2	120	25	0.21	> .99	.86	3.51	<10%	<1.7
F15T8	2	277	25	0.09	> .98	.86	3.50	<10%	<1.7
F15T8	1	120	16	0.13	> .99	1.02	6.38	<10%	<1.7
F11T8	2	120	20	0.17	> .99	.78	3.90	<10%	<1.7
F11T8	2	277	21	0.08	> .97	.78	3.71	< 15%	< 1.7
F11T8	1	120	14	0.11	> .99	.90	6.43	<10%	<1.7
F40T8	1	120	44	0.37	> .99	1.03	2.34	< 10%	< 1.7
F40T8	1	277	43	0.16	> .99	1.03	2.40	< 10%	< 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11-1993
- Meets ANSI Standard C62.41-1991
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits
- Meets CSA Standard 654 for Ballast Efficiency
- Anti-striation circuitry

Application:
- Minimum Starting Temperature: 0° F, -18° C
  - For ES & 28W Lamps: 60° F, 16° C
  - For F40T8: 32 °F, 0 °C
- Maximum Case Temperature: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 18 ft. max. lead length, 18 AWG
- No remote/tandem wiring for ES lamps

Safety:
- No PCB's
- $_C$UL$_{US}$ listed (Class P, Type 1 Outdoor, Type HL)

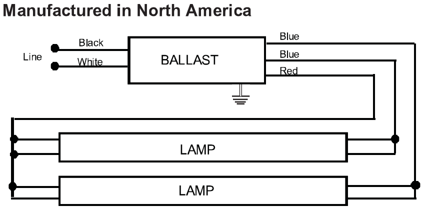
Physical Parameters:

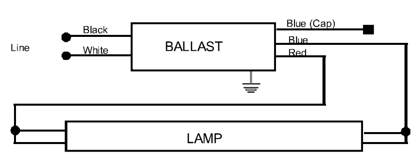
	Inches	Metric
Mounting Length: (Center to Center)	8.9" +/- 0.01"	226 mm
Overall Length:	9.5" +/- 0.01"	241.3 mm
Width:	1.31" + 0.03"/- 0.02"	33.3 mm
Height:	1.00" + 0.04"/- 0.01"	25.4 mm
Carton Quantity:	10	

Lead Length: Black, White 25" (+/-1"); Red 48" (+/-1"); Blue 31" (+/-1")

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America





For one lamp application, individually cap blue leads, insulate to 600 volts

Ballast must be grounded in accordance with national and local electrical codes.

Product #: ____________ Type: ______

Project: ____________ Date: ______

Comments: ____________ Initials: ______

ProLED®

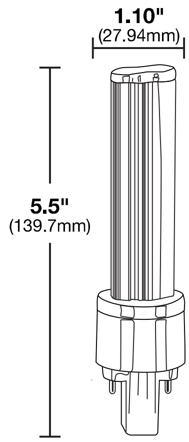
LED Hybrid Plug-Ins

Relamp/Reballast: LED 1-Lamp PL 4-Pin

Flicker Free Instant On

50,000 Hours **120-277V** **Instant On**

PL6H/8XX/HYB/LED



Hybrid

The PL6H is a six watt solution that is great for residential and commercial applications.

Specifications

- Magnetic CFL ballast compatible or bypass with simple rewiring from the same lamp
- Lasts 5 times longer than CFL
- 50,000 hour life resulting in lower maintenance costs over time
- Lamp base rotates for proper orientation in luminaire
- Mercury-free for safer operation and disposal
- RoHS Compliant
- Fits G23 and GX23 bases (2-Pin sockets)
- -20°C (-4°F) to 45°C (113°F) operating temperatures
- UL classified 1598C Retrofit Kit
- Instant-On
- 5-year warranty
- Power factor of >.90%
- 120-277V

RoHS Compliant 5 Limited Warranty

Ordering Information

Watt	Base	Product #	Product Code	Color Temp.	CRI	Lumens	Useful Life*	Pkg. Qty.	THD	MOL	Wattage Equivalent
6 Watt	GX23	81159	PL6H/827/HYB/LED	2700K	82	520	50,000	1/10	<20	5.5"	13
6 Watt	GX23	81160	PL6H/830/HYB/LED	3000K	82	520	50,000	1/10	<20	5.5"	13
6 Watt	GX23	81161	PL6H/835/HYB/LED	3500K	82	520	50,000	1/10	<20	5.5"	13
6 Watt	GX23	81162	PL6H/840/HYB/LED	4000K	82	520	50,000	1/10	<20	5.5"	13
6 Watt	GX23	81163	PL6H/850/HYB/LED	5000K	82	520	50,000	1/10	<20	5.5"	13

* Useful Life is defined as the point in time at which the LED will maintain at least 70% of its initial lumens. The LED will continue to operate past this point at decreased light levels.

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Atlanta I Chicago I Cleveland I Houston I Los Angeles I Phoenix

ProLED®

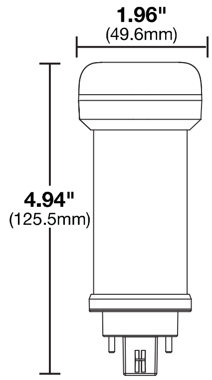
LED Direct Plug-ins

Product #: ______________ Type: ________

Project: ______________ Date: ________

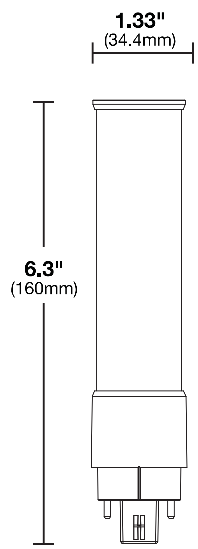
Comments: ______________ Initials: ________

PL12V/XXX/DIR/LED2



Vertical

PL12H/XXX/DIR/LED2



Horizontal

50,000 Hours **120-277V** **Instant On** **DLC QPL Listed**

ProLED Plug-in lamps are long-lasting, energy efficient replacements for CFL lamps with 4-pin G24q bases without any fixture re-wiring.

Specifications

- Dedicated horizontal and vertical orientation versions (horizontal features rotatable socket alignment)
- Lasts 5 times longer than CFL
- Electronic CFL ballast compatible
- 50,000 hour life resulting in lower maintenance costs over time
- Horizontal lamp base rotates for proper orientation in luminaire
- Works with existing 26W, 32W and 42W electronic CFL ballasts
- Mercury-free for safer operation and disposal
- RoHS Compliant
- Fits G24q and GX24q Sockets (26, 32, and 42W CFL) (4-Pin sockets)
- -20°C (-4°F) to 45°C (113°F) operating temperatures
- UL classified 1598C Retrofit Kit
- Instant-On
- 5-year warranty
- 120-277V

Ordering Information

Watt	Base	Product #	Product Code	Color Temp.	CRI	Lumens	Useful Life*	Pkg. Qty.	MOL	DLC Qualified	DLC Code	Wattage Equivalent
Vertical												
12 Watt	G24q/GX24q	82112	PL12V/835/DIR/LED2	3500K	82	1200	50,000	1/25	4.60"	Yes	PL1D2DEXZQ4K	26
12 Watt	G24q/GX24q	82113	PL12V/840/DIR/LED2	4000K	82	1200	50,000	1/25	4.60"	Yes	PLH0RTQ1C29S	26
12 Watt	G24q/GX24q	82114	PL12V/850/DIR/LED2	5000K	82	1200	50,000	1/25	4.60"	Yes	PLKR0T6ALBE2	26
Horizontal												
12 Watt	G24q/GX24q	82117	PL12H/835/DIR/LED2	3500K	82	1200	50,000	1/25	6.30"	Yes	PL0EB3R4FHPF	26
12 Watt	G24q/GX24q	82118	PL12H/840/DIR/LED2	4000K	82	1200	50,000	1/25	6.30"	Yes	PLRP96KP380H	26
12 Watt	G24q/GX24q	82119	PL12H/850/DIR/LED2	5000K	82	1200	50,000	1/25	6.30"	Yes	PLYTZ0JM554V	26

* Useful Life is defined as the point in time at which the LED will maintain at least 70% of its initial lumens. The LED will continue to operate past this point at decreased light levels.
** Check the latest update at www.DesignLights.org for listed product catalog numbers. All versions may not be listed.

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Atlanta I Carlstadt I Chicago I Cleveland I Houston I Los Angeles I Phoenix

Model# PL12V/835/DIR/LED2

Manufacturer: Halco Lighting Technologies
Brand: Halco Lighting Technologies
Technical Requirements Version: 4.3
Date Qualified: 11/16/2017
Product ID: PL1D2DEXZQ4K

Categorization

Main: Four Pin-Base Replacement Lamps for CFLs
General Application: Vertically-Mounted Lamps
Primary Use: Replacement Lamps (plug and play) (UL Type A)

Classification: Standard
Is Parent Product: No
DLC Family Code: CCCFAV
Listing Status: Listed

View Notes

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1200 lm
Wattage: 12 W
Efficacy: 100 lm/W
Power Factor: 0.9
CCT: 3500 K
CRI: 80
Total Harmonic Distortion: 20 %

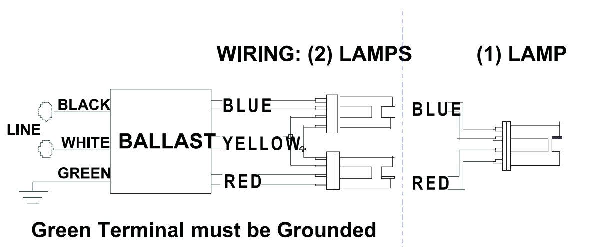
ICF-2S26-H1-LD@120

Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Lamp Type	Num. of Lamps	Rated Lamp Watts	Min. Start Temp (°F/C)	Input Current (Amps)	Input Power (ANSI Watts)	Ballast Factor	MAX THD %	Power Factor	MAX Lamp Current Crest Factor	B.E.F.
* CFM26W/GX24Q	1	26	0/-18	0.24	29	1.10	10	0.98	1.5	3.79
CFM26W/GX24q	2	26	0/-18	0.45	54	1.00	10	0.99	1.5	1.85
CFM32W/GX24q	1	32	0/-18	0.31	36	0.98	10	0.98	1.5	2.72
CFM42W/GX24q	1	42	0/-18	0.38	46	0.98	10	0.98	1.5	2.13
CFQ26W/G24q	1	26	0/-18	0.23	27	1.00	10	0.98	1.5	3.70
CFQ26W/G24q	2	26	0/-18	0.43	51	1.00	10	0.99	1.5	1.96
CFS21W/GR10q	2	21	0/-18	0.42	51	1.12	10	0.99	1.5	2.20
FT24W/2G11	2	24	0/-18	0.41	48	0.93	10	0.99	1.5	1.94

Wiring Diagram



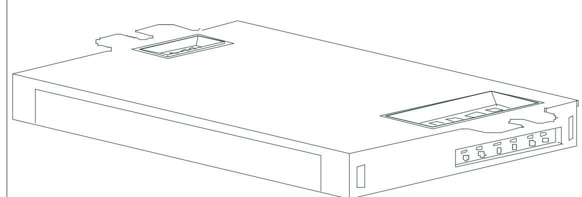
The wiring diagram that appears above is for the lamp type denoted by the asterisk (*)

Standard Lead Length (inches)

	in.	cm.
Black	0.0	
White	0.0	
Blue	0.0	
Red	0.0	
Yellow	0	
Gray		
Violet		

	in.	cm.
Yellow/Blue		
Blue/White		
Brown		
Orange		
Orange/Black		
Black/White		
Red/White		

Enclosure



Enclosure Dimensions

OverAll (L)	Width (W)	Height (H)	Mounting (M)
4.98 "	2.4 "	1.0 "	4.6 "
4 49/50	2 2/5	1	4 3/5
12.6 cm	6.1 cm	2.5 cm	11.7 cm

Revised 09/02/2004

Data is based upon tests performed by Advance Transformer in a controlled environment and representative of relative performance. Actual performance can vary depending on operating conditions. Specifications are subject to change without notice. All specifications are nominal unless otherwise noted.

ADVANCE
O'HARE INTERNATIONAL CENTER · 10275 WEST HIGGINS ROAD · ROSEMONT, IL 60018
Customer Support/Technical Service: Phone: 800-372-3331 · Fax: 630-307-3071
Corporate Offices: Phone: 800-322-2086

ADVANCE

ICF-2S26-H1-LD@120	
Brand Name	SMARTMATE
Ballast Type	Electronic
Starting Method	Programmed Start
Lamp Connection	Series
Input Voltage	120-277
Input Frequency	50/60 HZ
Status	Active

Electrical Specifications

Notes:

Section I - Physical Characteristics

1.1 Ballast shall be physically interchangeable with standard electromagnetic or standard electronic ballasts, where applicable.

1.2 Ballast shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

1.3 Ballast shall be provided with poke-in wire trap connectors color coded per ANSI C82.11.

Section II - Performance Requirements

2.1 Ballast shall be Programmed Start except for ballasts with -QS suffix, which shall be Rapid Start.

2.2 Ballast shall contain auto restart circuitry in order to restart lamps without resetting power.

2.3 Ballast shall operate from 50/60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the IntelliVolt ballast. RCF models shall operate from 60 Hz input source of 120V with sustained variations of +/- 10% (voltage and frequency) with no damage to the ballast.

2.4 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

2.5 Ballast shall have a Power Factor greater than 0.98 for primary lamp.

2.6 Ballast shall have a minimum ballast factor of 1.00 for primary lamp application.

2.7 Ballast shall provide for a Lamp Current Crest Factor of 1.7 or less in accordance with lamp manufacturer recommendations.

2.8 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

2.9 Ballast shall have a Class A sound rating.

2.10 Ballast shall have a minimum starting temperature of -18C (0F) for primary lamp. Ballasts for PL-H lamps shall have a minimum starting temperature of -30C (-20F) for primary lamp.

2.11 Ballast shall provide Lamp EOL Protection Circuit.

2.12 Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.

Section III - Regulatory Requirements

3.1 Ballast shall not contain any Polychlorinated Biphenyl (PCB).

3.2 Ballast shall be Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified where applicable.

3.3 Ballast shall be rated for use in air-handling spaces.

3.4 Ballast shall comply with ANSI C62.41 Category A for Transient protection.

3.5 Ballast shall comply with ANSI C82.11 where applicable.

3.6 Ballast shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

Section IV - Other

4.1 Ballast shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

4.2 Ballast shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 75C and three-years for a maximum case temperature of 85C (90C 3year warranty for ICF1H120-M4-XX, ICF2S42-90C-M2-XX and ICF2S70-M4-XX modesls).

4.3 Manufacturer shall have a fifteen-year history of producing electronic ballasts for the North American market.

Revised 09/02/2004

ADVANCE
O'HARE INTERNATIONAL CENTER - 10275 WEST HIGGINS ROAD
ROSEMONT, ILLINOIS 60018
TELEPHONE: (847) 390-5000 FAX: (847) 390-5109

Fixture Replacement: LED Fuel Pump Canopy (40 - 125W): 43 W

PROJECT NAME:________________ CATALOG NUMBER: CPL-40-B-U-C-50-B

NOTES:________________ FIXTURE SCHEDULE:________________

LED LOW-PROFILE CANOPY

CPL SERIES

PRODUCT DESCRIPTION:

Quick to install, the LED Low-Profile Canopy is the ideal retrofit solution for 100-250W HID garage and canopy luminaires. Offered in 20, 30, 40, and 52-watt versions, with different reflector options for parking garage and canopy distributions, the CPL can address a variety of application needs.

