

FX5
Explosion-Proof Electric Air Heater



Ruffneck™

Heaters for the Harshes Environment

Corrosion-Resistant Washdown Unit Heaters

Explosion-Proof Electric Air Heaters

Heat-Exchanger Unit Heaters

Convection Heaters

Thermostats



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CCI Thermal Technologies Inc. is a leader in advanced heating solutions. We offer our customers the broadest based industry knowledge, expertise and industrial heating products. In addition to our focus on product quality, we are setting a new industry standard for customer service.

At our facilities across North America we manufacture five of the top brands in industrial heating:

- Cata-Dyne™ - Explosion-Proof Gas Catalytic Heaters
- Ruffneck™ - Heaters for the Harshest Environments
- Caloritech™ - Engineered Electric Heat
- Norseman™ - Electric Explosion-Proof Heaters
- DriQuik™ - Curing Solutions

Ruffneck™, a key brand of CCI Thermal Technologies Inc., has a broad product line including heat-exchanger unit heaters, explosion-proof electric air heaters, industrial electric air heaters and explosion-proof thermostats. Established in 1975, Ruffneck™ has a long and proud history of supplying quality products to a worldwide customer base. All products are designed for rugged, industrial applications and Ruffneck™ is well known for its "ship the heat in a week" policy in which 95% of all standard orders are shipped within one week. Ruffneck™ has enhanced CCI Thermal's position as one of North America's leading manufacturers of industrial heating equipment.

We invite you to visit www.ccithermal.com to view the broad range of innovative industrial heating products manufactured by CCI Thermal Technologies Inc.



Edmonton, Alberta



Oakville, Ontario



Orillia, Ontario



Greensburg, Indiana

CCI Thermal Catalogs at a Glance

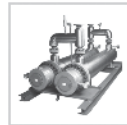
Caloritech™ Catalog: Section A Elements and Specialty Heaters

calvane heaters, tubular heaters,
bolt heaters, tubular band heaters,
mitosis heaters, finned tubular
heaters, cartridge heaters, strip and
finned strip heaters, hot plate/drum
heaters, cast-in heaters, transit heaters.



Caloritech™ Catalog: Section D Engineered Products

circulation heaters, heat transfer
systems, custom engineered
products, panel heaters, control
panels, technical data.



Caloritech™ Catalog: Section B Immersion Heaters

screwplug heaters, domestic
immersion heaters, urn heaters,
flange heaters, over-the-side
heaters, pipe insert heaters, gate
and gain heaters.



Caloritech™ Catalog: Section E Boilers

hot water boilers, steam boilers,
condensate receiver packages,
blow off tanks, packaged
circulation heaters, calorifiers.



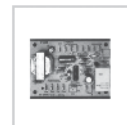
Caloritech™ Catalog: Section C Air and Space Heaters

infrared radiant heaters, panel
heaters, convection heaters,
commercial and explosion-proof
duct heaters, unit heaters, gate
and gain heaters.



Caloritech™ Catalog: Section F Controls

electronic controls, industrial
thermostats, explosion-proof
thermostats, thermoswitches,
thermocouples and thermowells,
x-Max® explosion-proof housings.



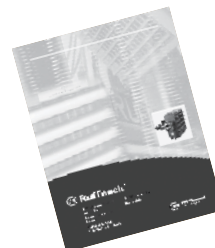
Cata-Dyne™ Catalog

explosion-proof infrared gas catalytic heaters, high temperature industrial infrared heaters, infrared gas catalytic heating systems, accessories.



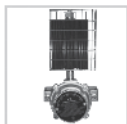
Ruffneck™ Catalog

explosion-proof electric air heaters, heat-exchanger unit heaters, corrosion-resistant washdown unit heaters, convection heaters, thermostats.



Norseman™ Catalog

natural convection explosion-proof heaters, forced air explosion-proof heaters, thermostats.



DriQuik™ Catalog

long, medium and short wavelength infrared ovens and emitters, dusters, cooling tunnels and control panels.

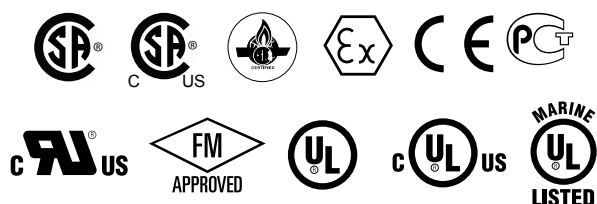


Putting Safety First

CCI Thermal has always been committed to the safety and well being of our customers.

We are familiar with the safety regulations of heating products in a wide variety of environments and ensure that our products meet or exceed the requirements for their applications.

CCI Thermal takes great pride in its lines of certified products.



Visit us at www.ccithermal.com

Our web site offers on-line PDF catalogs, product specifications, installation manuals, and technical documentation 24 hours a day. Additionally, you will find easy access to anyone of our factory representatives, regional sales managers or customer service personnel.

Quality

All our business processes are steered by the principles of ISO 9001:2000, providing an operational framework that places emphasis on continual improvement and customer satisfaction.

FX5 Explosion-Proof Electric Air Heaters

FX5 heaters are cUL_{US} certified for use in hazardous locations. They are designed for the harshest environments such as: dry indoor industrial applications, oil refineries, petrochemical plants, pulp and paper mills, grain elevators, hazardous waste storage facilities, wastewater treatment plants, etc., where specific explosive gases or dusts may be present.

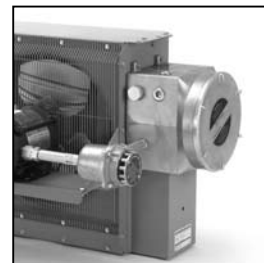


The FX5 offers a larger junction box for easier installation, additional limit controls and a heavy duty core. See page 16 for a full comparison between the new FX5 the FX4.



The heater core assembly is contained in a sturdy, epoxy-coated 14-gauge steel cabinet, which also carries the motor and fan assembly. Adjustable louvres allow directional control of the airflow. A narrow gap, two-piece fan guard is provided to shield

all moving parts. All fasteners are zinc plated for corrosion protection.

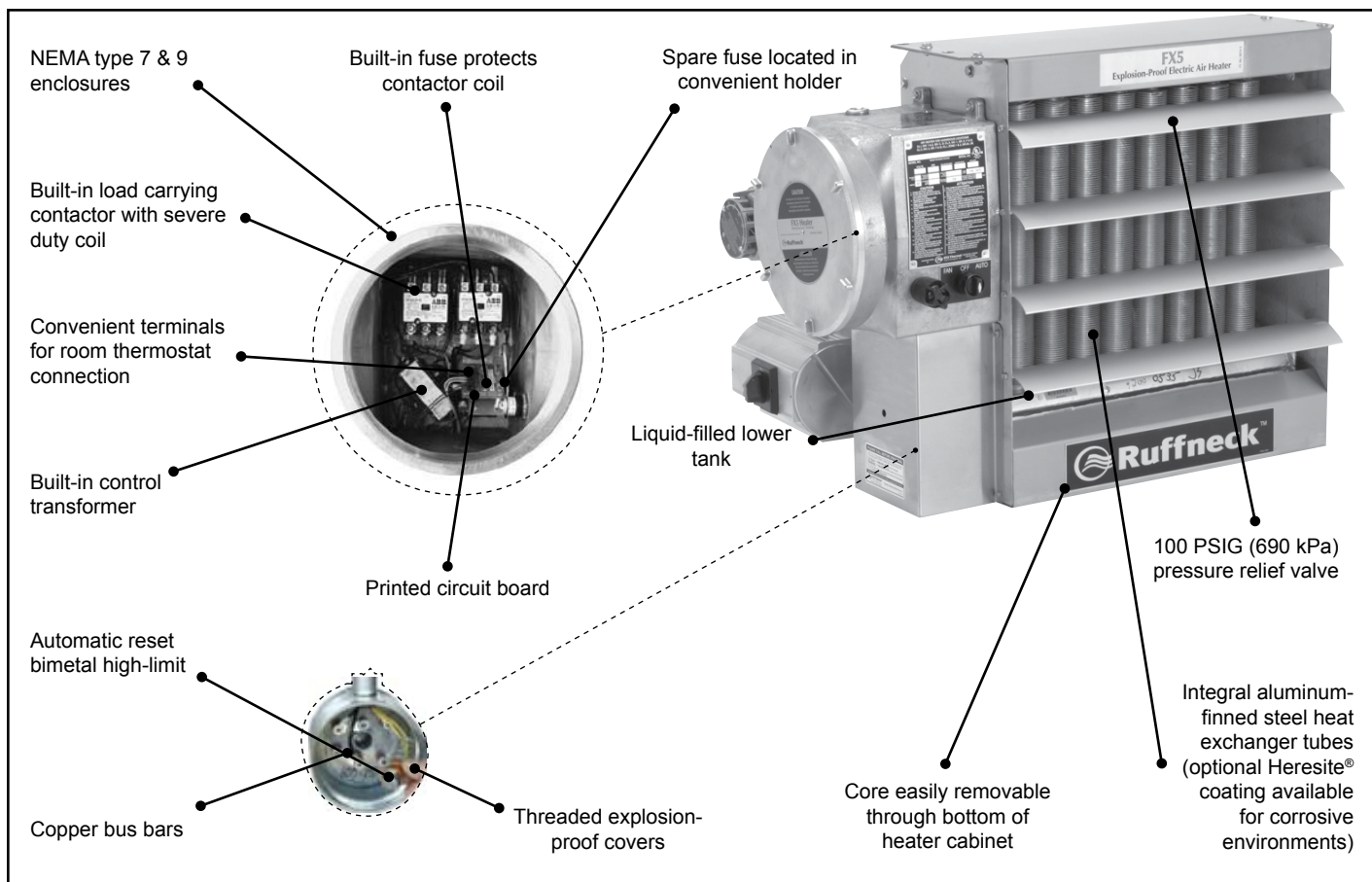


Ruffneck™ heaters are built to last. All Ruffneck™ products are subjected to exhaustive technical analysis and testing during design and development, and are manufactured under a registered quality assurance program. As a result, they have consistently proven their safety and reliability.