The series offers 0-10V dimming drivers standard with an optional integral microwave motion sensor to negate interference on light output. Consuming 75 percent less energy than incumbent fixtures, the CPL series provides immediate payback and long-term energy and maintenance cost savings.

FEATURES:

- 20W replaces up to 100 watt metal halide
- 30W replaces up to 150 watt metal halide
- 40W replaces up to 175 watt metal halide
- 52W replaces up to 250 watt metal halide
- Easy one-person installation, light weight with latch allowing both hands for wire connections hanging
- Universal 120-277V operation
- Emergency Battery Backup Option
- Photocontrol and programmable dimming motion sensor options available
- Two Distribution patterns, Canopy & Parking Garage
- 10kV surge protection included standard

MOUNTING:

- Latch design to hold fixture and allows both hands for wiring
- 18” leads standard for easier pendant mounting
- Standard ¾” NPT for pendant mounting (pendants by others)
- Standard adapter plate included for junction box mounting (junction boxes by others)
- Three side-mounted ½” NPT knockouts
- Cannot be mounted directly to combustible surfaces
- Beauty Plate accessory available to cover up to 14”x14” opening

CONTROLS:

Motion/Daylight Sensor with Remote Control Compatibility:
0-10V microwave-based motion sensor with integral photocontrol, allowing for three output states:100%; 10/20/30/50% output; or 0% output. Detection area, hold time, daylight threshold, and dimming level are configurable via DIP switches. At its maximum mounting height of 32 feet, the sensor can detect motion up to 30 feet away. Sensor mounted internally, behind lens which reduces vandalism and provides a cleaner look.

A compatible remote control is available with the sensor, which allows for easy sensor configuration, reprogramming, and troubleshooting when necessary. Users should review supplementary motion sensor datasheets and the product instruction manual for detailed remote control programming and operation. In the event of loss of power, remote control programmed settings return to DIP switch programmed settings.

120-277VAC Photocontrol:
Universal voltage photocontrols turn fixture on and off based on footcandle levels to help conserve energy during daylight hours. The operating temperature of the photocontrol is -30°F-120°F. Photocell mounted external.

WARRANTY:

10-year standard warranty with labor allowance*
(further details available at www.maxlite.com/warranties)
*Warranty Limitations: Product must be rated for the application per the Product Data Sheet (PDS); operated ≤16 hrs; in ambient of -29°F to 104°F.
*Up to $25/unit; labor allowances of up to $500/unit available for purchase – contact MaxLite representative for details.

ORDER STRUCTURE

FAMILY	WATTAGE (NOMINAL), EQUIVALENCY	GENERATION	VOLTAGE	DISTRIBU-TIONS	CCT	FINISH	OPTIONS
CPL= Low Profile Canopy	**20=** 20W, replaces up to 100W MH **30=** 30W, replaces up to 150W MH **40=** 40W, replaces up to 175W MH **52=** 52W, replaces up to 250W MH	**B=** Generation B	**U=** 120-277V **H=** 347-480V (30W+)	**P=** Parking Garage Distribution **C=** Canopy Distribution	**40=** 4000K **50=** 5000K	**B=** Bronze	**Blank=** No Option **EMO=** Battery Backup Rated 0°C (120V or 277V only) **EM2=** Battery Backup Rated -20°C (120V or 277V only) **PC=** Photocell (120V-277V only) **MS=** Motion/ Daylight Sensor (120V-277V only)

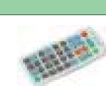
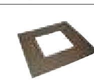
LED LOW-PROFILE CANOPY
CPL SERIES

SPECIFICATIONS

ITEM	SPECIFICATION	CPL20AUX50XXXX	CPL30AUX50XXXX	CPL40AUX50XXXX	CPL52AUX50XXXX
		DETAILS			
GENERAL PERFORMANCE	Power Consumption (W)	20W	30W	40W	52W
	Equivalent Wattage	up to 100W MH	up to 150W MH	up to 175W MH	up to 250W MH
	Parking Garage - Lumens Delivered	2278 lm	3329 lm	4713 lm	6347 lm
	Canopy Distribution - Lumens Delivered	2374 lm	3431 lm	4935 lm	6539 lm
	Efficacy (lm/W)	120-125	115-118	119-124	123-127
	CRI	≥70			
	Color Temperature (K)	4000K and 5000K			
	L70 Lumen Maintenance (hours)	≥100,000 Hrs.			
	Color Consistency	Proprietary binning for uniform color			
ELECTRICAL	Power Factor	≥0.90			
	Input Voltage	120-277V			
	Dimming	0-10V. Dimming Range: 10%-100%			
	Surge Protection	10kV surge protection included standard			
PHYSICAL	Housing	Die-cast Aluminium			
	Lens	Polycarbonate			
	Operating Temperature	-104°F / -40°C - 40°C			
CERTIFICATION	Certification	cULus (30W, 40W, 52W), ETL (20W), Supports Title 24 Compliance			
	Material Usage	RoHS compliant; no mercury			
	Environment	Outdoor,wet location			
	Warranty	10 Year warranty*			
QUALIFICATION	DesignLight Consortium	DLC 4.2 Premium			

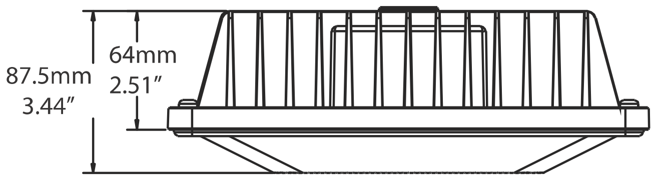
ORDERING:

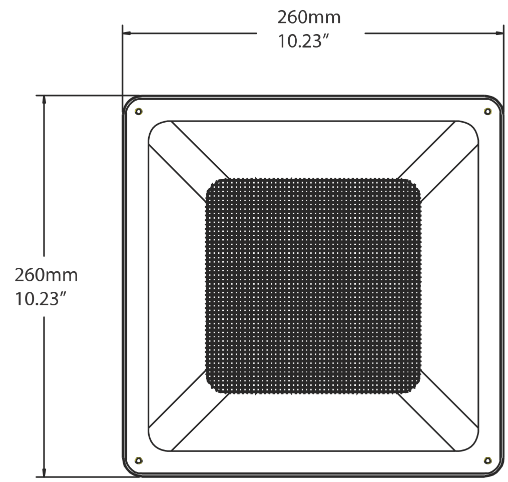
ORDER CODE	MODEL NUMBER	DLC PRODUCT ID	NOMINAL WATTAGE	EQUIVALENCY	DISTRIBUTION
1408347	CPL20BUC50B	P3OZNCPN	20W	100W MH	Canopy
1408349	CPL20BUP50B	PNH1HBCF	20W	100W MH	Parking Garage
102005	CPL30BUC50B	POC9WZRJ	30W	150W MH	Canopy
102001	CPL30BUP50B	PJ6N9J4W	30W	150W MH	Parking Garage
102010	CPL40BUC50B	PQKC3148	40W	175W MH	Canopy
101024	CPL40BUP50B	P0ZD912L	40W	175W MH	Parking Garage
102339	CPL52BUC50B	P0ZN6Q1A	50W	250W MH	Canopy
102335	CPL52BUP50B	PZYTSGJ7	50W	250W MH	Parking Garage

ACCESSORIES			
ORDER CODE	MODEL NUMBER	DESCRIPTION	ACCESSORIES IMAGE
108133	RMHYTHRC-05	REMOTE CTRL PROGRAMMING HC403VRC/HC419VRC	
1409168	CPL-15SQ-PLATE*	CPL SERIES ALUMINUM BEAUTY PLATE FOR 15" x 15" SQUARE HOLES, BRONZE*	

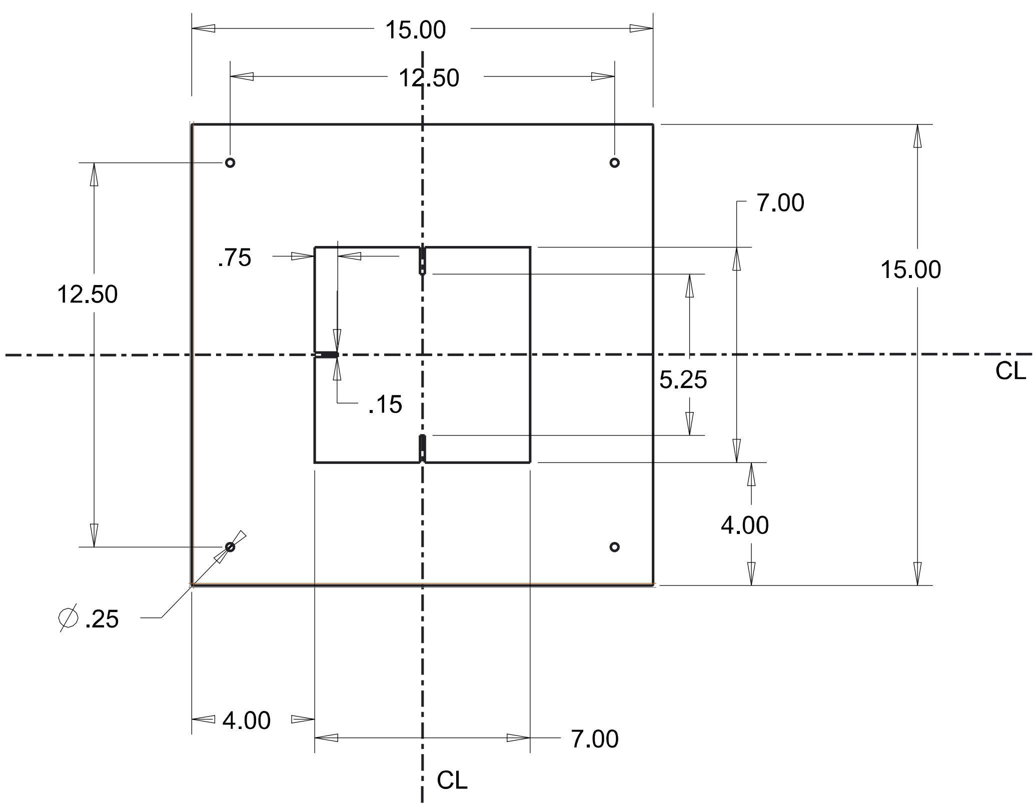
***See page 3 for CPL Cover Plate dimensions**

DIMENSIONS

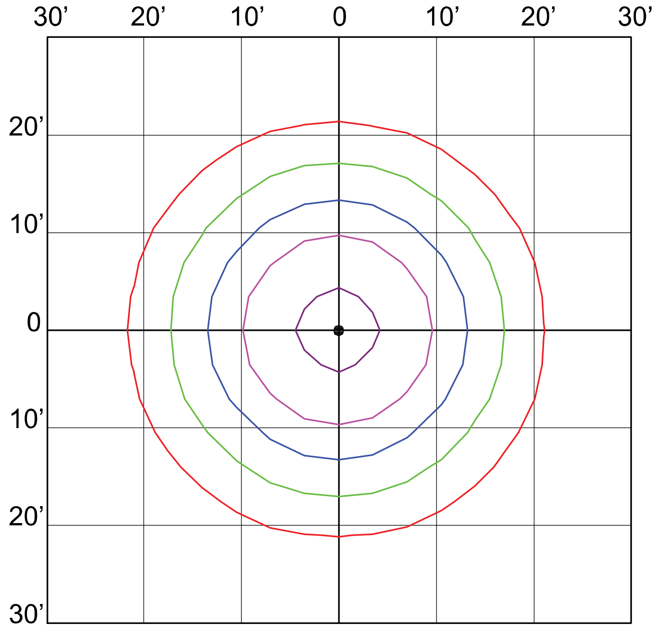




CPL PLATE DIMENSIONS

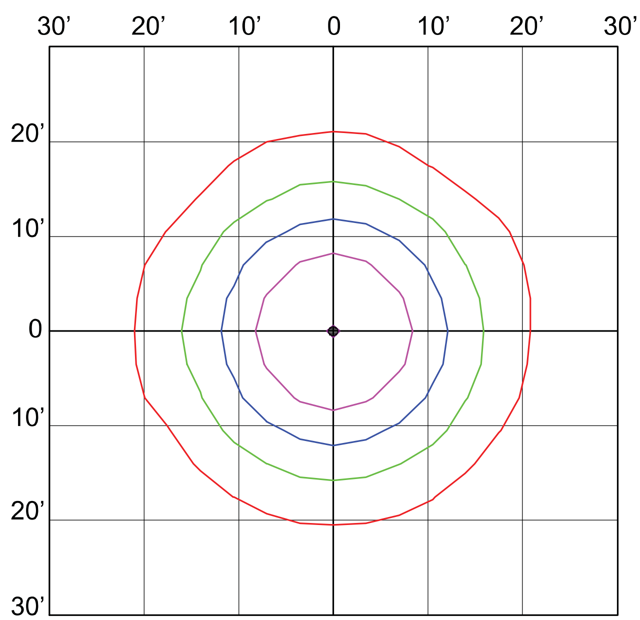


CPL20 FOOTCANDLE:



20W, Canopy
2,415 Lumens
10’ Mounting Height
Foot-candle Correction Factor:

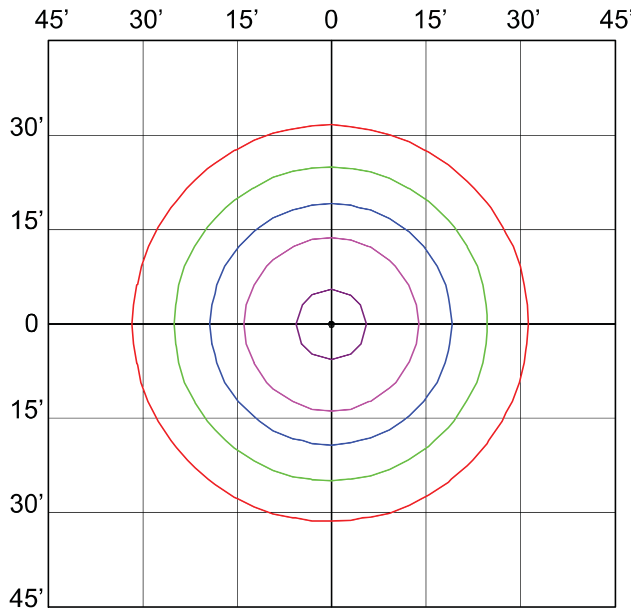
New Height:	8’	10’	15’	20’
Multiply by:	1.56	1	0.44	0.25



20W, Parking
2,200 Lumens
10’ Mounting Height
Foot-candle Correction Factor:

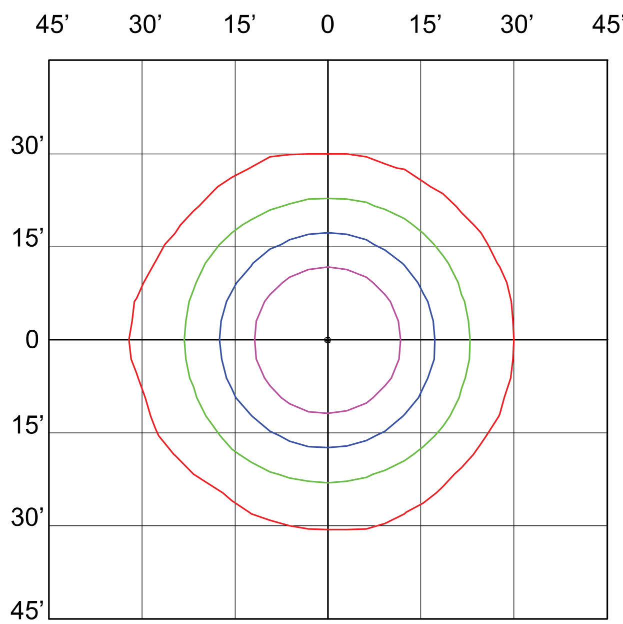
New Height:	8’	10’	15’	20’
Multiply by:	1.56	1	0.44	0.25

CPL40 FOOTCANDLE:



40W, Canopy
5,150 Lumens
15’ Mounting Height
Foot-candle Correction Factor:

New Height:	10’	15’	20’	25’
Multiply by:	2.25	1	0.56	0.36



40W, Parking
4,645 Lumens
15’ Mounting Height
Foot-candle Correction Factor:

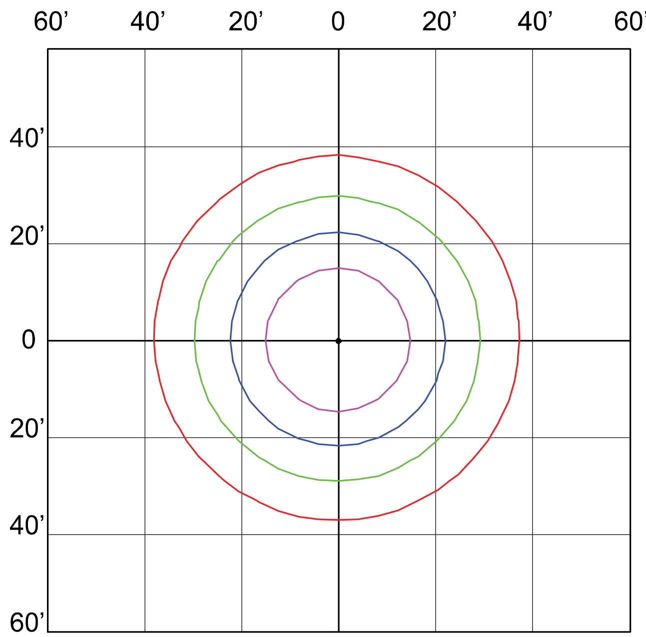
New Height:	10’	15’	20’	25’
Multiply by:	2.25	1	0.56	0.36

A NEW WAVE OF LIGHT

PROJECT NAME:______________________ CATALOG NUMBER:______________________

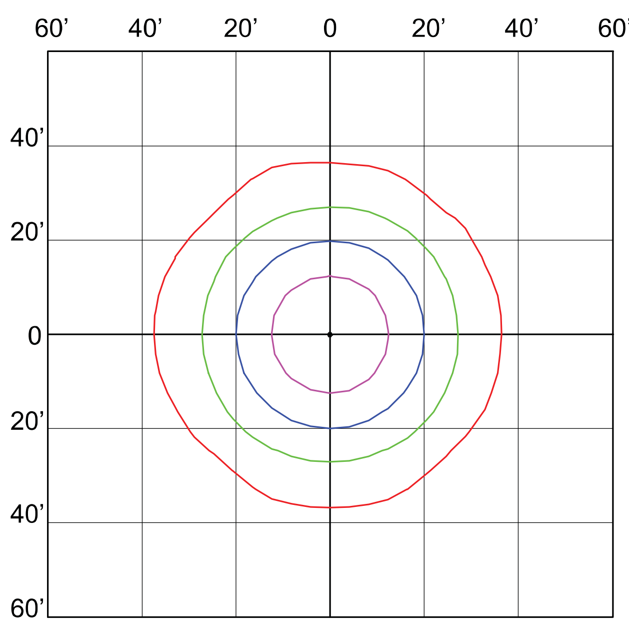
NOTES:______________________ FIXTURE SCHEDULE:______________________

CPL52 FOOTCANDLE:



52W, Canopy
6,510 Lumens
20’ Mounting Height
Foot-candle Correction Factor:

New Height:	10’	15’	20’	25’
Multiply by:	4	1.78	1	0.64



52W, Parking
6,095 Lumens
20’ Mounting Height
Foot-candle Correction Factor:

New Height:	10’	15’	20’	25’
Multiply by:	4	1.78	1	0.64

Model# CPL40BUC50[B,W,G][Blank,PC, MS, EM, EM0, EM2]

Manufacturer: MaxLite Inc.
Brand: Maxlite
Technical Requirements Version: 4.4
Date Qualified: 09/10/2018
Product ID: PQKC3148

Categorization

Main: Outdoor Luminaires
General Application: Low Output
Primary Use: Fuel Pump Canopy Luminaires
System Type: AC

Reported Data | Zonal Lumens | Spacing Criteria | Product Features

Light Output: 4938 lm
Wattage: 40 W
Efficacy (AC): 124 lm/W
Power Factor: 0.9
CCT: 5000 K
CRI: 75
Total Harmonic Distortion: 11.81 %

SLIM AREA LIGHT

Project	
Schedule / Date	
Notes	
Catalog Number	LED-FXSAL100/50K/DB/3S

Fixture Replacement: LED Pole Mount (70 - 260W): 100 W

Slim Area Light

Product Description

Our naturaLED® Slim Area Light is constructed with a durable, die-cast aluminum housing and excellent thermal design and is the perfect lighting solution for your parking lot, street, walkway, building flood up/down light and/or as a sign lighter. It provides uniform, consistent color with a wide range of wattage selections to replace from 50W to 1500W HID fixtures.

Our fixtures are DLC Premium certified and IP65 rated with five types of mounting options available: Swivel Bracket, Slip Fitter, Yoke, 6" Extruded Arm and Pendant Mount. Compatible integrated autonomous and photocell motion sensors are available as options to address your needs. Energy savings can be as much as 85% while eliminating maintenance costs in labor and lamp and ballast replacement.

- 360W Type 3 Lens
- 100W Type 5 Lens

Features & Benefits

- DLC Premium
- IP65 Rated
- Uniform and Consistent color
- Optimized Thermal Design
- Minimize Glare
- Select Binning for Color Consistency
- Aluminum Die-cast Housing
- Finish: Epoxy Powder Coat

Specifications

- Input line voltage: 120-277 / 277-480
- 0-10V Dimming
- L90-100,000 hours rated chips
- Powerfactor >0.9
- CRI >70
- Available in Type 3 and Type 5 Light Distribution
- Operating temperature: -40°F ~ 122°F

Applications

- Parking Lot Lighting
- Street Lighting
- Site Lighting
- Streetscape Lighting
- Area Lighting

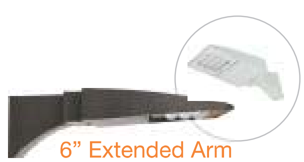
Color Choices

Dark Bronze White Black

Accessories (Mounting Options)

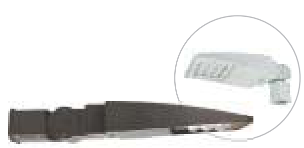
- Slip Fitter
- Swivel Bracket
- 6" Extended Arm
- Pendant Mount
- Yoke Mount

Pendant Mount (rigid pole not included)

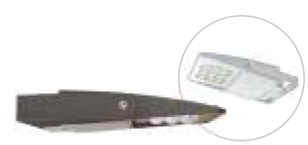


6" Extended Arm

Swivel Bracket



Slip Fitter



Yoke Mount

18276

Slim Area Light

Ordering Information (120-277V)

Code	Description	CCT	Watt	Lumen	Equiv Wattage	Voltage	Beam Angle	Color	Rated Hrs	IP 65	DLC
7616	LED-FXSAL29/40K/DB/3S	4000K	29	3,517	100-150	120-277	Type 3	D.Bronze	50,000	•	•
7617	LED-FXSAL29/50K/DB/3S	5000K	29	3,576	100-150	120-277	Type 3	D.Bronze	50,000	•	•
7618	LED-FXSAL29/40K/WH/3S	4000K	29	3,517	100-150	120-277	Type 3	White	50,000	•	•
7619	LED-FXSAL29/50K/WH/3S	5000K	29	3,576	100-150	120-277	Type 3	White	50,000	•	•
7620	LED-FXSAL50/40K/DB/3S	4000K	50	6,241	250	120-277	Type 3	D.Bronze	50,000	•	•
7621	LED-FXSAL50/50K/DB/3S	5000K	50	6,247	250	120-277	Type 3	D.Bronze	50,000	•	•
7622	LED-FXSAL50/40K/WH/3S	4000K	50	6,241	250	120-277	Type 3	White	50,000	•	•
7623	LED-FXSAL50/50K/WH/3S	5000K	50	6,247	250	120-277	Type 3	White	50,000	•	•
7752	LED-FXSAL75/30K/DB/3S	3000K	75	8,738	250-400	120-277	Type 3	D.Bronze	50,000	•	
7624	LED-FXSAL75/40K/DB/3S	4000K	75	8,738	250-400	120-277	Type 3	D.Bronze	50,000	•	•
7625	LED-FXSAL75/50K/DB/3S	5000K	75	9,011	250-400	120-277	Type 3	D.Bronze	50,000	•	•
7753	LED-FXSAL75/30K/WH/3S	3000K	75	8,738	250-400	120-277	Type3	White	50,000	•	
7626	LED-FXSAL75/40K/WH/3S	4000K	75	8,738	250-400	120-277	Type 3	White	50,000	•	•
7627	LED-FXSAL75/50K/WH/3S	5000K	75	9,011	250-400	120-277	Type 3	White	50,000	•	•
7754	LED-FXSAL100/30K/DB/3S	3000K	100	11,540	400	120-277	Type3	D.Bronze	50,000	•	
7628	LED-FXSAL100/40K/DB/3S	4000K	100	11,548	400	120-277	Type 3	D.Bronze	50,000	•	•
7629	LED-FXSAL100/50K/DB/3S	5000K	100	11,821	400	120-277	Type 3	D.Bronze	50,000	•	•
7755	LED-FXSAL100/30K/WH/3S	3000K	100	11,548	400	120-277	Type 3	White	50,000	•	
7630	LED-FXSAL100/40K/WH/3S	4000K	100	11,548	400	120-277	Type 3	White	50,000	•	•
7631	LED-FXSAL100/50K/WH/3S	5000K	100	11,821	400	120-277	Type 3	White	50,000	•	•
7769	LED-FXSAL150/40K/DB/3S	4000K	150	20,000	400-575	120-277	Type 3	D.Bronze	50,000	•	•
7770	LED-FXSAL150/50K/DB/3S	5000K	150	20,000	400-575	120-277	Type 3	D.Bronze	50,000	•	•
9232	LED-FXSAL150/50K/WH/3S	5000K	150	20,604	400-575	120-277	Type 3	White	50,000	•	•
9234	LED-FXSAL150/50K/BK/3S	5000K	150	20,604	400-575	120-277	Type 3	Black	50,000	•	•
7746	LED-FXSAL180/30K/DB/3S	3000K	180	22,191	400-575	120-277	Type 3	D.Bronze	50,000	•	
7632	LED-FXSAL180/40K/DB/3S	4000K	180	22,191	400-575	120-277	Type 3	D.Bronze	50,000	•	•
7633	LED-FXSAL180/50K/DB/3S	5000K	180	22,743	400-575	120-277	Type 3	D.Bronze	50,000	•	•
7747	LED-FXSAL180/30K/WH/3S	3000K	180	22,191	400-575	120-277	Type 3	White	50,000	•	
7634	LED-FXSAL180/40K/WH/3S	4000K	180	22,191	400-575	120-277	Type 3	White	50,000	•	•
7635	LED-FXSAL180/50K/WH/3S	5000K	180	22,743	400-575	120-277	Type 3	White	50,000	•	•
7748	LED-FXSAL240/30K/DB/3S	3000K	240	29,794	750-1000	120-277	Type 3	D.Bronze	50,000	•	
7636	LED-FXSAL240/40K/DB/3S	4000K	240	29,794	750-1000	120-277	Type 3	D.Bronze	50,000	•	•
7637	LED-FXSAL240/50K/DB/3S	5000K	240	30,274	750-1000	120-277	Type 3	D.Bronze	50,000	•	•
7749	LED-FXSAL240/30K/WH/3S	3000K	240	29,794	750-1000	120-277	Type 3	White	50,000	•	
7638	LED-FXSAL240/40K/WH/3S	4000K	240	29,794	750-1000	120-277	Type 3	White	50,000	•	•
7639	LED-FXSAL240/50K/WH/3S	5000K	240	30,274	750-1000	120-277	Type 3	White	50,000	•	•
7750	LED-FXSAL360/30K/DB/3S	3000K	360	44,796	1000-1500	120-277	Type 3	D.Bronze	50,000	•	
7640	LED-FXSAL360/40K/DB/3S	4000K	360	44,796	1000-1500	120-277	Type 3	D.Bronze	50,000	•	•
7641	LED-FXSAL360/50K/DB/3S	5000K	360	45,878	1000-1500	120-277	Type 3	D.Bronze	50,000	•	•
7751	LED-FXSAL360/30K/WH/3S	3000K	360	44,796	750-1000	120-277	Type 3	White	50,000	•	
7642	LED-FXSAL360/40K/WH/3S	4000K	360	44,796	1000-1500	120-277	Type 3	White	50,000	•	•
7643	LED-FXSAL360/50K/WH/3S	5000K	360	45,878	1000-1500	120-277	Type 3	White	50,000	•	•

Ordering Information (277-480V)

Code	Description	CCT	Watt	Lumen	Equiv Wattage	Voltage	Beam Angle	Color	Rated Hrs	IP 65	DLC
7724	LED-FXSAL180/40K/DB/3S/480	4000K	180	22,147	400-575W	277-480	Type 3	D.Bronze	50,000	•	•
7725	LED-FXSAL180/50K/DB/3S/480	5000K	180	22,717	400-575W	277-480	Type 3	D.Bronze	50,000	•	•
7726	LED-FXSAL180/40K/WH/3S/480	4000K	180	22,147	400-575W	277-480	Type 3	White	50,000	•	•
7727	LED-FXSAL180/50K/WH/3S/480	5000K	180	22,717	400-575W	277-480	Type 3	White	50,000	•	•
7728	LED-FXSAL240/40K/DB/3S/480	4000K	240	28,912	750-1000W	277-480	Type 3	D.Bronze	50,000	•	•
7729	LED-FXSAL240/50K/DB/3S/480	5000K	240	29,546	750-1000W	277-480	Type 3	D.Bronze	50,000	•	•
7730	LED-FXSAL240/40K/WH/3S/480	4000K	240	28,912	750-1000W	277-480	Type 3	White	50,000	•	•
7731	LED-FXSAL240/50K/WH/3S/480	5000K	240	29,546	750-1000W	277-480	Type 3	White	50,000	•	•
7732	LED-FXSAL360/40K/DB/3S/480	4000K	360	43,560	1000-1500W	277-480	Type 3	D.Bronze	50,000	•	•
7733	LED-FXSAL360/50K/DB/3S/480	5000K	360	44,405	1000-1500W	277-480	Type 3	D.Bronze	50,000	•	•
7734	LED-FXSAL360/40K/WH/3S/480	4000K	360	43,560	1000-1500W	277-480	Type 3	White	50,000	•	•
7735	LED-FXSAL360/40K/WH/3S/480	5000K	360	44,405	1000-1500W	277-480	Type 3	White	50,000	•	•