For hazardous location heating, rely on the Ruffneck™ FX5 heater for the most dependable, trouble-free service available.

Suitable for the following hazardous location classifications:

- Class I, Divisions 1 & 2, Groups C & D
- Class II, Divisions 1 & 2, Groups E, F & G
- Class I, Zones 1 & 2, Groups IIA & IIB
- Temperature Code T3B 165°C (329°F)



Heresite® is a registered trademark of Heresite® Protective Coatings Inc.

3 - YEAR WARRANTY

Performance Data for 60 Hertz FX5

UL_{us} Temperature Code T3B 165°C (329°F)

NOMINAL WATTAGE (kW)	MODEL	VOLTAGE	PHASE	TOTAL CURRENT (A)	OPTIONAL BUILT-IN DISCONNECT SWITCH	AIR TEMPERATURE RISE		BTU/hr
						°F	°C	
3	FX5-208160-030	208	1	14.4	DS5	11.2	6.2	10,250
	FX5-208360-030	208	3	8.3				
	FX5-240160-030	240	1	12.5				
	FX5-240360-030	240	3	7.2				
	FX5-480160-030 °	480	1	6.3				
	FX5-480360-030	480	3	3.6				
	FX5-600360-030	600	3	2.9				
5	FX5-208160-050	208	1	24.0	DS5	18.6	10.3	17,050
	FX5-208360-050	208	3	13.9				
	FX5-240160-050	240	1	20.8				
	FX5-240360-050	240	3	12.0				
	FX5-480160-050 °	480	1	10.4				
	FX5-480360-050	480	3	6.0				
	FX5-600360-050	600	3	4.8				
7.5	FX5-208160-075	208	1	36.1	DS5	27.9	15.5	25,600
	FX5-208360-075	208	3	20.8				
	FX5-240160-075	240	1	31.3				
	FX5-240360-075	240	3	18.0				
	FX5-480160-075 °	480	1	15.6				
	FX5-480360-075	480	3	9.0				
	FX5-600360-075	600	3	7.2				
10	FX5-208160-100*	208	1	48.1	Not Available	37.2	20.6	34,100
	FX5-208360-100	208	3	27.8	DS5			
	FX5-240160-100	240	1	41.7	DS5			
	FX5-240360-100	240	3	24.1	DS5			
	FX5-480160-100 °	480	1	20.8	DS5			
	FX5-480360-100	480	3	12.0	DS5			
	FX5-600360-100	600	3	9.6	DS5			
15	FX5-240160-150*	240	1	62.5	Not Available	27.1	15.1	51,200
	FX5-240360-150	240	3	36.1	DS5			
	FX5-480160-150 °	480	1	31.3	DS5			
	FX5-480360-150	480	3	18.0	DS5			
	FX5-600360-150	600	3	14.4	DS5			
20	FX5-480160-200 °	480	1	41.7	DS5	36.1	20.1	68,250
	FX5-480360-200	480	3	24.1	DS5			
	FX5-600360-200	600	3	19.2	DS5			
25	FX5-480360-250	480	3	30.1	DS5	45.2	25.1	85,300
	FX5-600360-250	600	3	24.1	DS5			
30	FX5-480360-300	480	3	36.1	DS5	26.4	14.6	102,350
	FX5-600360-300	600	3	28.9				
35	FX5-480360-350	480	3	42.1	DS5	30.7	17.1	119,450
	FX5-600360-350	600	3	33.7				

Note: (*) Exceeds the 48 amp. circuit limit of NEC 424-22

(°)480 1 Phase units are certified Class I, Div. 1, Group D and Class II, Div.1, Groups F and G.

1. Minimum conductor size for 30°C (86°F) ambient. Derate conductor for ambient temperature. Use minimum 90°C (194°F) insulation.
2. Heater is functioning normally if at rated voltage the amp draw is within 10% of the value in this table.
3. Operation at lower voltage will result in reduced heat output and amp draw.
4. Add "T" to model number when adding a built-in thermostat.
5. Add "D" to model number when adding a built-in disconnect switch.
6. Add "P" to model number when adding a built-in pilot light.
7. Add "S" to model number when adding a 3-way switch.
8. Add "H" to model number for units with high "off" (deenergized) ambient temperatures.
9. Add "C" to model number for units with Heresite® coating.
10. Add "A" to model number for units with stainless steel cabinet.

See page 10 for
model coding.See page 8
for installation
conditions.

Performance Data for 50 Hertz FX5

Class I, Divisions 1 & 2, Groups C & D;
Class II, Divisions 1 & 2, Groups E, F & G;
Class I, Zones 1 & 2, Groups IIA & IIB.
Temperature Code T3B 165°C (329°F)



NOMINAL WATTAGE (kW)	MODEL	VOLTAGE	PHASE	TOTAL CURRENT (A)	OPTIONAL BUILT-IN DISCONNECT SWITCH	AIR TEMPERATURE RISE		BTU/HR
						°F	°C	
2.5	FX5-220150-025	220	1	11.4	DS5	11.2	6.3	8,550
4.2	FX5-220150-042	220	1	19.1	DS5	19.0	10.5	14,350
6.3	FX5-220150-063	220	1	28.6	DS5	28.5	15.7	21,500
8.4	FX5-220150-084	220	1	38.2	DS5	37.8	21.1	28,700
12.6	FX5-220150-126*	220	1	57.3	Not Available	27.5	15.2	43,000
2.8	FX5-230150-028	230	1	12.20	DS5	12.5	7.0	9,550
4.6	FX5-230150-046	230	1	20.0	DS5	20.7	11.5	16,000
6.9	FX5-230150-069	230	1	30.0	DS5	31.1	17.2	23,550
13.8	FX5-230150-138*	230	1	59.9	Not Available	30.1	16.6	47,100
15	FX5-240150-150*	240	1	62.5	Not Available	27.1	15.1	51,200
15	FX5-240350-150	240	3	36.1	DS5	27.1	15.1	51,200
20	FX5-240350-200*	240	3	48.1	Not Available	36.1	20.1	68,250
2.5	FX5-380350-025	380	3	3.8	DS5	11.2	6.3	8,550
4.2	FX5-380350-042	380	3	6.4	DS5	19.0	10.5	14,350
6.3	FX5-380350-063	380	3	9.6	DS5	28.5	15.7	21,500
8.4	FX5-380350-084	380	3	12.8	DS5	37.8	21.1	28,700
12.5	FX5-380350-125	380	3	19.0	DS5	27.2	15.1	42,700
20.9	FX5-380350-209	380	3	31.8	DS5	22.0	12.1	71,350
2.8	FX5-400350-028	400	3	4.0	DS5	12.5	7.0	9,550
4.6	FX5-400350-046	400	3	6.6	DS5	20.7	11.5	15,700
6.9	FX5-400350-069	400	3	10.0	DS5	31.1	17.2	23,550
9.3	FX5-400350-093	400	3	13.4	DS5	42.0	23.2	31,750
13.9	FX5-400350-139	400	3	20.1	DS5	30.2	16.7	74,450
18.5	FX5-400350-185	400	3	26.7	DS5	40.2	22.3	63,150
23.1	FX5-400350-231	400	3	33.3	DS5	24.2	13.5	78,850
3.7	FX5-415350-037	415	3	5.1	DS5	16.6	9.2	12,650
7.5	FX5-415350-075	415	3	10.4	DS5	33.8	18.7	25,600
14.9	FX5-415350-149	415	3	20.7	DS5	32.5	18.1	50,850
22.4	FX5-415350-224	415	3	31.2	DS5	23.5	13.1	76,450
4.2	FX5-440350-042	440	3	5.5	DS5	19.0	10.5	14,350
8.4	FX5-440350-084	440	3	11.0	DS5	37.8	21.1	28,700
16.8	FX5-440350-168	440	3	27.5	DS5	36.5	20.3	57,350
20.9	FX5-440350-209	440	3	27.5	DS5	22.1	12.2	71,350

Notes:

- Minimum conductor size for 30°C (86°F) ambient. Derate conductor for ambient temperature. Use minimum 90°C (194°F) insulation.
- Heater is functioning normally if at rated voltage the amp draw is within 10% of the value in this table.
- Operation at lower voltage will result in reduced heat output and amp draw
- Add "T" to model number when adding a built-in thermostat
- Add "D" to model number when adding a built-in disconnect switch
- Add "P" to model number when adding a built-in pilot light
- Add "S" to model number when adding a 3-way switch
- Add "H" to model number for units with high "off" (deenergized) ambient temperatures
- Add "C" to model number for units with Heresite® coating
- Add "A" to model number for units with stainless steel cabinet

Installation Conditions:

- The FX5 Series Electric Air Heaters are for dry indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.
- The FX5 heaters are to be used only in atmospheres having an ignition temperature higher than 165°C (329°F).
- Altitude restrictions apply – see specifications on next page.
- Heaters should be connected to a fixed power supply and must be permanently mounted in a level, upright position during operation.
- Read and be aware of the terms of our Warranty located in the owner's manual.
- Refer to Owner's Manual.