Mounting Options

Slip Fitter -SF

Code	Model	Description
P10101	MT-SAL/SF/DB	Slip Fitter for Dark Bronze
P10102	MT-SAL/SF/WH	Slip Fitter for White

Swivel Bracket

Code	Model	Description
P10103	MT-SAL/SB/DB	Swivel Bracket for Dark Bronze
P10104	MT-SAL/SB/WH	Swivel Bracket for White

6” Extruded Arm - EA6

Code	Model	Description
P10105	MT-SAL/EA6/DB	6” Extruded Arm for D. Bronze
P10106	MT-SAL/EA6/WH	6” Extruded Arm for White

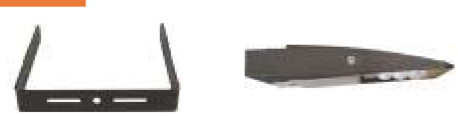
Dual Pendant Box

Code	Model	Description
P10107	MT-SAL/DPB/DB	Dual Pendant Box 3/4” NPT D.Bronze
P10108	MT-SAL/DPB/WH	Dual Pendant Box 3/4” NPT White

9” Yoke Mount

Code	Model	Description
P10111	MT-SAL/YK9/DB	9” Yoke Mount for 29-100W, D. Bronze
P10112	MT-SAL/YK9/WH	9” Yoke Mount for 29-100W White

15” Yoke Mount



Code	Model	Description
P10113	MT-SAL/YK15/DB	15” Yoke Mount for 180-360W, D. Bronze
P10114	MT-SAL/YK15/WH	15” Yoke Mount for 180-360W White

Accessory Options

Remote Controlled Motion/PhotoCell Sensor

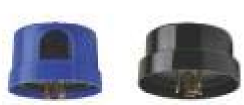
Code	Model	Description
K136178	PLT/LDB/9SWC	Remote Controllable Sensor 0-10V 3X C Lens (29-100W) Dark Bronze Plate
K136179	PLT/LDB/9SWD	Remote Controllable Sensor 0-10V 2X D Lens (29-100W) Dark Bronze Plate
K137178	PLT/LWH/9SWC	Remote Controllable Sensor 0-10V 3X C Lens (29-100W) White Plate
K137179	PLT/LWH/9SWD	Remote Controllable Sensor 0-10V 100-277V 2X D Lens (29-100W) White Plate
K134178	PLT/SDB/9SWC	Remote Controllable Sensor 0-10V 100-277V 3X C Lens (180-360W) Dark Bronze Plate
K134179	PLT/SDB/9SWD	Remote Controllable Sensor 0-10V 100-277V 2X D Lens (180-360W) Dark Bronze Plate
K135178	PLT/SWH/9SWC	Remote Controllable Sensor 0-10V 100-277V 3X C Lens (180-360W) White Plate
K135179	PLT/SWH/9SWD	Remote Controllable Sensor 0-10V 100-277V 2X D Lens (180-360W) White Plate

P10164	SEN-SRP280	Remote Control

Motion/Photocell Sensor

Code	Model	Description
K134115	PLT/SB/SWC	Motion/Photocell 0-10V 100-277V 3X C Lens (29-100W) Dark Bronze Plate
K134116	PLT/SB/SWD	Motion/Photocell 0-10V 100-277V 2X D Lens (29-100W) Dark Bronze Plate
K135115	PLT/SWH/SWC	Motion/Photocell 0-10V 100-277V 3X C Lens (29-100W) White Plate
K135116	PLT/SWH/SWD	Motion/Photocell 0-10V 100-277V 2X D Lens (29-100W) White Plate
K136115	PLT/LDB/SWC	Motion/Photocell 0-10V 100-277V 3X C Lens (180-360W) Dark Bronze Plate
K136116	PLT/LDB/SWD	Motion/Photocell 0-10V 100-277V 2X D Lens (180-360W) Dark Bronze Plate
K137115	PLT/LWH/SWC	Motion/Photocell 0-10V 100-277V 3X C Lens (180-360W) White Plate
K137116	PLT/LWH/SWD	Motion/Photocell 0-10V 100-277V 2X D Lens (180-360W) White Plate

Photocell Sensor & Short Cap

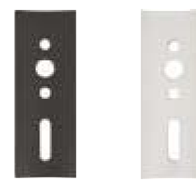


Code	Model	Description
K141030	REC3PLK/PHO	Receptacle Mount & Photocell for SAL
P10053	SEN-PHO-LK-MT/SRT	Twist-Lock Mount Shorting Cap

Receptacle

Code	Model	Description
P10141	REC3PLK	3 prong twist lock receptacle mount
P10142	REC7PLK	7 prong twist lock receptacle mount

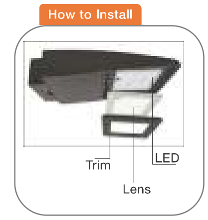
EA6 Adaptor



Code	Model	Description
P10119	MT-SAL/4PA/DB	4” Round pole adaptor for SAL-DB
P10120	MT-SAL/5PA/DB	5” Round pole adaptor for SAL-DB
P10121	MT-SAL/6PA/DB	6” Round pole adaptor for SAL-DB
P10122	MT-SAL/4PA/WH	4” Round pole adaptor for SAL-WH
P10123	MT-SAL/5PA/WH	5” Round pole adaptor for SAL-WH
P10124	MT-SAL/6PA/WH	6” Round pole adaptor for SAL-WH

Type 5 Lens

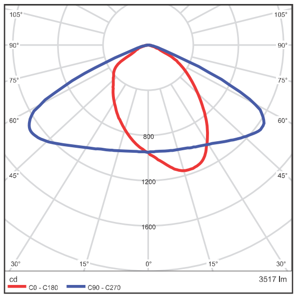
How to Install



Code	Model	Description
P10127	LENS-SAL-SMALL-V	SAL small type V
P10128	LENS-SAL-LARGE-V/DB	SAL large type V Dark Bronze
P10131	LENS-SAL-LARGE-V/WH	SAL large type V White

Photometric Data

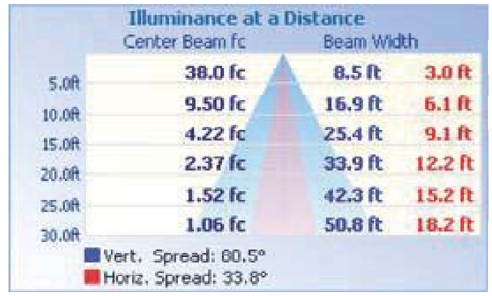
29Watt- Type 3



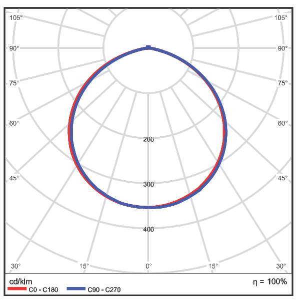
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	808.02	23.00
0-40	1380.33	39.20
0-60	2748.99	78.20
60-80	736.38	20.90
70-80	172.54	4.90
90-120	1.71	0.00
90-180	3.73	0.10
0-180	3517.00	100.00

Total Luminaire Efficiency = 100.00%



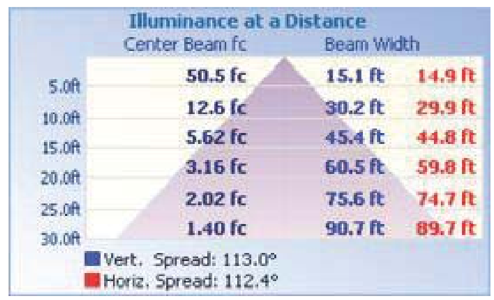
29Watt- Type 5



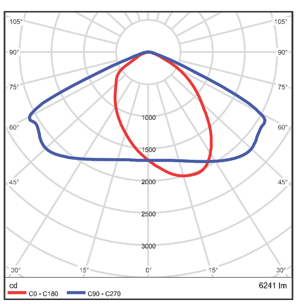
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	991.92	27.80
0-40	1633.2	45.80
0-60	2893.88	81.10
60-80	612.77	17.20
70-80	190.06	5.30
90-120	16.13	0.50
90-180	41.88	1.20
0-180	3573.19	100.20

Total Luminaire Efficiency = 100.00%



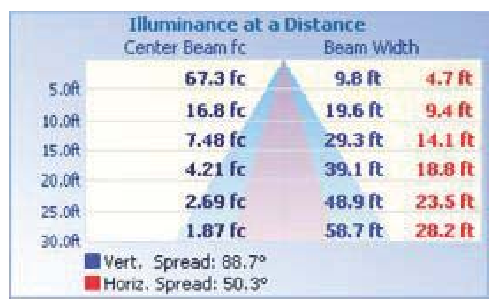
50Watt- Type 3



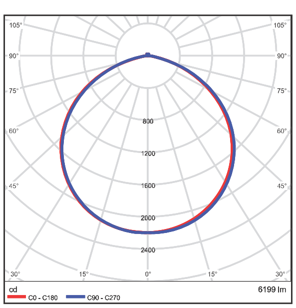
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	1426.12	22.90
0-40	2457.64	39.40
0-60	4955.73	79.40
60-80	1236.3	19.80
70-80	281.74	4.50
90-120	2.74	0.00
90-180	6.39	0.10
0-180	6240.69	00.00

Total Luminaire Efficiency = 100.00%



50Watt- Type 5



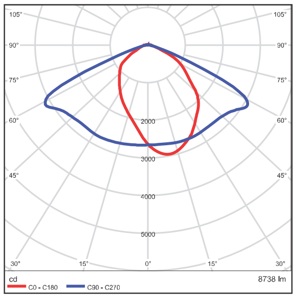
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	1727.63	27.80
0-40	2844.27	45.80
0-60	5038.66	81.20
60-80	1054.29	17.00
70-80	322.59	5.20
90-120	27.86	0.40
90-180	72.57	1.20
0-180	6207.47	100.00

Total Luminaire Efficiency = 100.00%

Photometric Data

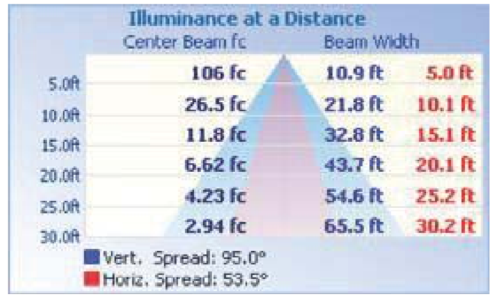
75Watt- Type 3



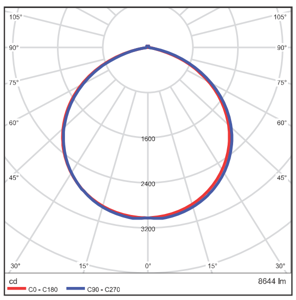
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	2063.73	23.60
0-40	3428.37	39.20
0-60	6762.27	77.40
60-80	1900.34	21.70
70-80	521.62	6.00
90-120	4.12	0.00
90-180	9.14	0.10
0-180	8738.13	100.00

Total Luminaire Efficiency = 100.00%



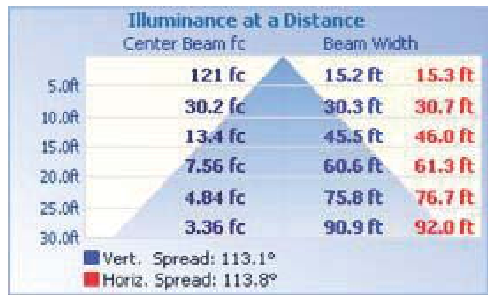
75Watt- Type 5



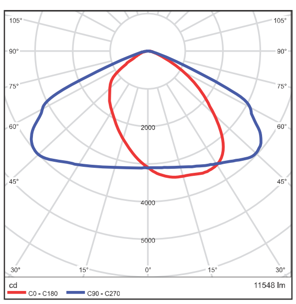
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	2381.12	27.50
0-40	3929.47	45.40
0-60	6997.31	80.80
60-80	1499.67	17.30
70-80	462.55	5.30
90-120	38.92	0.40
90-130	53.67	0.60
90-180	101.05	1.20
0-180	8657.41	100.20

Total Luminaire Efficiency = 100.00%



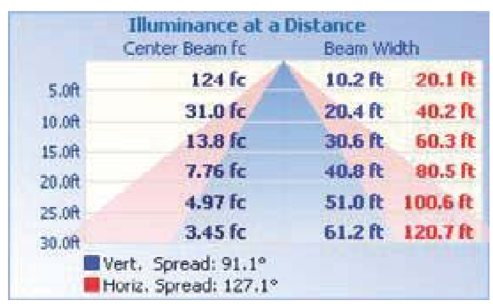
100Watt- Type 3



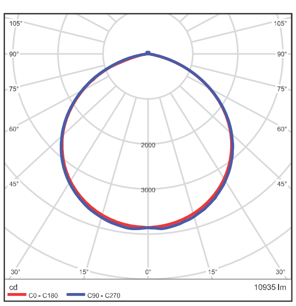
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	2578.11	22.30
0-40	4497.16	38.90
0-60	9183.28	79.50
60-80	2270.09	19.70
70-80	540.29	4.70
90-120	5.17	0.00
90-130	6.81	0.10
90-180	11.90	0.10
0-180	11547.83	100.00

Total Luminaire Efficiency = 100.00%



100Watt- Type 5



Zonal Lumen Summary

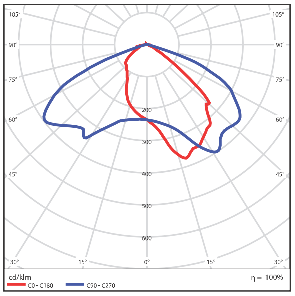
Zone	Lumens	% Luminaire
0-30	3035.57	27.70
0-40	5004.85	45.70
0-60	8883.69	81.10
60-80	1863.68	17.00
70-80	568.50	5.20
90-120	49.07	0.40
90-130	67.71	0.60
90-180	127.76	1.20
0-180	10949.69	100.00

Total Luminaire Efficiency = 100.00%

18276

Photometric Data

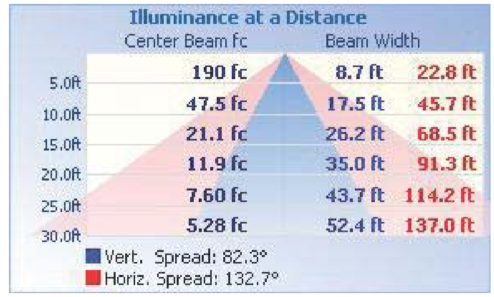
150 Watt- Type 3



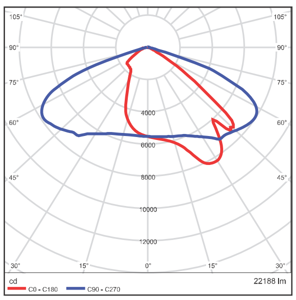
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	4690.75	23.20
0-40	8363.67	41.40
0-60	16652.17	82.40
60-80	3397.93	16.80
70-80	715.66	3.50
90-120	20.01	0.10
90-130	25.25	0.10
90-180	43.64	0.20
0-180	20211.09	100.00