Note: (*) Exceeds the 48 amp. circuit limit of NEC 424-22

Specifications for 60 Hertz FX5

60 HERTZ		FX5								
NOMINAL kW		3	5	7.5	10	15	20	25	30	35
Maximum Altitude	(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000	6,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134	1,829
Air Delivery @ 70°F	(CFM)	850				1,750		3,600		
	@ 21°C (m³/hr.)	1,444				2,973		6,116		
Horizontal Throw	(ft.)	30				40		70		
	(m)	9.1				12.2		21.3		
Maximum Mounting Height (to underside)	(ft.)	10				10		20		
	(m)	3.0				3.0		6.1		
Motor Power*	(HP)	1/2				1/2		1/2		
	(kW)	0.373				0.373		0.373		
Motor Speed	(RPM)	1,725				1,725		1,725		
Fan Diameter	(in.)	12				16		20		
	(mm)	305				406		508		
Net Weight		without DS5		with DS5		without DS5	with DS5	without DS5	with DS5	
	(lbs.)	140		152		168	180	201	213	
	(kg)	63.5		68.9		76.2	81.6	91.2	96.6	
Shipping Weight	(lbs.)	194		206		218	230	252	264	
	(kg)	88		93.4		98.9	104.3	114.3	119.7	

See page 16 for general specifications common to all FX5 models.

Weights are an approximate maximum.

* Manufacturer reserves the right to replace motors with suitable alternates.

Specifications for 50 Hertz FX5

50 HERTZ		FX5							
NOMINAL kW		2.5	3.7 & 4.2	6.3 & 7.5	8.4	12.5 & 12.6	14.9 & 16.7	20.9	22.4
Maximum Altitude	(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134
Air Delivery @ 70°F	(CFM)	700				1,450		3,000	
	@ 21°C (m³/hr.)	1,189				2,463		5,096	
Horizontal Throw	(ft.)	25				35		60	
	(m)	7.6				10.7		18.2	
Maximum Mounting Height (to underside)	(ft.)	10				10		20	
	(m)	3.0				3.0		6.1	
Motor Speed	(RPM)	1,437				1,437		1,437	
Motor Power*	(HP)	1/4				1/4		1/2	
	(kW)	0.187				0.187		0.373	
Fan Diameter	(in.)	12				16		20	
	(mm)	305				406		508	
Net Weight		without DS5		with DS5		without DS5	with DS5	without DS5	with DS5
	(lbs.)	140		152		168	180	201	213
	(kg)	63.5		68.9		76.2	81.6	91.2	96.6
Shipping Weight	(lbs.)	194		206		218	230	252	264
	(kg)	88		93.4		98.9	104.3	114.3	119.7

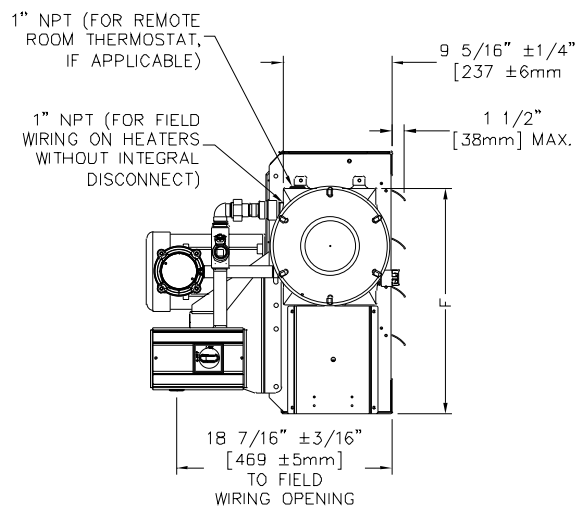
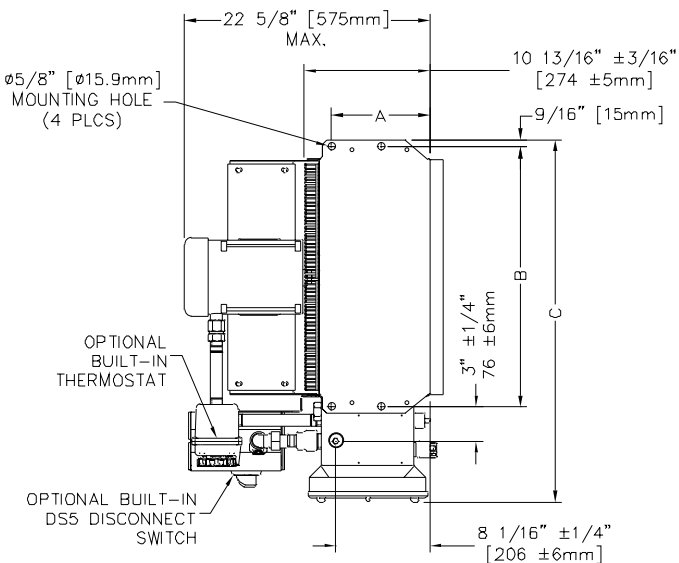
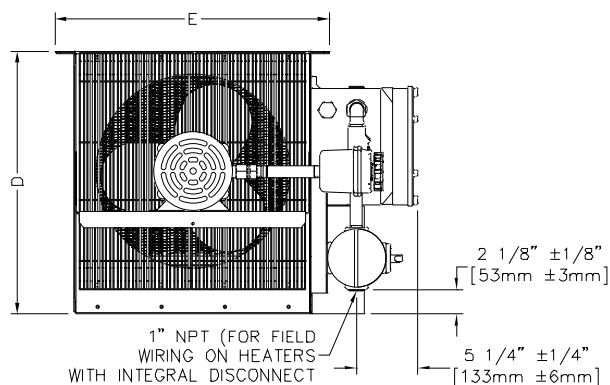
See page 16 for general specifications common to all FX5 models.

Weights are an approximate maximum.

* Manufacturer reserves the right to replace motors with suitable alternates.

DIM.	kW	2.5-10	12.5-20	20.9-35	DIM. TOL. ±
A	in.	8-7/16	8-7/16	8-7/16	1/8
	mm	215	215	215	3
B	in.	18-3/16	22-5/16	26-1/4	1/8
	mm	462	566	667	3
C	in.	27	31	35	3/16
	mm	686	787	889	4
D	in.	18-1/2	22-1/2	26-1/2	1/8
	mm	470	572	674	3
E	in.	19-7/16	23-7/16	27-7/16	3/8
	mm	494	596	697	10
F	in.	17-1/2	19-1/2	21-13/16	5/16
	mm	444	495	554	8

DIMENSIONAL TOLERANCES $\pm 1/8"$ [$\pm 3\text{mm}$]
UNLESS OTHERWISE SPECIFIED.



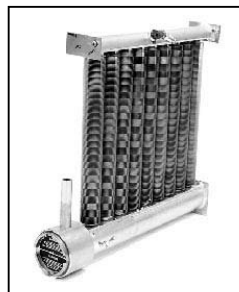
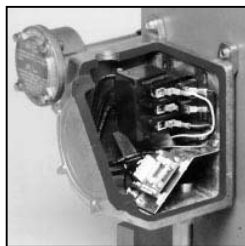
Model Coding

MODEL SERIES	HEATER VOLTAGE	PHASE	HERTZ	HEATER KILOWATTS	WELDED CORE	OPTIONS
FX5 - 480	208V 240V 480V 600V	1 3	50 60	030 - 3 kW 050 - 5 kW 075 - 7.5 kW 100 - 10 kW 150 - 15 kW 200 - 20 kW 250 - 25 kW 300 - 30 kW 350 - 35 kW		T - Built-in thermostat D - Built-in disconnect switch P - Built-in pilot light S - 3-way switch H - Unit with high "off" (deenergized) ambient temperatures C - Heresite® coating A - Stainless steel cabinet
5th GENERATION						

Reminder: This nomenclature illustration is intended primarily to explain how a product part number is defined. Not all voltage and/or wattage combinations are available – please consult the catalogue chart(s) for product availability.