Total Luminaire Efficiency = 100.00%



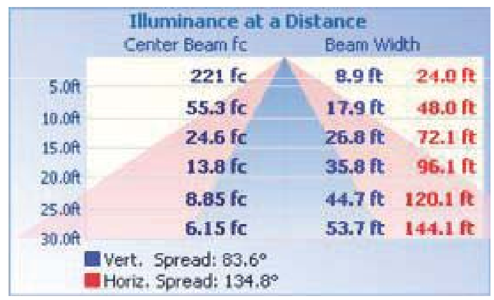
180 Watt- Type 3



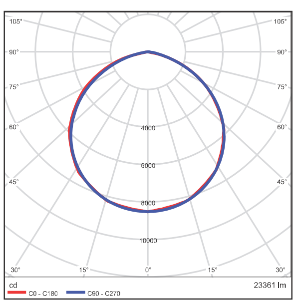
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	4767.93	21.50
0-40	8532.86	38.50
0-60	17764.15	80.10
60-80	4310.05	19.40
70-80	922.31	4.20
90-120	14.29	0.10
90-130	22.73	0.10
90-180	43.44	0.20
0-180	22188.46	100.00

Total Luminaire Efficiency = 100.00%



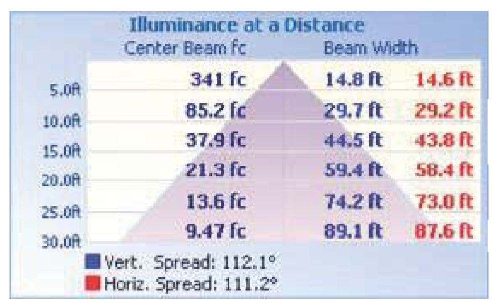
180 Watt- Type 5



Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	6625.12	28.40
0-40	10895.7	6.70
0-60	19240.86	82.40
60-80	4019.51	17.20
70-80	1238.83	5.30
90-120	0.00	0.00
90-130	0.00	0.00
90-180	0.00	0.00
0-180	23353.2	100.00

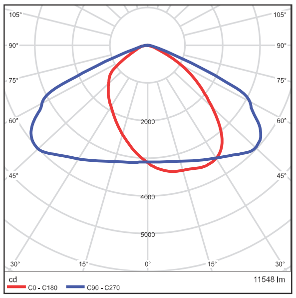
Total Luminaire Efficiency = 100.00%



18276

Photometric Data

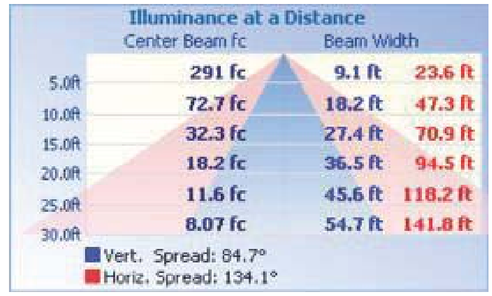
240 Watt- Type 3



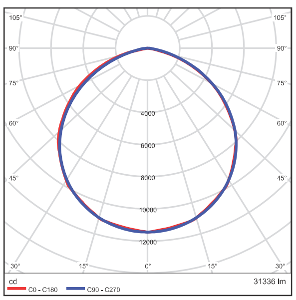
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	2578.11	22.30
0-40	4497.16	38.90
0-60	9183.28	79.50
60-80	2270.09	19.70
70-80	540.29	4.70
90-120	5.17	0.00
90-130	6.81	0.10
90-180	11.90	0.10
0-180	11547.83	100.00

Total Luminaire Efficiency = 100.00%



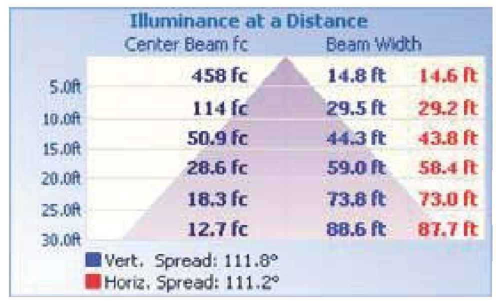
240 Watt- Type 5



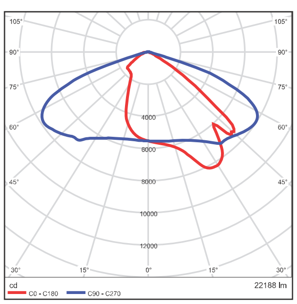
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	8905.68	28.40
0-40	14645.84	46.80
0-60	25848.36	82.50
60-80	5354.7	17.10
70-80	1639.24	5.20
90-120	0.00	0.00
90-130	0.00	0.00
90-180	0.00	0.00
0-180	31325.59	100.00

Total Luminaire Efficiency = 100.00%



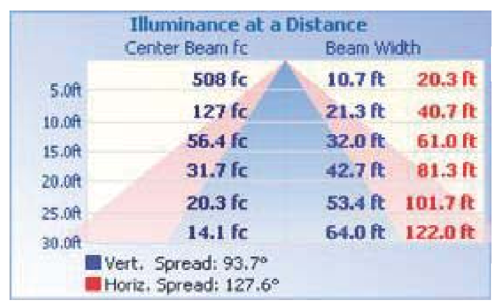
360 Watt- Type 3



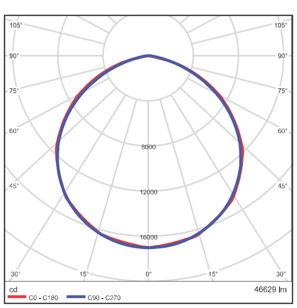
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	4767.93	21.50
0-40	8532.86	38.50
0-60	17764.15	80.10
60-80	4310.05	19.40
70-80	922.31	4.20
90-120	14.29	0.10
90-130	22.73	0.10
90-180	43.44	0.20
0-180	22188.46	100.00

Total Luminaire Efficiency = 100.00%



360 Watt- Type 5



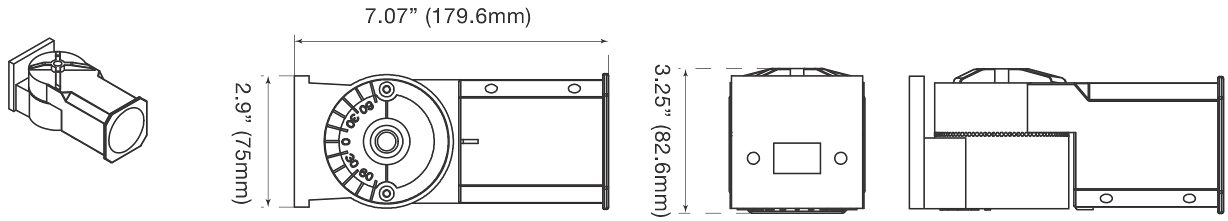
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	13251.89	28.40
0-40	21794.53	46.80
0-60	38466.48	82.50
60-80	7972.82	17.10
70-80	2444.72	5.20
90-120	0.00	0.00
90-130	0.00	0.00
90-180	0.00	0.00
0-180	46614.58	100.00

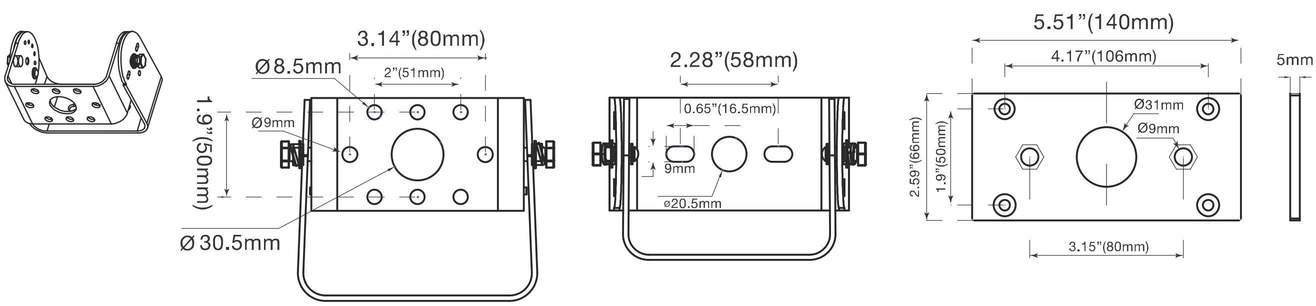
Total Luminaire Efficiency = 100.00%

Mounting Dimensions

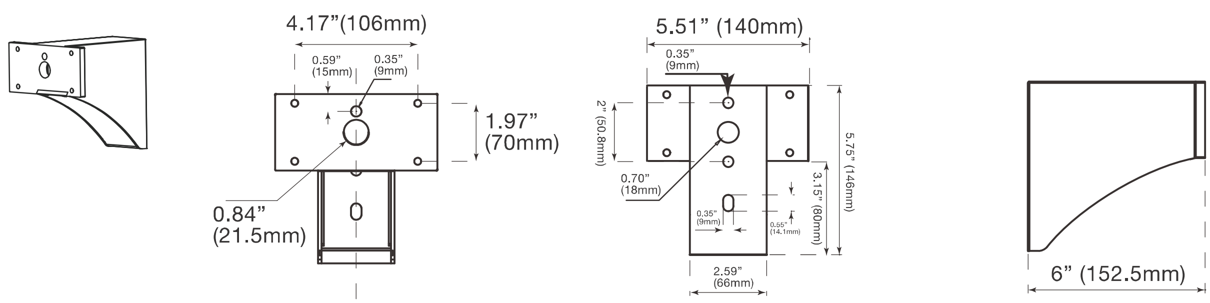
Slip Fitter -SF



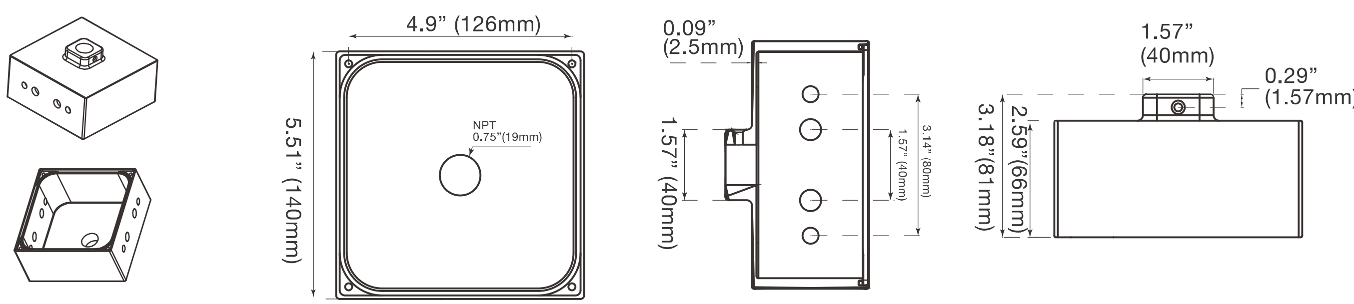
Swivel Bracket -SB



6” Extruded Arm

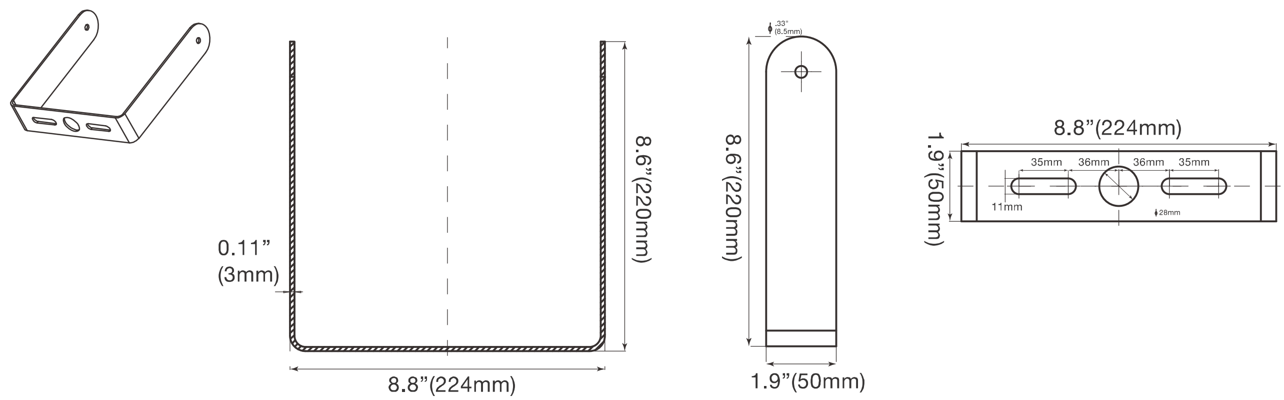


Dual Pendant Box

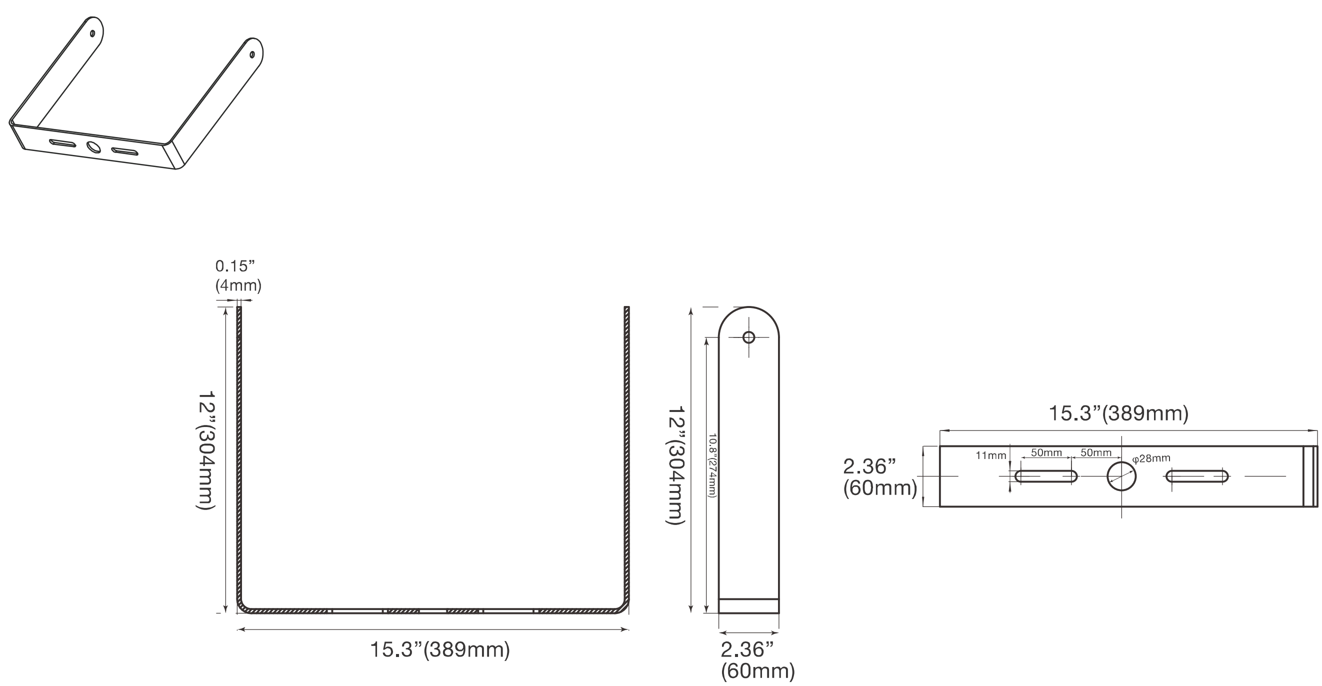


Mounting Dimensions

Yoke - 9”



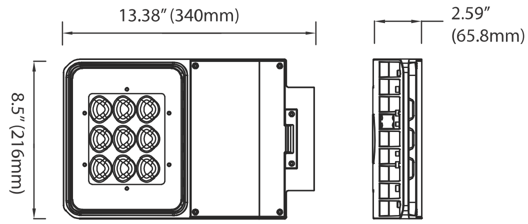
Yoke - 15”



Product Dimensions

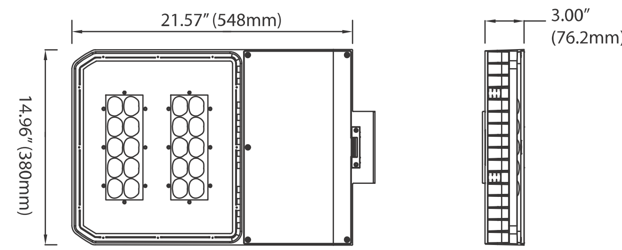
29W~100W

29W: 6.75-lbs
50W: 7.07-lbs
75W: 7.40-lbs
100W: 7.76-lbs



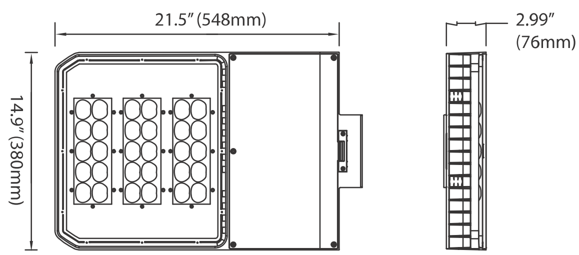
150W/180W

Weight: 21.56-lbs



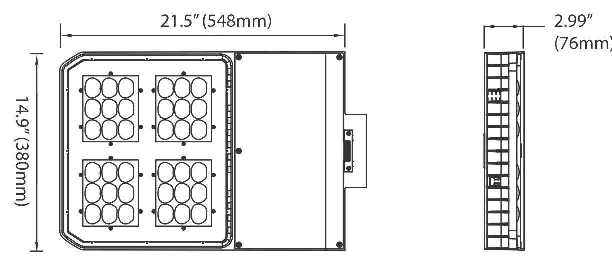
240W

Weight: 22-lbs

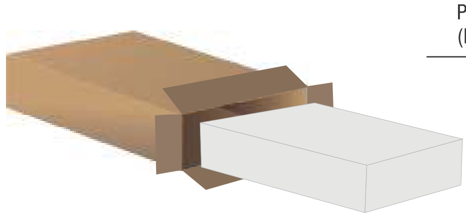


360W

Weight: 25.44-lbs



Package



Package (Master)
1

Model# LED-FXSAL100/50K/XX/3S

Manufacturer: PLUSRITE ELECTRIC (CHINA) CO LTD
Brand: Plusrite
Technical Requirements Version: 4.4
Date Qualified: 06/19/2017
Product ID: P6TK1LBD

Categorization

Main: Outdoor Luminaires
General Application: High Output
Primary Use: Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
System Type: AC

Classification: Premium
Is Parent Product: No
DLC Family Code: DDDJCR
Listing Status: Listed

View Notes

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 11321 lm
Wattage: 93.86 W
Efficacy (AC): 120.57 lm/W
Power Factor: 0.90
CCT: 5000 K
CRI: 71.8
Total Harmonic Distortion: 7.54 %

SINCE 1945
KEYSTONE

DIRECTDRIVE LED
LINE VOLTAGE T8 TUBES

Relamp: Dir Line LED-3-Lamp-4-Foot-Prem-10.5W

KT-LED10.5T8-48G-840-D

T8 LED LAMP

DESCRIPTION

10.5W T8 LED | 4000K | >83 CRI | High Efficiency

DLC · UL Classified · c UL us · RoHS Compliant · 5 YEAR WARRANTY

LAMP TYPE: Linear	
BULB TYPE: T8 LED	
BASE TYPE: G13 (Medium Bi-Pin)	
WATTAGE: 10.5W	
COLOR TEMPERATURE: 4000K	
COLOR RENDERING INDEX (CRI): >83	
WARRANTY: 5 Years	

PRODUCT FEATURES

- Replacement for Conventional Fluorescent Lamp
- 50,000+ Hour Lifetime
- Approximately 40% More Energy Efficient that Standard F32T8 Lamps
- Environmentally Friendly: No Mercury Used
- UL Classified
- Operating Temperature: -20°C/-4°F to 45°C/113°F
- Listed on DLC Qualified Product List
- Integral Driver (Isolated), Eliminates the Need for External Driver or Ballast
- 100+ Lumens per Watt
- Instant Startup
- Frosted Lens Eliminates Pixelation

OPERATING SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Input Voltage	Power Consumption	Power Factor	Input Current
120-277Vac	10.5W	>0.9	.094A @ 120V .040A @ 277V

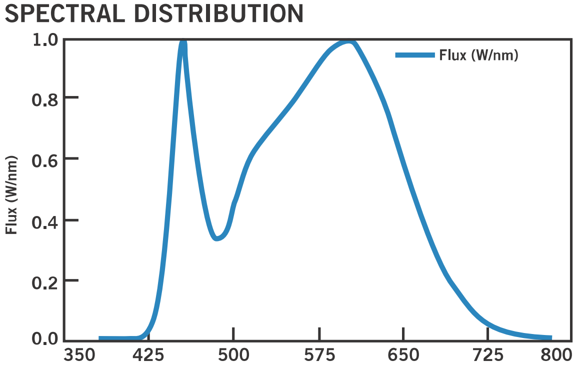
RATED LIFE

L70 (Hours)	50,000

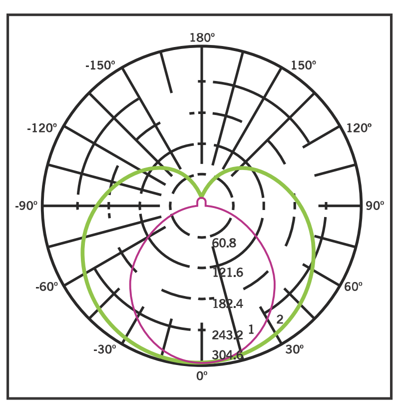
PHOTOMETRIC CHARACTERISTICS

Color Temperature (CCT)	4000K
Luminous Flux	1730 lm
Color Rendering Index (CRI)	>83
Efficacy	160 lm/W
Beam Angle	240°
Visible Light Area	325°

SPECTRAL DISTRIBUTION



POLAR CANDELA DISTRIBUTION



Maximum Candela = 1248.55
Located at Horizontal Angle = 0, Vertical Angle 0

1. Violet Vertical Plane through Horizontal Angles (90-270)

2. Green Vertical Plane through Horizontal Angles (0-180)

KEYSTONE SINCE 1945 | DIRECTDRIVE LED LINE VOLTAGE T8 TUBES

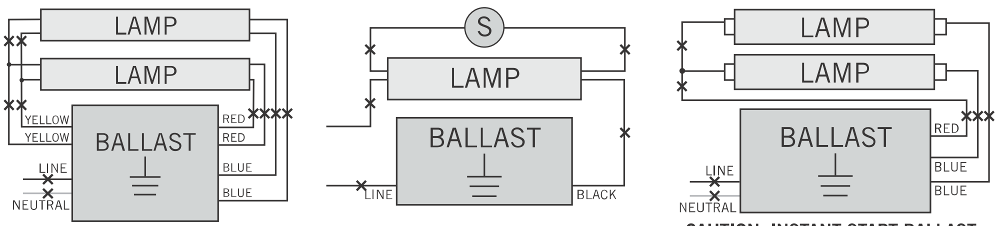
KT-LED10.5T8-48G-840-D
T8 LED LAMP

WIRING DIAGRAMS

1. Cut all existing connections to ballast as shown below and remove ballast.

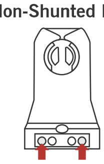
Typical Ballast Configurations:

PROGAM START — PREHEAT WITH STARTER — INSTANT START



CAUTION: INSTANT START BALLAST WITH SHUNTED SOCKETS.

Typical Non-Shunted Lampholder

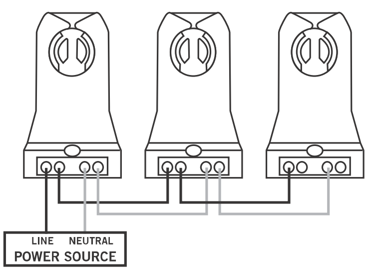


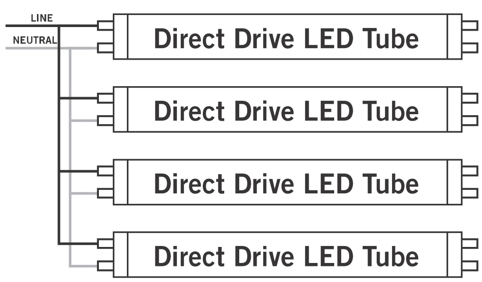
Connect wires directly to these terminals

CAUTION: Use only non-shunted lampholders.
Do not install product in a fixture with shunted lampholders (found in all fixtures using instant start ballasts). If the current lampholders are shunted, remove them and replace them with non-shunted lampholders. Make new connections directly to terminals as indicated above.

Keystone can provide any style replacement lampholders. Call us at 800-464-2680.

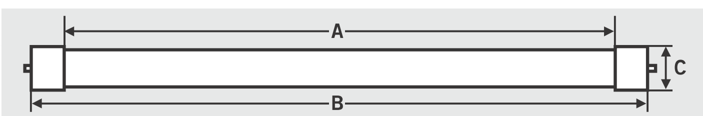
2. Re-wire fixture as shown below.





PHYSICAL CHARACTERISTICS

LAMP DIMENSIONS



A (Illuminated Length)	44.38”
B (Body Length)	47.15”
C (Diameter)	1.10”

NOMINAL LENGTH: 48” **BASE TYPE:** G13 (Medium Bi-Pin)

ORDERING INFORMATION

ORDER CODE	PACKAGING STYLE	PACK QTY.	ITEM STATUS
KT-LED10.5T8-48G-840-D-CP	Carton Pack (Egg Crate Packaging)	25	Quick Ship

CATALOG NUMBER BREAKDOWN

KT-LED10.5T8-48G-840-D-CP

KT	LED	10.5	T8	48	G	8	40	D	CP
Keystone Technologies	LED Lamp	Wattage	Lamp Type	Nominal Length (Inches)	Glass	800 Series	Color Temp.	Direct Drive Series	Packaging Style

Model# **KT-LED10.5T8-48G-840-D**

Manufacturer: Keystone Technologies
Brand: KEYSTONE
Technical Requirements Version: 4.4
Date Qualified: 01/09/2018
Product ID: PLJQREE0QJIS

Categorization

Main: Linear Replacement Lamp
General Application: T8 Four-Foot
Primary Use: Internal Driver/Line Voltage (UL Type B) Lamps
System Type: AC

Classification: standard
Is Parent Product: No
DLC Family Code: NANOOE
Listing Status: Listed

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1700 lm
Wattage: 10.5 W
Efficacy (AC): 162 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

RL/RB: Plug & Play LED-2-Lamp-U-Bend-U6-12W

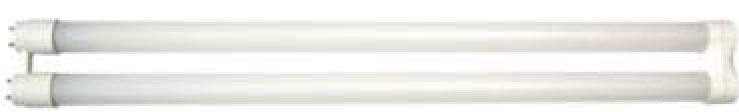
LED LAMPS

ProLED®

LED T8 U-Bend Direct Series

Easy To Install | 50,000 Hours | DIRECT BALLAST COMPATIBLE Direct Ballast Compatible | DLC QPL Listed | Dimmable

T8 direct LED U-Bend lamps with unique two piece design for more even light distribution



6" and 1-5/8" Options

No Re-Wiring Necessary

Dimmable when used on Dimming Ballasts

Instant On - No Flicker

Backed by a 5-Year Warranty

Applications:

Office
Education
Food Service
Hospitality
Medical
Retail

Markets:

Commercial

ProLED®

LED T8 U-Bend Direct Series

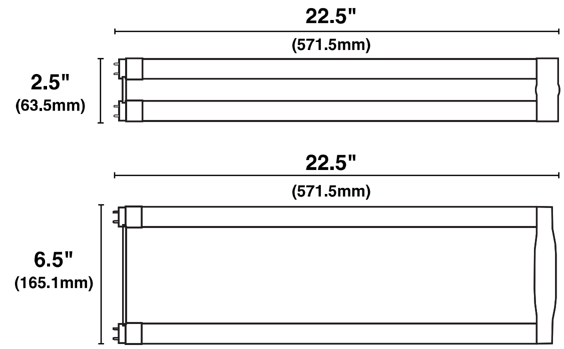
Product #: ____________ Type: ______

Project: ____________ Date: ______

Comments: ____________ Initials: ______

Specifications

- Operates on instant start, programmed start and dimming ballasts
- 50,000 hour life resulting in lower maintenance costs over time
- Uses 56% less energy and lasts up to 75% longer resulting in lower costs for the end user[1]
- Suitable for use in totally enclosed luminaires
- UL listed for damp locations



Ordering Information

	Lamp Wattage	System Wattage§	Base	Product #	Product Code	Color Temp.	CRI	Lumens	Useful Life*	Beam Spread	DLC Qualified	Pkg. Qty.	MOD	MOL	THD	Equivalent Wattage
✪	11.5	14	G13	84074	T8U6FR11/835/DIR2/LED	3500K	82	1700	50,000	270°	Yes	1/12	6.5"	22.5"	<20%	32
✪	11.5	14	G13	84075	T8U6FR11/840/DIR2/LED	4000K	82	1800	50,000	270°	Yes	1/12	6.5"	22.5"	<20%	32
✪	11.5	14	G13	84076	T8U6FR11/850/DIR2/LED	5000K	82	1800	50,000	270°	Yes	1/12	6.5"	22.5"	<20%	32
✪	12	14	G13	83077	T8U2FR12/835/DIR/LED	3500K	82	1700	50,000	270°	No	1/12	2.5"	22.5"	<20%	32
✪	12	14	G13	83078	T8U2FR12/840/DIR/LED	4000K	82	1800	50,000	270°	No	1/12	2.5"	22.5"	<20%	32
✪	12	14	G13	83079	T8U2FR12/850/DIR/LED	5000K	82	1800	50,000	270°	No	1/12	2.5"	22.5"	<20%	32