FX4 Explosion-Proof Electric Air Heaters

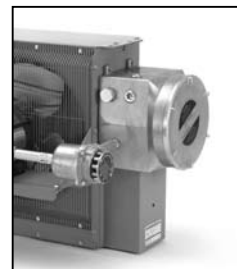
FX4 heaters are UL listed and/or CSA certified for use in hazardous locations. They are designed for dry indoor industrial applications such as oil refineries, petrochemical plants, pulp and paper mills, grain elevators, hazardous waste storage facilities, wastewater treatment plants, etc., where specific explosive gases or dusts may be present.



All FX4 heaters utilize the VacuCore® liquid-to-air heat exchanger. The induced vacuum within the sealed core provides greater efficiency, even distribution of heat across the face of the exchanger, and a faster warm-up. When necessary, the entire core can be safely and easily replaced with a new exchange unit.

The heater core assembly is contained in a sturdy, epoxy-coated 14-gauge steel cabinet which also carries the

motor and fan assembly. Adjustable louvres allow directional control of the airflow. A narrow gap, two-piece fan guard is provided to shield all moving parts. All fasteners are zinc plated for corrosion protection.

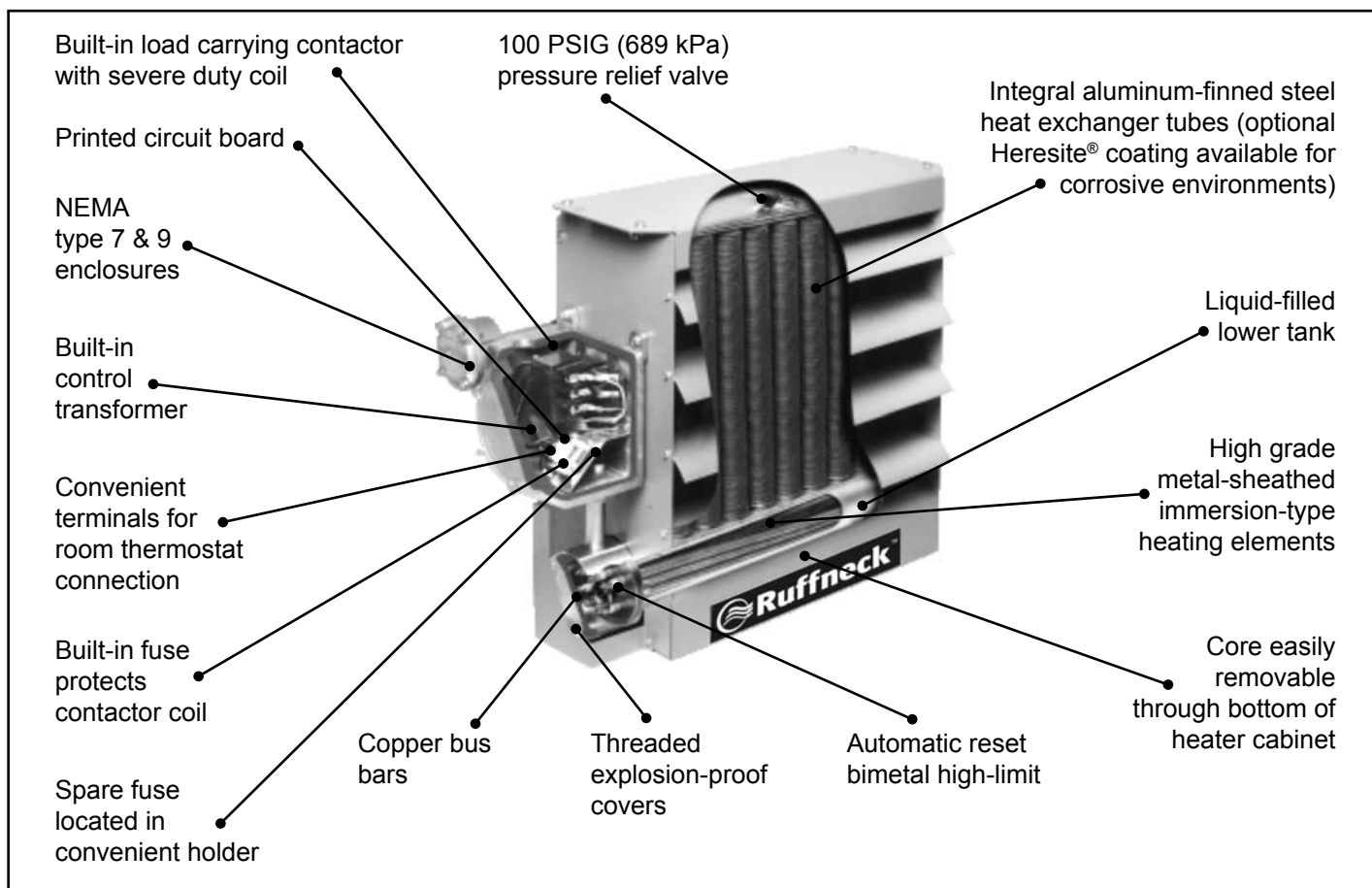


Ruffneck™ heaters are built to last. All Ruffneck™ products are subjected to exhaustive technical analysis and testing during design and development, and are manufactured under a registered quality assurance program. As a result, they have consistently proven their safety and reliability.

For hazardous location heating, rely on the Ruffneck™ FX4 heater for the most dependable, trouble-free service available.

SUITABLE FOR THE FOLLOWING HAZARDOUS LOCATION CLASSIFICATIONS:

- Class I, Divisions 1 & 2, Groups C & D
- Class II, Divisions 1 & 2, Groups E, F & G



Heresite® is a registered trademark of Heresite® Protective Coatings Inc.

3 - YEAR WARRANTY

Performance Data for 60 Hertz FX4

UL listed and/or CSA certified. Temperature Code T3B 165°C (329°F)

NOMINAL WATTAGE (kW)	MODEL	VOLTAGE	PHASE	TOTAL CURRENT (A)	AIR TEMPERATURE RISE		BTU/hr
					°F	°C	
3	FX4-208160-030	208	1	14.4	19.0	10.5	10,250
	FX4-240160-030	240	1	12.5			
	FX4-208360-030	208	3	8.3			
	FX4-240360-030	240	3	7.2			
	FX4-480160-030*	480	1	6.3			
	FX4-480360-030	480	3	3.6			
	FX4-600360-030*	600	3	2.9			
5	FX4-208160-050	208	1	24.0	31.6	17.6	17,050
	FX4-240160-050	240	1	20.8			
	FX4-208360-050	208	3	13.9			
	FX4-240360-050	240	3	12.0			
	FX4-480160-050*	480	1	10.4			
	FX4-480360-050	480	3	6.0			
	FX4-600360-050*	600	3	4.8			
7.5	FX4-208160-075	208	1	36.1	27.9	15.5	25,600
	FX4-240160-075	240	1	31.3			
	FX4-208360-075	208	3	20.8			
	FX4-240360-075	240	3	18.0			
	FX4-480160-075*	480	1	15.6			
	FX4-480360-075	480	3	9.0			
	FX4-600360-075*	600	3	7.2			
10	FX4-208160-100*†	208	1	48.1	37.2	20.6	34,100
	FX4-240160-100	240	1	41.7			
	FX4-208360-100	208	3	27.8			
	FX4-240360-100	240	3	24.1			
	FX4-480160-100*	480	1	20.8			
	FX4-480360-100	480	3	12.0			
	FX4-600360-100*	600	3	9.6			
15	FX4-240160-150*†	240	1	62.5	27.1	15.0	51,200
	FX4-208360-150	208	3	41.6			
	FX4-240360-150	240	3	36.1			
	FX4-480160-150*	480	1	31.3			
	FX4-480360-150	480	3	18.0			
	FX4-600360-150*	600	3	14.4			
20	FX4-208360-200*†	208	3	55.5	36.1	20.1	68,250
	FX4-240360-200*†	240	3	48.1			
	FX4-480160-200*	480	1	41.7			
	FX4-480360-200	480	3	24.1			
	FX4-600360-200*	600	3	19.2			
25	FX4-240360-250*†	240	3	60.1	21.9	12.2	85,300
	FX4-480360-250	480	3	30.1			
	FX4-600360-250*	600	3	24.1			
30	FX4-480360-300	480	3	36.1	26.3	14.6	102,350
	FX4-600360-300*	600	3	28.9			
35	FX4-480360-350	480	3	42.1	28.0	15.6	119,450
	FX4-600360-350*	600	3	33.7			

240V heaters are also suitable for 220V & 230V with derated wattage. 480V heaters are also suitable for 460V with derated wattage. 600V heaters are also suitable for 575V with derated wattage.

Note: (*) CSA certified only. (†) Exceeds the 48 amp. circuit limit of NEC 424-22

To order a heater with a built-in room thermostat, add a "T" suffix to model number.

Please specify CSA or UL heater when ordering.