Instant Start Ballast Compatibility

# of Lamps	Manufacturer	Model	Type
1	Philips-Advance	IOPA-1P32-N	Instant Start
	Philips-Advance	IOP-1P32-N	Instant Start
	Philips-Advance	ICN-1P32-N	Instant Start
	Universal Lighting Technologies	B132IUNVHP-N	Instant Start
2	Halco	EP232IS/L/MV/SL	Instant Start
	Halco	EP232IS/MV/HE	Instant Start
	Halco	EP232IS/L/MV/HE	Instant Start
	Halco	EP232IS/H/MV/HE	Instant Start
	Philips-Advance	ICN-2P32-N	Instant Start
	Philips-Advance	IOPA-2P32-N	Instant Start
	Philips-Advance	IOP-2P32-N	Instant Start
	Philips-Advance	IOP-2P32-LW-N	Instant Start
	Philips-Advance	IOPA-2P32HL-SC	Instant Start
	Philips-Advance	REB-2P32-SC	Instant Start
	Philips-Advance	VEL-2P32-SC	Instant Start
	Universal Lighting Technologies	B232IUNVHP-N	Instant Start
	Universal Lighting Technologies	B232IUNVEL-A	Instant Start
	Universal Lighting Technologies	B233IUNVHE-A	Instant Start
	Universal Lighting Technologies	B232IUNVHEH-A	Instant Start
	Universal Lighting Technologies	B232IUNVHP-B	Instant Start

# of Lamps	Manufacturer	Model	Type
3	Halco	EP332IS/MV/HE	Instant Start
	Halco	EP332IS/L/MV/HE	Instant Start
	Philips-Advance	IOPA-3P32-LW-N	Instant Start
	Universal Lighting Technologies	B332IUNVHP-A	Instant Start
4	Halco	E432IS/120/R/SL	Instant Start
	Halco	EP432IS/MV/HE	Instant Start
	Halco	EP432IS/L/MV/HE	Instant Start
	Philips-Advance	IOPA-4P32-N	Instant Start
	Philips-Advance	IOPA-4P32-HL-SC	Instant Start
	Philips-Advance	IOP-4P32-N	Instant Start
	Philips-Advance	IOP-4P32-LW-N	Instant Start
	Philips-Advance	REB-4P32-SC	Instant Start
	Philips-Advance	ICN-4P32-SC	Instant Start
	Universal Lighting Technologies	B432IUNVHE L-A	Instant Start
	Universal Lighting Technologies	B432IUNVHP-A	Instant Start

* For full listing of Ballast compatibility, see www.halcolighting.com

✪ NEW ITEM

* Useful Life is defined as the point in time at which the lamp will maintain at least 70% of its initial lumens. The lamp will continue to burn past this point, but at decreased light levels.

Warranty – Commercial / Industrial: This product is warranted for 5 years from the date of purchase.

Must be operated with an ambient fixture temperature between -4°F(-20°C) and 122°F(50°C).

§ Specifications are based on use with normal ballast factor ballasts (0.88). For LBF and HBF ballast performance, see the ProLED® Linear Direct T8 Specifications Sheet.

[1] Energy savings based on $0.11 kWh over a 50,000 hour life.

Halco Lighting Technologies 2940 Pacific Drive I Norcross, GA 30071 I Toll Free 800.677.3334 I Phone 770.242.3612 I Fax 800.880.0822 I halcolighting.com I Atlanta I Carlstadt I Cleveland I Houston I Los Angeles I Phoenix

Model# **T8U6FR11/840/DIR2/LED**

Manufacturer: Halco Lighting Technologies
Brand: ProLED
Technical Requirements Version: 4.3
Date Qualified: 06/14/2017
Product ID: PHFM7T76

Categorization

Main: Linear Replacement Lamp
General Application: U-Bend Replacement Lamps
Primary Use: Replacement Lamps (plug and play) (UL Type A)

Classification: standard
Is Parent Product: No
DLC Family Code: VVVWMM
Listing Status: Listed

View Notes

Reported Data | Zonal Lumens | Spacing Criteria | Product Features | Version History | Family Data

Light Output: 1800 lm
Wattage: 14 W
Efficacy: 128 lm/W
Power Factor: 0.9
CCT: 4000 K
CRI: 82
Total Harmonic Distortion: 20 %

TRIAD®

B232IUNVHP-N

APPLICATION and PERFORMANCE SPECIFICATION

Description: High frequency electronic ballast for (2/1) F32T8, (2/1) F32T8ES-30W, (2/1) F32T8ES-25W, (2/1) F25T8ES-22W (2/1) F28T8, (2/1) F25T8, (2/1) F17T8, (2/1) F15T8, (2/1) F11T8 and (1) F40T8. Also equivalent U-shaped lamps.

- Line Voltage: 108vac - 305vac, 50/60Hz
- Parallel Lamp Operation
- Also operates on 125VDC input, (+)L (-)N
- Instant Start
- Active Power Factor Correction

*60 Hz data

Lamp Type	Lamp #	Volts	Input Watts	Nominal Line Amps	Power Factor	Ballast Factor	Ballast Efficacy Factor	Harmonic Total	Crest Factor
F32T8	**2**	**120**	**55**	**0.46**	**> .99**	**.88**	**1.60**	**< 10%**	**< 1.7**
F32T8	**2**	**277**	**53**	**0.19**	**> .99**	**.88**	**1.66**	**< 10%**	**< 1.7**
F32T8	1	120	36	0.30	> .99	1.04	2.89	< 10%	< 1.7
F32T8	1	277	36	0.13	> .99	1.04	2.89	< 10%	< 1.7
F32T8ES (30W)	2	120	54	0.45	> .99	.88	1.63	< 10%	< 1.7
F32T8ES (30W)	2	277	52	0.19	> .99	.88	1.69	< 10%	< 1.7
F32T8ES (30W)	1	120	34	0.28	> .99	1.05	3.09	< 10%	< 1.7
F32T8ES (30W)	1	277	33	0.12	> .98	1.05	3.18	< 10%	< 1.7
F32T8ES (25W)	2	120	45	0.38	> .99	.89	1.98	< 10%	< 1.7
F32T8ES (25W)	2	277	44	0.16	> .99	.89	2.02	< 10%	< 1.7
F32T8ES (25W)	1	120	28	0.24	> .99	1.05	3.75	< 10%	< 1.7
F32T8ES (25W)	1	277	28	0.10	> .98	1.05	3.75	< 10%	< 1.7
F28T8	2	120	48	0.40	> .99	.88	1.83	< 10%	< 1.7
F28T8	2	277	47	0.17	> .99	.88	1.87	< 10%	< 1.7
F28T8	1	120	30	0.25	> .99	1.05	3.50	< 10%	< 1.7
F28T8	1	277	30	0.11	> .98	1.05	3.50	< 10%	< 1.7
F25T8	2	120	45	0.37	> .99	.90	2.00	< 10%	< 1.7
F25T8	2	277	44	0.16	> .99	.90	2.05	< 10%	< 1.7
F25T8	1	120	28	0.24	> .99	1.05	3.75	< 10%	< 1.7
F25T8	1	277	28	0.10	> .98	1.05	3.75	< 10%	< 1.7
F25T8ES (22W)	2	120	37	0.31	> .99	.89	2.43	< 10%	< 1.7
F25T8ES (22W)	2	277	36	0.13	> .99	.89	2.46	< 10%	< 1.7
F25T8ES (22W)	1	120	24	0.20	> .99	1.14	4.74	< 10%	< 1.7
F25T8ES (22W)	1	277	24	0.09	> .98	1.14	4.74	< 10%	< 1.7
F17T8	2	120	32	0.27	> .99	.89	2.78	< 10%	< 1.7
F17T8	2	277	32	0.12	> .98	.89	2.78	< 10%	< 1.7
F17T8	1	120	21	0.18	> .99	1.07	5.10	< 15%	< 1.7
F17T8	1	277	21	0.08	> .97	1.07	5.10	< 15%	< 1.7
F15T8	2	120	25	0.21	> .99	.86	3.51	<10%	<1.7
F15T8	2	277	25	0.09	> .98	.86	3.50	<10%	<1.7
F15T8	1	120	16	0.13	> .99	1.02	6.38	<10%	<1.7
F11T8	2	120	20	0.17	> .99	.78	3.90	<10%	<1.7
F11T8	2	277	21	0.08	> .97	.78	3.71	< 15%	< 1.7
F11T8	1	120	14	0.11	> .99	.90	6.43	<10%	<1.7
F40T8	1	120	44	0.37	> .99	1.03	2.34	< 10%	< 1.7
F40T8	1	277	43	0.16	> .99	1.03	2.40	< 10%	< 1.7

Application and Performance Specification Information Subject to Change without Notification.

Performance:
- Meets ANSI Standard C82.11-1993
- Meets ANSI Standard C62.41-1991
- Meets FCC Part 18 (Class A) for EMI and RFI Non-Consumer Limits
- Meets CSA Standard 654 for Ballast Efficiency
- Anti-striation circuitry

Application:
- Minimum Starting Temperature: 0° F, -18° C
  - For ES & 28W Lamps: 60° F, 16° C
  - For F40T8: 32 °F, 0 °C
- Maximum Case Temperature: 167° F, 75° C
- Sound Rated: A
- Remote Mounting: 18 ft. max. lead length, 18 AWG
- No remote/tandem wiring for ES lamps

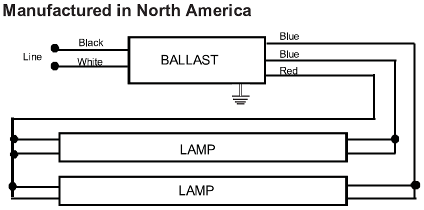
Safety:
- No PCB's
- $_{C}UL_{US}$ listed (Class P, Type 1 Outdoor, Type HL)

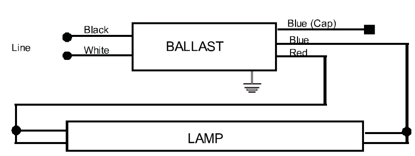
Physical Parameters:

	Inches	Metric
• Mounting Length: (Center to Center)	8.9" +/- 0.01"	226 mm
• Overall Length:	9.5" +/- 0.01"	241.3 mm
• Width:	1.31" + 0.03"/- 0.02"	33.3 mm
• Height:	1.00" + 0.04"/- 0.01"	25.4 mm
• Carton Quantity:	10	
Lead Length:	Black, White 25" (+/-1")	
	Red 48" (+/-1")	
	Blue 31" (+/-1")	

Warranty:
Universal Lighting Technologies warrants to the purchaser that each electronic ballast will be free from defects in material or workmanship for a period of 5 years from date of manufacture when properly installed and under normal conditions of use. Call **1-800-BALLASTx800** for technical assistance.

Manufactured in North America





For one lamp application, individually cap blue leads, insulate to 600 volts

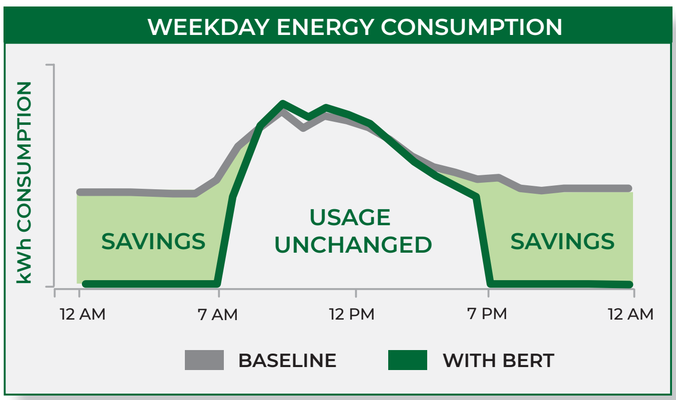
Ballast must be grounded in accordance with national and local electrical codes.

BERT® CONTROL

STANDARD SOFTWARE
SOPHISTICATED MASS REMOTE CONTROL

TURN SMALL LOADS OFF AND SAVE BIG

Plug load devices consume energy whether they are being used or sitting idle overnight. Energy consumed when devices are not being used is known as standby load or overnight load. Bert eliminates standby load by automatically turning plug load and other small miscellaneous loads off nights, weekends, and extended holidays when buildings are unoccupied.



EASY SCHEDULE CREATION

To create a schedule, select whether devices should turn on or off, enter the day of the week, and the scheduled on or off time. Schedule hours can be set for Every Day, Week Days, Weekends, or Individual day (Saturday). Devices can be turned on and off up to 50 times per week.

Unique schedules can be created for specific buildings, groups of buildings, areas with a building or device types. Multiple versions of each schedule, such as school year and summer vacation, are created and saved on the server.

Once the schedules are created, they are applied to each group. When new schedules are needed, the appropriate stored schedules are selected and applied to the groups.

SCHEDULE STORED ON BERT

Because the current schedule is also stored locally in each Bert, Berts continue to run their schedule even when the wireless network is down. When communications are restored, the Bert immediately checks the server for schedule updates.

MANUAL OVERRIDE BUTTON

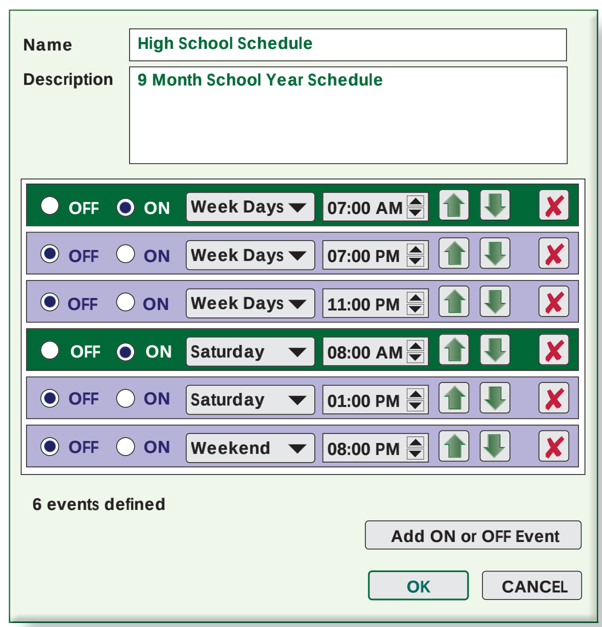
Every Bert has a manual override button that lets users turn devices on during off hours.

INSTANT LOAD SHEDDING

In addition to regular operating schedules, load shedding schedules can be created, instantly turning selected devices off for demand curtailment events. Devices can be turned off for a set duration or powered on with the click of a button if the load shedding event ends early.

LOAD SHIFTING SCHEDULES

Certain loads can be shifted to lower rate time periods. With Bert, laptop carts can be recharged overnight when rates are lower and water heaters can be scheduled to reheat water during non-peak hours.



BUILDING SYSTEM INTEGRATION

Control and manage devices from the BAS UI with Bert's BACnet gateway, BERT CONNECT.

Meet BERT Your energy control freak.

Bert
Your energy control freak

All Plug and Hardwired Loads

BERT® Smart Plug Series Data Sheet

Plug-in measurement and control for individual 110V/15A devices

	BERT 110 M	BERT 110 X
BERT		
Dimensions	3.5″ W x 3.5″ H x 2″ D	3.5″ W x 3.5″ H x 2″ D
Weight	4.2 Ounces	4.4 Ounces
Voltage	120 Volts	120 Volts
Amperage	Up to 15 Amps	Up to 15 Amps
Operating Environment	Indoor Use Only	Indoor Use Only
Manual Override Button	Yes	Yes
BAS Integration	BACnet/IP	BACnet/IP
Standard Software	Measurement, Analysis and Control	Measurement, Analysis and Control
Intelligent Control Options	Threshold and Temperature	Threshold and Temperature
Measurement Accuracy	+/-5%	+/-5%
Measurement Update Frequency	Configurable: 1 to 999 seconds	Configurable: 1 to 999 seconds
Stored Measurement Data - Server	Unlimited	Unlimited
Stored Measurement Data - Bert	14-Day Rolling Log	14-Day Rolling Log
M & V Reporting	Daily, Weekly, Monthly, Yearly or User Defined	Daily, Weekly, Monthly, Yearly or User Defined
Wireless Specifications	2.4 GHz, 802-11 b/g	2.4/5 GHz, 802.11 a/b/g/n
Communication Protocol	UDP	UDP
Network Security	WPA/WPA2-PSK	WPA/WPA2-PSK, WPA/WPA2-Enterprise
Certifications	UL 916 and 60950-1, FCC	UL 916 and 60950-1, FCC

RECOMMENDED DEVICES FOR USE WITH BERT SMART PLUGS

Printers, Copiers, Projectors, Charging Carts, Vending Machines, Large Coffeemakers, Hot/Cold Beverage Dispensers, Window AC units

Appendix D
Formulae

Lighting Upgrades

Algorithms

$$\Delta kW = (\#\ of\ replaced\ fixtures) * (baseline\ fixture\ wattage\ from\ table) - (\#\ of\ fixtures\ installed) * (wattage\ of\ new\ fixture)$$

$$\text{Energy Savings}\left(\frac{\text{kWh}}{\text{yr}}\right) = (\Delta\text{kW}) * (Hrs) * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = (\Delta\text{kW}) * (CF) * (1 + HVAC_d)$$

$$\text{Fuel Savings}\left(\frac{\text{MMBtu}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (\text{HVAC}_\text{g})$$

Definition of Variables

ΔkW = Change in connected load from baseline to efficient lighting level.
CF = Coincidence factor
Hrs = Annual hours of operation
$HVAC_d$ = HVAC interactive factor for peak demand savings
$HVAC_e$ = HVAC interactive factor for annual energy savings
$HVAC_g$ = HVAC interactive factor for annual fuel savings

Boilers and Furnaces

Fuel Savings (MMBtu/yr) = Cap_{in} * $EFLH_h$ * ((Eff_q/Eff_b)-1) / 1000 kBtu/MMBtu

Definition of Variables

Cap_{in} = Input capacity of qualifying unit in kBtu/hr
$EFLH_h$ = The Equivalent Full Load Hours of operation for the average unit during the heating season in hours
Eff_b = Boiler Baseline Efficiency
Eff_q = Boiler Proposed Efficiency
1000 = Conversion from kBtu to MMBtu

HVAC Equipment Replacement

Air Conditioning Algorithms:

Energy Savings (kWh/yr) = N * Tons * 12 kBtuh/Ton * ($1/EER_b$-$1/EER_q$) * $EFLH_c$

Peak Demand Savings (kW) = N * Tons * 12 kBtuh/Ton * ($1/EER_b$-$1/EER_q$) * CF

Heat Pump Algorithms:

Cooling Energy Savings (kWh/yr) = N * Tons * 12 kBtuh/Ton * ($1/EER_b$-$1/EER_q$) * $EFLH_c$

Heating Energy Savings (Btu/yr) = N * Tons * 12 kBtuh/Ton * ((1/ (COP_b * 3.412))-(1/ (COP_q * 3.412)) * $EFLH_h$

Where $_c$ is for cooling and $_h$ is for heating.

Definition of Variables

N = Number of units

Tons = Rated cooling capacity of unit.This value comes from ARI/AHRI or AHAM rating or manufacturer data.

EER_b = Energy Efficiency Ratio of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER should be used in place of EER.

COP_b = Coefficient of Performance of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

EER_q = Energy Efficiency Ratio of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 (5.4 tons) BtuH, SEER should be used in place of EER.

COP_q = Coefficient of Performance of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 BtuH

Motor Replacement

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

<u>Definition of Variables</u>
ΔkW = kW Savings at full load

HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.

LF = Load Factor, percent of full load at typical operating condition

IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD

η_{base} = Efficiency of the baseline motor

η_{prem} = Efficiency of the energy-efficient motor

HRS = Annual operating hours

CF = Coincidence Factor

Component	**Type**	**Value**	**Source**
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
LF	Fixed	0.75	1
hp_{base}	Fixed	ASHRAE 90.1-2013 Baseline Efficiency Table	ASHRAE
hp_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

Chillers

Algorithms

For IPLV:

Energy Savings (kWh/yr) = N * Tons * EFLH * ($IPLV_b$ – $IPLV_q$)

Peak Demand Savings (kW) = N * Tons * PDC * ($IPLV_b$ – $IPLV_q$)

For FLV:

Energy Savings (kWh/yr) = N * Tons * EFLH * (FLV_b – FLV_q)

Peak Demand Savings (kW) = N * Tons * PDC * (FLV_b – FLV_q)

Definition of Variables

N = Number of units

Tons = Rated capacity of coolling equipment.

EFLH = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off peak periods.

PDC = Peak Duty Cycle: fraction of time the compressor runs during peak hours

$IPLV_b$ = Integrated Part Load Value of baseline equipment, kW/Ton. The efficiency of the chiller under partial-load conditions.

$IPLV_q$ = Integrated Part Load Value of qualifying equipment, kW/Ton. The efficiency of the chiller under partial-load conditions.

FLV_b = Full Load Value of baseline equipment, kW/Ton. The efficiency of the chiller under full-load conditions.

FLV_q = Full Load Value of qualifying equipment, kW/Ton. The efficiency of the chiller under full-load conditions.

Summary of Inputs

Electric Chiller Assumptions

Electric Chillers Component	Type	Situation	Value	Source
Tons	Rated Capacity, Tons	All	Varies	From Application
$IPLV_b$ (kW/ton)	Variable	See table below	Varies	1
$IPLV_q$ (kW/ton)	Variable	All	Varies	From Application (per

Appendix E

ASHRAE 90.1 Minimum Performance Requirement

TABLE G3.1.1-3 Baseline HVAC System Types

Building Type	Climate Zones 3b, 3c, and 4–8	Climate Zones 1–3a
Residential	System 1—PTAC	System 2—PTHP
Public assembly <120,000 ft^2	System 3—PSZ-AC	System 4—PSZ-HP
Public assembly ≥120,000 ft^2	System 12—SZ-CV-HW	System 13—SZ-CV-ER
Nonresidential and 3 floors or fewer and <25,000 ft^2	System 3—PSZ-AC	System 4—PSZ-HP
Nonresidential and 4 or 5 Floors and <25,000 ft^2 or 5 floors or fewer and 25,000 ft^2 to 150,000 ft^2	System 5—Packaged VAV with reheat	System 6—Packaged VAV with PFP boxes
Nonresidential and more than 5 floors or >150,000 ft^2	System 7—VAV with reheat	System 8—VAV with PFP boxes
Heated-only storage	System 9—Heating and ventilation	System 10—Heating and ventilation
Retail and 2 floors or fewer	System 3—PSZ-AC	System 4—PSZ-HP

Notes:

1. Residential building types include dormitory, hotel, motel, and multifamily. Residential space types include guest rooms, living quarters, private living space, and sleeping quarters. Other building and space types are considered nonresidential.
2. Where attributes make a building eligible for more than one baseline system type, use the predominant condition to determine the system type for the entire building except as noted in Exception (1) to Section G3.1.1.
3. For laboratory spaces in a building having a total laboratory exhaust rate greater than 5000 cfm, use a single system of type 5 or 7 serving only those spaces.
4. For hospitals, depending on building type, use System 5 or 7 in all climate zones.
5. Public assembly building types include houses of worship, auditoriums, movie theaters, performance theaters, concert halls, arenas, enclosed stadiums, ice rinks, gymnasiums, convention centers, exhibition centers, and natatoriums.

G3.1.1-4 Baseline System Descriptions

System No.	System Type	Fan Control	Cooling Type	Heating Type
1. PTAC	Packaged terminal air conditioner	Constant volume	Direct expansion	Hot-water fossil fuel boiler
2. PTHP	Packaged terminal heat pump	Constant volume	Direct expansion	Electric heat pump
3. PSZ-AC	Packaged rooftop air conditioner	Constant volume	Direct expansion	Fossil fuel furnace
4. PSZ-HP	Packaged rooftop heat pump	Constant volume	Direct expansion	Electric heat pump
5. Packaged VAV with Reheat	Packaged rooftop VAV with reheat	VAV	Direct expansion	Hot-water fossil fuel boiler
6. Packaged VAV with PFP Boxes	Packaged rooftop VAV with parallel fan power boxes and reheat	VAV	Direct expansion	Electric resistance
7. VAV with Reheat	VAV with reheat	VAV	Chilled water	Hot-water fossil fuel boiler
8. VAV with PFP Boxes	VAV with parallel fan-powered boxes and reheat	VAV	Chilled water	Electric resistance
9. Heating and Ventilation	Warm air furnace, gas fired	Constant volume	None	Fossil fuel furnace
10. Heating and Ventilation	Warm air furnace, electric	Constant volume	None	Electric resistance
11. SZ-VAV	Single-zone VAV	VAV	Chilled water	See note.
12. SZ-CV-HW	Single zone	Constant volume	Chilled water	Hot-water fossil fuel boiler
13. SZ-CV-ER	Single zone	Constant volume	Chilled water	Electric resistance

Notes:

1. For purchased chilled water and purchased heat, see G3.1.1.3.
2. Where the proposed design heating source is electric or other, the heating type shall be electric resistance. Where the proposed design heating source is fossil fuel, fossil/electric hybrid, or purchased heat, the heating type shall be hot-water fossil fuel boiler.

TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, air cooled	<65,000 Btu/h[b]	All	Split system	13.0 SEER	AHRI 210/240
			Single package	13.0 SEER (before 1/20/15) 14 SEER (as of 1/1/2015)	
Through the wall, air cooled	≤30,000 Btu/h[b]	All	Split system	12.0 SEER	
			Single package	12.0 SEER	
Small duct high velocity, air cooled	<65,000 Btu/h[b]	All	Split System	11.0 SEER	
Air conditioners, air cooled	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.2 EER 11.4 IEER (before 1/1/2016) 12.9 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.7 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.4 IEER (as of 1/1/2016)	
		All other	Split system and single package	10.8 EER 11.0 IEER (before 1/1/2016) 12.2 IEER (as of 1/1/2016)	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	10.0 EER 10.1 IEER (before 1/1/2016) 11.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.8 EER 9.9 IEER (before 1/1/2016) 11.4 IEER (as of 1/1/2016)	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	9.7 EER 9.8 IEER (before 1/1/2016) 11.2 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.5 EER 9.6 IEER (before 1/1/2016) 11.0 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units— Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, water cooled	<65,000 Btu/h	All	Split system and single package	12.1 EER 12.3 IEER	AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	12.1 EER 12.3 IEER (before 1/1/2016) 13.9 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	11.9 EER 12.1 IEER (before 1/1/2016) 13.7 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	12.5 EER 12.5 IEER (before 1/1/2016) 13.9 IEER (as of 1/1/2016)	
		All other	Split system and single package	12.3 EER 12.5 IEER (before 1/1/2016) 13.7 IEER (as of 1/1/2016)	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	12.4 EER 12.6 IEER (before 1/1/2016) 13.6 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	12.2 EER 12.4 IEER (before 1/1/2016) 13.4 IEER (as of 1/1/2016)	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	12.2 EER 12.4 IEER (before 1/1/2016) 13.5 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	12.0 EER 12.2 IEER (before 1/1/2016) 13.3 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units— Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, evaporatively cooled	<65,000 Btu/h[b]	All	Split system and single package	12.1 EER 12.3 IEER	AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split system and single package	11.9 EER 12.1 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	12.0 EER 12.2 IERR	
		All other	Split system and single package	11.8 EER 12.0 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	11.9 EER 12.1 IEER	
		All other	Split system and single package	11.7 EER 11.9 IEER	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	11.7 EER 11.9 IEER	
		All other	Split system and single package	11.5 EER 11.7 IEER	
Condensing units, air cooled	≥135,000 Btu/h			10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥135,000 Btu/h			13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥135,000 Btu/h			13.5 EER 14.0 IEER	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-2 Electrically Operated Unitary and Applied Heat Pumps— Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air cooled (cooling mode)	<65,000 Btu/h[b]	All	Split system	13.0 SEER (before 1/1/2015) 14 SEER (as of 1/1/2015)	AHRI 210/240
			Single package	13.0 SEER (before 1/1/2015) 14 SEER (as of 1/1/2015)	
Through the wall, air cooled (cooling mode)	≤30,000 Btu/h[b]	All	Split system	12.0 SEER	
			Single package	12.0 SEER	
Small duct high velocity, air cooled	<65,000 Btu/h[b]	All	Split System	11.0 SEER	
Air cooled (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.2 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	10.8 EER 11.0 IEER (before 1/1/2016) 12.0 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	10.6 EER 10.7 IEER (before 1/1/2016) 11.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	10.4 EER 10.5 IEER (before 1/1/2016) 11.4 IEER (as of 1/1/2016)	
	≥240,000 Btu/h	Electric resistance (or none)	Split system and single package	9.5 EER 9.6 IEER (before 1/1/2016) 10.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.3 EER 9.4 IEER (before 1/1/2016) 0.4 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-2 Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Water to air, water loop (cooling mode)	<17,000 Btu/h	All	86°F entering water	12.2 EER	ISO 13256-1
	≥17,000 Btu/h and <65,000 Btu/h	All	86°F entering water	13.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	86°F entering water	13.0 EER	
Water to air, groundwater (cooling mode)	<135,000 Btu/h	All	59°F entering water	18.0 EER	
Brine to air, ground loop (cooling mode)	<135,000 Btu/h	All	77°F entering water	14.1 EER	
Water to water, water loop (cooling mode)	<135,000 Btu/h	All	86°F entering water	10.6 EER	ISO 13256-2
Water to water, groundwater (cooling mode)	<135,000 Btu/h	All	59°F entering water	16.3 EER	
Brine to water, ground loop (cooling mode)	<135,000 Btu/h	All	77°F entering water	12.1 EER	
Air cooled (heating mode)	<65,000 Btu/h[b] (cooling capacity)	—	Split system	7.7 HSPF (before 1/1/2015) 8.2 HSPF (as of1/1/2015)	AHRI 210/240
			Single package	7.7 HSPF (before 1/1/2015) 8.0 HSPF (as of1/1/2015)	
Through the wall, air cooled (heating mode)	≤30,000 Btu/h[b] (cooling capacity)	—	Split system	7.4 HSPF	
			Single package	7.4 HSPF	
Small duct high velocity, air cooled (heating mode)	<65,000 Btu/h[b]	—	Split System	6.8 HSPF	
Air cooled (heating mode)	≥65,000 Btu/h[c] and <135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb outdoor air	3.3 COP_H	AHRI 340/360
			17°F db/15°F wb outdoor air	2.25 COP_H	
	≥135,000 Btu/h[c] (cooling capacity)	—	47°F db/43°F wb outdoor air	3.2 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP_H	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.