Defender explosion-proof thermostats are suitable for all FX4 models.

See page 15 for
model coding.

See page 13
for installation
conditions.

Performance Data for 50 Hertz FX4

CSA certified only. Class I, Divisions 1 & 2, Groups C & D;
 Class II, Divisions 1 & 2, Groups E, F & G;
 Class I, Zones 1 & 2, Groups IIA & IIB.
 Temperature Code T3B 165°C (329°F)



NOMINAL WATTAGE (kW)	MODEL	VOLTAGE	PHASE	TOTAL CURRENT (A)	AIR TEMPERATURE RISE		BTU/hr
					°F	°C	
2.5	FX4-220150-025	220	1	11.4	19.7	11.0	8,550
4.2	FX4-220150-042	220	1	19.1	33.2	18.4	14,350
6.3	FX4-220150-063	220	1	28.6	28.4	15.8	21,500
8.4	FX4-220150-084	220	1	38.2	37.9	21.1	28,650
12.6	FX4-220150-126	220	1	57.3	27.5	15.3	43,000
2.5	FX4-380350-025	380	3	3.8	19.7	11.0	8,550
4.2	FX4-380350-042	380	3	6.4	33.2	18.4	14,350
6.3	FX4-380350-063	380	3	9.6	28.4	15.8	21,500
8.4	FX4-380350-084	380	3	12.8	37.9	21.1	28,650
12.5	FX4-380350-125	380	3	19.0	27.2	15.1	42,650
16.7	FX4-380350-167	380	3	25.4	36.4	20.2	57,000
20.9	FX4-380350-209	380	3	31.8	22.0	12.2	71,300
3.7	FX4-415350-037	415	3	5.1	29.2	16.2	12,600
7.5	FX4-415350-075	415	3	10.4	33.9	18.8	25,600
14.9	FX4-415350-149	415	3	20.7	32.5	18.0	50,850
22.4	FX4-415350-224	415	3	31.2	23.6	13.1	76,450

To order a heater with a built-in room thermostat, add a "T" suffix to model number.

Installation Conditions

1. The FX4 Series Electric Air Heaters are for dry indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.
2. The FX4 heaters are to be used only in atmospheres having an ignition temperature higher than 165°C (329°F)
3. Altitude restrictions apply – see specifications on next page.
4. Heaters should be connected to a fixed power supply and must be permanently mounted in a level, upright position during operation.
5. Read and be aware of the terms of our Warranty located in the owner's manual.
6. Refer to Owner's Manual.

Specifications for 60 Hertz FX4

60 HERTZ		FX4								
NOMINAL kW		3	5	7.5	10	15	20	25	30	35
Maximum Altitude	(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000	6,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134	1,829
Air Delivery @ 70°F	(CFM)	500		850		1,750		3,600		3,950
	@ 21°C (m³/hr.)	850		1,444		2,973		6,116		6,711
Horizontal Throw	(ft.)	15		30		40		70		
	(m)	4.6		9.1		12.2		21.3		
Maximum Mounting Height (to underside)	(ft.)	7		10		10		20		
	(m)	2.1		3.0		3.0		6.1		
Motor Power	(HP)	1/2				1/2		1/2		
	(kW)	0.373				0.373		0.373		
Motor Speed	(RPM)	1,725				1,725		1,725		
Fan Diameter	(in.)	12				16		20		
	(mm)	305				406		508		
Net Weight	(lbs.)	131				153		192		
	(kg)	59.5				69.5		87.3		
Shipping Weight	(lbs.)	180				202		241		
	(kg)	81.8				91.8		109.5		

See page 16 for general specifications common to all FX4 models.

Weights are an approximate maximum.

Specifications for 50 Hertz FX4

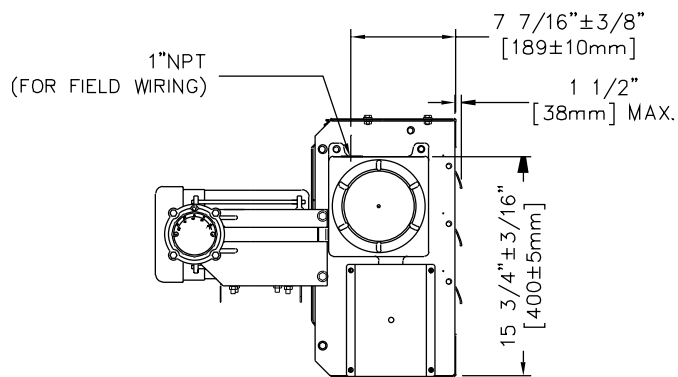
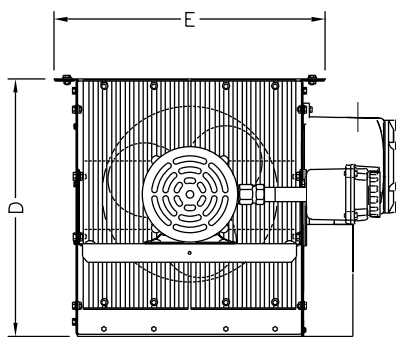
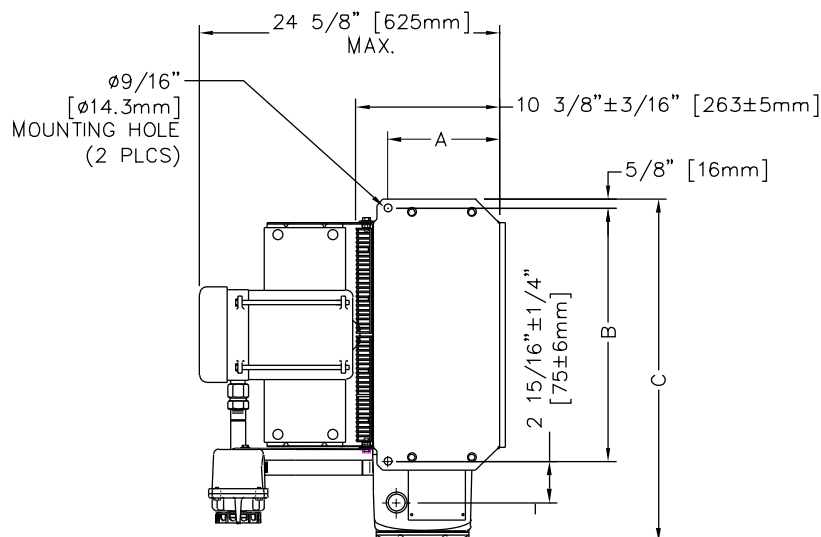
50 HERTZ		FX4							
NOMINAL kW		2.5	3.7 & 4.2	6.3 & 7.5	8.4	12.5 & 12.6	14.9 & 16.7	20.9	22.4
Maximum Altitude	(ft.)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134
Air Delivery @ 70°F	(CFM)	400		700		1,450		3,000	
	@ 21°C (m³/hr.)	679		1,189		2,463		5,096	
Horizontal Throw	(ft.)	13		25		35		60	
	(m)	4.0		7.6		10.7		18.2	
Maximum Mounting Height (to underside)	(ft.)	7		10		10		20	
	(m)	2.1		3.0		3.0		6.1	
Motor Speed	(RPM)	1,437				1,437		1,437	
Fan Diameter	(in.)	12				16		20	
	(mm)	305				406		508	
Net Weight	(lbs.)	131				153		192	
	(kg)	59.5				69.5		87.3	
Shipping Weight	(lbs.)	180				202		241	
	(kg)	81.8				91.8		109.5	

See page 16 for general specifications common to all FX4 models.

Weights are an approximate maximum.

DIM.	kW	2.5–10	12.5–20	20.9–35	DIM. TOL. ±
A	in.	8–1/16	6–11/16	7–1/16	1/8
	mm	204	170	179	3
B	in.	18–3/16	22–3/16	26–3/16	1/8
	mm	462	564	665	3
C	in.	24–5/8	28–5/8	32–5/8	5/16
	mm	625	727	828	8
D	in.	18–1/2	22–1/2	26–1/2	1/8
	mm	470	572	674	3
E	in.	19–7/16	23–7/16	27–7/16	1/8
	mm	494	596	697	3

DIMENSIONAL TOLERANCES $\pm 1/8"$ [$\pm 3\text{mm}$]
UNLESS OTHERWISE SPECIFIED.



Model Coding

FX4	480	3	60	350	T or C
MODEL SERIES	HEATER VOLTAGE	PHASE	HERTZ	HEATER KILOWATTS	OPTIONS
	208V 240V 480V 600V	1 3	50 60	030 – 3 kW 050 – 5 kW 075 – 7.5 kW 100 – 10 kW 150 – 15 kW 200 – 20 kW 250 – 25 kW 300 – 30 kW 350 – 35 kW	T – Built-in Thermostat C – Heresite® Coating
4th GENERATION					Ask about available Heresite® coatings.

Reminder: This nomenclature illustration is intended primarily to explain how a product part number is defined. Not all voltage and/or wattage combinations are available – please consult the catalogue chart(s) for product availability.

Side by Side Comparison - FX5 to FX4

Common Features for the FX5 & FX4 Specifications	
Hazardous Location Classifications	Class I, Divisions 1 & 2, Groups C & D Class II, Divisions 1 & 2, Groups E, F & G Class I, Zones 1 & 2, Group IIA & IIB Temperature Code T3B 165°C (329°F)
Motor Type	Explosion-Proof. Thermally protected. Permanently lubricated ball bearings.
Fan	Aluminum blade. Steel spider and hub with 5/8 in. (15 mm) bore.
Fan Guard	Split design with close wire spacing. 1/4 in. (6.3mm) diameter probe will not enter.
Heating Elements	Long-life metal-sheathed elements
Control Circuit	120 Volts, 0.128 amps, 15VA. (Grounded)
Optional Built-in Thermostat	Explosion-proof. 36°F to 82°F (2°C to 28°C)
Control Transformer	Multiple voltage primary, 120V secondary, 25VA.
Contactor	40 or 75 amp. Rated for 500,000 mechanical operations. 120 Volts, 15VA coil (separately fuse-protected).
Conduit Material	Heavy wall, 0.122 in. (3 mm), steel
Overpressure Protection	Preset 100 psig (690 kPa) pressure relief valve, aluminum body, no serviceable parts.
Operational Temperature Range	-4°F to 104°F (-20°C to 40°C)

Distinctive Features for the FX5 & FX4 Specifications		
	FX5	FX4
Approvals		
Junction Box (h x w x d)	10.25" (230 mm) x 8.00" (180 mm) x 9.12" (205 mm)	6.94" (156 mm) x 6.56" (147 mm) x 5.125" (115 mm)
Temperature High-Limit	Same as FX4 plus an additional ambient high limit.	Automatic reset type, snap-action bimetal, open on temperature rise. Rated 100,000 cycles at 10 amp, handles 0.128 amps.
Heating Elements	Propylene Glycol	Propylene Glycol
Cabinet Material	Same as FX4 with optional stainless steel casing.	14 ga. (0.075 in.-1mm) epoxy powder coated steel. Optional Heresite coating available for corrosive atmospheres.
Core	HD Core	XD Core
Field Connections	Two 1" NPT	One 1" NPT
Weight (for 15kW unit)	168 lbs. (76.36 kgs)	144 lbs. (65.38 kgs)
Weight with disconnect (for 15kW unit)	180 lbs. (81.82 kgs)	n/a
Optional Built-in Disconnect Switch	DS5 uses x-Max® construction	DS4 is no longer available
Optional Pilot Light	Explosion-proof light fixture with replaceable bulb	n/a
Optional 3 - Way Switch	Explosion-proof 3 position fan switch (on, off, fan only).	n/a
Mounting Holes	Four 9/16 in. (14 mm) diameter holes at the top of heater	Two 9/16 in. (14 mm) diameter holes at the top of heater.

FE1 Explosion-Proof Electric Air Heaters



FE1 heaters are CE Marked & ATEX Approved to Directive 94/9/EC for use in hazardous locations. They are designed for dry indoor industrial applications such as oil refineries, petrochemical plants, pulp and paper mills, hazardous waste storage facilities, wastewater treatment plants, etc., where specific explosive gases or dusts may be present.

All FE1 heaters utilize the VacuCore® liquid-to-air heat exchanger. The induced vacuum within the sealed core provides greater efficiency, even distribution of heat across the face of the exchanger, and a faster warm-up. When necessary, the entire core can be safely and easily replaced with a new or factory reconditioned exchange unit.

The heater core assembly is contained in a sturdy, epoxy-coated, 14-gauge steel cabinet which also carries the motor and fan assembly. Adjustable louvers allow directional control of the airflow. A narrow gap, two-piece fan guard is provided to shield all moving parts. All fasteners are zinc plated for corrosion protection.

All aspects and details of the FE1 are subjected to exhaustive technical analysis and testing during design and development, and are manufactured under a registered quality assurance program. As a result, they have consistently proven their safety and reliability.



**3-YEAR
WARRANTY**



HO02

POCC CA.HO02 B01196

Model Coding

FE1	220	1	50	126	T																										
MODEL SERIES	HEATER VOLTAGE	PHASE	HERTZ	HEATER KILOWATTS	OPTIONS																										
1st GENERATION	220V 230V 240V 380V 400V 415V 440V 480V 600V	1 3	50 60	<table><tr><td>025 - 2.5 kW</td><td>100 - 10.0 kW</td></tr><tr><td>028 - 2.8 kW</td><td>125 - 12.5 kW</td></tr><tr><td>030 - 3.0 kW</td><td>126 - 12.6 kW</td></tr><tr><td>037 - 3.7 kW</td><td>138 - 13.8 kW</td></tr><tr><td>042 - 4.2 kW</td><td>139 - 13.9 kW</td></tr><tr><td>046 - 4.6 kW</td><td>149 - 14.9 kW</td></tr><tr><td>050 - 5.0 kW</td><td>150 - 15.0 kW</td></tr><tr><td>063 - 6.3 kW</td><td>167 - 16.7 kW</td></tr><tr><td>069 - 6.9 kW</td><td>185 - 18.5 kW</td></tr><tr><td>075 - 7.5 kW</td><td>200 - 20.0kW</td></tr><tr><td>084 - 8.4 kW</td><td>209 - 20.9 kW</td></tr><tr><td>093 - 9.3 kW</td><td>224 - 22.4 kW</td></tr><tr><td></td><td>231 - 23.1 kW</td></tr></table>	025 - 2.5 kW	100 - 10.0 kW	028 - 2.8 kW	125 - 12.5 kW	030 - 3.0 kW	126 - 12.6 kW	037 - 3.7 kW	138 - 13.8 kW	042 - 4.2 kW	139 - 13.9 kW	046 - 4.6 kW	149 - 14.9 kW	050 - 5.0 kW	150 - 15.0 kW	063 - 6.3 kW	167 - 16.7 kW	069 - 6.9 kW	185 - 18.5 kW	075 - 7.5 kW	200 - 20.0kW	084 - 8.4 kW	209 - 20.9 kW	093 - 9.3 kW	224 - 22.4 kW		231 - 23.1 kW	T - Built-in thermostat
025 - 2.5 kW	100 - 10.0 kW																														
028 - 2.8 kW	125 - 12.5 kW																														
030 - 3.0 kW	126 - 12.6 kW																														
037 - 3.7 kW	138 - 13.8 kW																														
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046 - 4.6 kW	149 - 14.9 kW																														
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063 - 6.3 kW	167 - 16.7 kW																														
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075 - 7.5 kW	200 - 20.0kW																														
084 - 8.4 kW	209 - 20.9 kW																														
093 - 9.3 kW	224 - 22.4 kW																														
	231 - 23.1 kW																														

General Specifications for all FE1 Models

Approvals	ATEX Approved (Directive 94/9/EC), GosStandart Certificate of Conformity (GOST)
Hazardous Location Classifications	CE ITS07ATEXQ5657  II 2 G, Ex d IIB T3 Zone 1
Enclosures	NEMA Type 7 & 9. For indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.
Motor Type	Explosion-proof. Thermally protected. Permanently lubricated ball bearings.
Fan	Aluminum blades with steel spider and hub, 15.9 mm bore.
Fan Guard	Split design with close wire spacing. 6.3 mm diameter probe will not enter.
Mounting Holes	Two 14.3 mm diameter holes at top of heater.
Heating Elements	Three long-life, low watt-density, high grade metal-sheathed elements.
Temperature High-Limit	Automatic reset type, snap-action bimetal, open on temperature rise. Rated 100,000 cycles at 10 amps.
Control Circuit	120 Volts, 0.128 amps, 15VA. (Grounded)
Optional Built-in Thermostat	Flame-proof. 2°C to 28°C.
Control Transformer	Multiple primary, 120 volts secondary, 25 VA.
Contactors	40 or 75 amp. Rated for 500,000 mechanical operations. 120 Volts, 15 VA coil (separately fuse-protected).
Heat Transfer Fluid	Long-life formulated PROPYLENE glycol and water, freeze protected to -45°C.
Cabinet Material	14 gauge (1.90 mm) Steel. Epoxy coated with five-stage pretreatment, including iron phosphate. Optional Heresite® coating available for corrosive atmospheres.
Core	Core Steel with integral aluminum fins, vacuum charged and sealed. Optional Heresite® coating available for corrosive atmospheres.
Conduit Material	Heavy wall, 3.1 mm (0.122 in.) steel.
Overpressure Protection	Preset 690 kPa (100 psig) pressure relief valve, aluminum body, no serviceable parts.
Operational Temperature Limitations	-20°C to 40°C
Storage Limitations	-45°C to 80°C, short term to 150°C (302°F) maximum 16 hours continuous. Do not immerse in water. Do not store in areas exposed to rain or snow.

Performance Data for FE1 60 Hertz

C E ITS07ATEXQ5657 Ex II 2 G, Ex d IIB T3 Zone 1

	MODEL	VOLTAGE (V)	NOMINAL WATTAGE (kW)	BTU/hr	PHASE	TOTAL CURRENT (A)	AIR TEMPERATURE RISE	
							°F	°C
220 VOLT	FE112-220160-2.5	220	2.5	8,550	1	11.4	14.4	8.0
	FE112-220160-4.2	220	4.2	14,350	1	19.1	25.0	13.9
	FE112-220160-6.3	220	6.3	21,500	1	28.6	22.5	12.5
	FE112-220160-8.4	220	8.4	28,700	1	38.2	30.3	16.9
	FE116-220160-12.6	220	12.6	43,050	1	57.3	21.9	12.2
230 VOLT	FE112-230160-2.8	230	2.8	9,550	1	12.0	15.7	8.7
	FE112-230160-4.6	230	4.6	15,700	1	20.0	27.3	15.2
	FE112-230160-6.9	230	6.9	23,550	1	29.9	24.6	13.7
	FE112-230160-9.2	230	9.2	31,400	1	39.9	33.2	18.4
	FE116-230160-13.8	230	13.8	47,150	1	59.9	23.9	13.3
240 VOLT	FE112-240160-3.0	240	3.0	10,250	1	12.4	17.1	9.5
	FE112-240160-5.0	240	5.0	17,100	1	20.8	29.8	16.5
	FE112-240160-7.5	240	7.5	25,600	1	31.2	26.8	14.9
	FE112-240160-10.0	240	10.0	34,150	1	41.7	36.1	20.1
	FE116-240160-15.0	240	15.0	51,250	1	62.5	26.1	14.5
380 VOLT	FE112-380360-2.5	380	2.5	8,550	3	3.8	14.3	7.9
	FE112-380360-4.2	380	4.2	14,350	3	6.4	24.9	13.8
	FE112-380360-6.3	380	6.3	21,500	3	9.6	22.4	12.5
	FE112-380360-8.4	380	8.4	28,700	3	12.8	30.2	16.8
	FE116-380360-12.5	380	12.5	42,700	3	19.0	21.8	12.1
	FE116-380360-16.7	380	16.7	57,050	3	25.4	29.3	16.3
	FE120-380360-20.9	380	20.9	71,400	3	31.8	17.8	9.9
400 VOLT	FE112-400360-2.8	400	2.8	9,550	3	4.1	15.8	8.8
	FE112-400360-4.6	400	4.6	15,700	3	6.6	27.6	15.3
	FE112-400360-6.9	400	6.9	23,550	3	10.0	24.8	13.8
	FE112-400360-9.3	400	9.3	31,750	3	13.4	33.4	18.6
	FE116-400360-13.9	400	13.9	47,450	3	20.1	24.1	13.4
	FE116-400360-18.5	400	18.5	63,200	3	26.7	32.5	18.1
	FE120-400360-23.1	400	23.1	78,900	3	33.3	19.7	11.0
415 VOLT	FE112-415360-3.7	415	3.7	12,650	3	5.1	22.2	12.3
	FE112-415360-7.5	415	7.5	25,600	3	10.4	27.0	15.0
	FE116-415360-14.9	415	14.9	50,900	3	20.7	26.3	14.6
	FE120-415360-22.4	415	22.4	76,500	3	31.2	19.2	10.7
440 VOLT	FE112-440360-4.2	440	4.2	14,350	3	5.5	25.0	13.9
	FE112-440360-8.4	440	8.4	28,700	3	11.0	30.3	16.9
	FE116-440360-12.6	440	12.6	43,050	3	16.5	22.8	12.7
	FE116-440360-16.8	440	16.8	57,400	3	22.0	29.5	16.4
	FE120-440360-21.0	440	21.0	71,700	3	27.6	17.9	9.9
480 VOLT	FE112-480360-3.0	480	3.0	10,250	3	3.6	17.1	9.5
	FE112-480360-5.0	480	5.0	17,100	3	6.0	29.8	16.5
	FE112-480360-7.5	480	7.5	25,600	3	9.0	26.8	14.9
	FE112-480360-10.0	480	10.0	34,150	3	12.0	36.1	20.1
	FE116-480360-15.0	480	15.0	51,250	3	18.0	26.1	14.5
	FE116-480360-20.0	480	20.0	68,300	3	24.1	35.1	19.5
600 VOLT	FE112-600360-3.0	600	3.0	10,250	3	2.9	17.1	9.5
	FE112-600360-5.0	600	5.0	17,100	3	4.8	29.8	16.5
	FE112-600360-7.5	600	7.5	25,600	3	7.2	26.8	14.9
	FE112-600360-10.0	600	10.0	34,150	3	9.6	36.1	20.1
	FE116-600360-15.0	600	15.0	51,250	3	14.4	26.1	14.5
	FE116-600360-20.0	600	20.0	68,300	3	19.2	35.1	19.5

Notes:

1. To order a heater with a built-in room thermostat, add a "T" suffix to model number.
2. Heater is functioning normally if at rated voltage the amp draw is within 10% of the value in this table.

Performance Data for FE1 50 Hertz

CE ITS07ATEXQ5657 Ex II 2 G, EEx d IIB T3 Zone 1

	MODEL	VOLTAGE (V)	NOMINAL WATTAGE (kW)	BTU/hr	PHASE	TOTAL CURRENT (A)	AIR TEMPERATURE RISE	
							°F	°C
220 VOLT	FE112-220150-2.5	220	2.5	8,550	1	11.4	18.0	10.0
	FE112-220150-4.2	220	4.2	14,350	1	19.1	31.3	17.4
	FE112-220150-6.3	220	6.3	21,500	1	28.6	27.4	15.2
	FE112-220150-8.4	220	8.4	28,700	1	38.2	36.8	20.5
	FE116-220150-12.6	220	12.6	43,050	1	57.3	26.4	14.7
230 VOLT	FE112-230150-2.8	230	2.8	9,550	1	12.0	19.6	10.9
	FE112-230150-4.6	230	4.6	15,700	1	20.0	34.2	19.0
	FE112-230150-6.9	230	6.9	23,550	1	29.9	29.9	16.6
	FE112-230150-9.2	230	9.2	31,400	1	39.9	40.3	22.4
	FE116-230150-13.8	230	13.8	47,150	1	59.9	28.9	16.1
240 VOLT	FE112-240150-3.0	240	3.0	10,250	1	12.4	21.4	11.9
	FE112-240150-5.0	240	5.0	17,100	1	20.8	37.2	20.7
	FE112-240150-7.5	240	7.5	25,600	1	31.2	32.6	18.1
	FE112-240150-10.0	240	10.0	34,150	1	41.7	43.8	24.4
	FE116-240150-15.0	240	15.0	51,250	1	62.5	31.4	17.5
380 VOLT	FE112-380350-2.5	380	2.5	8,550	3	3.8	17.9	10.0
	FE112-380350-4.2	380	4.2	14,350	3	6.4	31.1	17.3
	FE112-380350-6.3	380	6.3	21,500	3	9.6	27.2	15.1
	FE112-380350-8.4	380	8.4	28,700	3	12.8	36.6	20.4
	FE116-380350-12.5	380	12.5	42,700	3	19.0	26.3	14.6
	FE116-380350-16.7	380	16.7	57,050	3	25.4	35.4	19.7
	FE120-380350-20.9	380	20.9	71,400	3	31.8	21.4	11.9
400 VOLT	FE112-400350-2.8	400	2.8	9,550	3	4.1	19.8	11.0
	FE112-400350-4.6	400	4.6	15,700	3	6.6	34.5	19.2
	FE112-400350-6.9	400	6.9	23,550	3	10.0	30.2	16.8
	FE112-400350-9.3	400	9.3	31,750	3	13.4	40.6	22.6
	FE116-400350-13.9	400	13.9	47,450	3	20.1	29.1	16.2
	FE116-400350-18.5	400	18.5	63,200	3	26.7	39.2	21.8
	FE120-400350-23.1	400	23.1	78,900	3	33.3	23.7	13.1
415 VOLT	FE112-415350-3.7	415	3.7	12,650	3	5.1	27.8	16.3
	FE112-415350-7.5	415	7.5	25,600	3	10.4	32.7	18.9
	FE116-415350-14.9	415	14.9	50,900	3	20.7	31.7	18.1
	FE120-415350-22.4	415	22.4	76,500	3	31.2	23.0	13.1
440 VOLT	FE112-440350-4.2	440	4.2	14,350	3	5.5	31.3	17.4
	FE112-440350-8.4	440	8.4	28,700	3	11.0	36.8	20.5
	FE116-440350-12.6	440	12.6	43,050	3	16.5	27.5	15.3
	FE116-440350-16.8	440	16.8	57,400	3	22.0	35.6	19.8
	FE120-440350-21.0	440	21.0	71,700	3	27.6	21.5	11.9
480 VOLT	FE112-480350-3.0	480	3.0	10,250	3	3.6	21.4	11.9
	FE112-480350-5.0	480	5.0	17,100	3	6.0	37.2	20.7
	FE112-480350-7.5	480	7.5	25,600	3	9.0	32.6	18.1
	FE112-480350-10.0	480	10.0	34,150	3	12.0	43.8	24.4
	FE116-480350-15.0	480	15.0	51,250	3	18.0	31.4	17.5
	FE116-480350-20.0	480	20.0	68,300	3	24.1	42.4	23.6
600 VOLT	FE112-600350-3.0	600	3.0	10,250	3	2.9	21.4	11.9
	FE112-600350-5.0	600	5.0	17,100	3	4.8	37.2	20.7
	FE112-600350-7.5	600	7.5	25,600	3	7.2	32.6	18.1
	FE112-600350-10.0	600	10.0	34,150	3	9.6	43.8	24.4
	FE116-600350-15.0	600	15.0	51,250	3	14.4	31.4	17.5
	FE116-600350-20.0	600	20.0	68,300	3	19.2	42.4	23.6

Notes:

1. To order a heater with a built-in room thermostat, add a "T" suffix to model number.
2. Heater is functioning normally if at rated voltage the amp draw is within 10% of the value in this table.

Specifications for 60 Hertz FE1

60 HERTZ		FE1							
	NOMINAL kW	2.5 to 3.0	3.7 to 5.0	6.3 to 7.5	8.4 to 10	12.5 to 13.9	14.9 to 20	20.9 to 21	22.4 to 23.1
Maximum Altitude	(ft)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134
Air Delivery @70°F	(CFM)	500		850		1,750		3,600	
	@21°F (m³/hr)	850		1,444		2,973		6,116	
Horizontal Throw	(ft)	15		30		40		70	
	(m)	4.6		9.1		12.2		21.3	
Maximum Mounting Height (to underside)	(ft)	7		10		10		20	
	(m)	2.1		3.0		3.0		6.1	
Motor Speed	(RPM)	1,725				1,725		1,725	
Fan Diameter	(in)	12				16		20	
	(mm)	305				406		508	
Net Weight	(lbs)	131				153		192	
	(kg)	59.5				69.5		87.3	
Shipping Weight	(lbs)	180				202		241	
	(kg)	81.8				91.8		109.5	

Weights are an approximate maximum.

Specifications for 50 Hertz FE1

50 HERTZ		FE1							
NOMINAL kW		2.5 to 3.0	3.7 to 5.0	6.3 to 7.5	8.4 to 10	12.5 to 13.9	14.9 to 20	20.9 to 21	22.4 to 23.1
Maximum Altitude	(ft)	12,000	8,000	10,000	7,000	10,000	7,000	10,000	7,000
	(m)	3,658	2,438	3,048	2,134	3,048	2,134	3,048	2,134
Air Delivery	@70°F (CFM)	400		700		1,450		3,000	
	@21°F (m³/hr)	679		1,189		2,463		5,096	
Horizontal Throw	(ft)	13		25		35		60	
	(m)	4.0		7.6		10.7		18.2	
Maximum Mounting Height (to underside)	(ft)	7		10		10		20	
	(m)	2.1		3.0		3.0		6.1	
Motor Speed	(RPM)	1,425				1,425		1,425	
Fan Diameter	(in)	12				16		20	
	(mm)	305				406		508	
Net Weight	(lbs)	131				153		192	
	(kg)	59.5				69.5		87.3	
Shipping Weight	(lbs)	180				202		241	
	(kg)	81.8				91.8		109.5	

Weights are an approximate maximum.

Notes:

1. Minimum conductor size for 30°C (86°F) ambient. Derate conductor for ambient temperature. Use minimum 90°C (194°F) insulation.
2. Operation at lower voltage will result in reduced heat output and amp draw.
3. Add "T" to model number when adding a built-in thermostat.

Installation Conditions:

1. The FE1 Series Electric Air Heaters are for dry indoor use only. Do not immerse in water. Do not store or use in areas exposed to rain or snow.
2. The FE1 heaters are to be used only in atmospheres having an ignition temperature higher than Temperature Code T3 200°C (329°F) for Class I & II.
3. Altitude restrictions apply – see specifications above.
4. Heaters should be connected to a fixed power supply and must be permanently mounted in a level, upright position during operation.
5. Read and be aware of the terms of our Warranty located in the owner's manual.
6. Refer to Owner's Manual.

CX1 ProVector® Explosion-Proof Heaters

For hazardous locations heating, rely on the Ruffneck™ CX1 ProVector® for the most dependable, trouble-free service available. CCI Thermal manufactures explosion-proof air heaters to satisfy the demanding requirements of the oil and gas well drilling industry. The harsh operating conditions of this application require the utmost in heater reliability.

FEATURE

- sloped-top cabinet
- no exposed copper or brass
- high-velocity airflow
- 14-gauge steel cabinet, available with stainless steel construction
- one of the shortest cabinet lengths available
- optional built-in thermostat
- incoloy 840 heating elements
- radial-embossed aluminum plate fins
- galvanized steel mounting brackets
- approvals - Groups A, B, C, D; IIA, IIB & IIC available IP55 moisture ingress protection

The unique design features and rugged, quality construction details that have made Ruffneck™ heaters the choice of the oil and gas industry are also appreciated by other heavy-duty industries throughout the world. The CX1 ProVector® explosion-proof heater offers the following outstanding features and benefits:

BENEFIT

- prevents objects from being set on top which restrict airflow
- corrosion resistant, suitable for H₂S environments
- heats up area faster with better heat distribution
- rugged reliability and unsurpassed corrosion resistance available with stainless steel construction
- smaller profile utilizes less wall and floor space
- reduced field installation costs
- longer life expectancy
- reduced fin warping for better heat transfer capabilities
- quick installation
- industry first approvals for built-in thermostat with Groups A, B, C, D; IIA, IIB, IIC ratings



Sloped top cabinet prevents objects from being set on top which could restrict airflow

Openings optimized for maximum safety and high airflow velocity

Epoxy-coated 14-gauge steel front and side cabinet panels
SS 304 available

Finned tube assembly can be easily removed

Radial-embossed aluminum plate fins

14-gauge galvanized steel rear cabinet panel
SS 304 available

Incoloy 840 heating elements contained in aluminum tube assembly

Large, heavy-duty aluminum data plate for legibility

Upward facing bolted explosion-proof cover

Aluminum enclosure

Optional built-in room thermostat with low (1) to high (10) settings. Available with Defender or x-Max® housings (not shown).

CX1 ProVector® Performance Data

Model (See Note #3)	Unit Wattage (kW)	Unit Output (BTU/hr)	Cabinet Length (inches)	Unit Voltage (volts)	Phase	Unit Current (amps)
Without built-in room thermostat (See Note #3)						
CX1-120160-012-T2A-IIB	1.2	4097	31.34	120	1	10.0
CX1-208160-012-T2A-IIB	1.2	4097	31.34	208	1	5.8
CX1-240160-012-T2A-IIB	1.2	4097	31.34	240	1	5.0
CX1-277160-012-T2A-IIB	1.2	4097	31.34	277	1	4.3
CX1-480160-012-T2A-IIB	1.2	4097	31.34	480	1	2.5
CX1-600160-012-T2A-IIB*	1.2	4097	31.34	600	1	2.0
CX1-120160-018-T2A-IIB	1.8	6146	31.34	120	1	15.0
CX1-208160-018-T2A-IIB	1.8	6146	31.34	208	1	8.7
CX1-240160-018-T2A-IIB	1.8	6146	31.34	240	1	7.5
CX1-277160-018-T2A-IIB	1.8	6146	31.34	277	1	6.5
CX1-480160-018-T2A-IIB	1.8	6146	31.34	480	1	3.8
CX1-600160-018-T2A-IIB*	1.8	6146	31.34	600	1	3.0
CX1-208160-036-T2A-IIB	3.6	12292	31.34	208	1	17.3
CX1-240160-036-T2A-IIB	3.6	12292	31.34	240	1	15.0
CX1-277160-036-T2A-IIB	3.6	12292	31.34	277	1	13.0
CX1-480160-036-T2A-IIB	3.6	12292	31.34	480	1	7.5
CX1-600160-036-T2A-IIB*	3.6	12292	31.34	600	1	6.0
CX1-208160-048-T2A-IIB*	4.8	16389	49.45	208	1	23.1
CX1-240160-048-T2A-IIB	4.8	16389	49.45	240	1	20.0
CX1-277160-048-T2A-IIB	4.8	16389	49.45	277	1	17.3
CX1-480160-048-T2A-IIB	4.8	16389	49.45	480	1	10.0
CX1-600160-048-T2A-IIB*	4.8	16389	49.45	600	1	8.0
CX1-208160-076-T2A-IIB*	7.6	25950	59.49	208	1	36.5
CX1-240160-076-T2A-IIB*	7.6	25950	59.49	240	1	31.7
CX1-277160-076-T2A-IIB*	7.6	25950	59.49	277	1	27.4
CX1-480160-076-T2A-IIB	7.6	25950	59.49	480	1	15.8
CX1-600160-076-T2A-IIB*	7.6	25950	59.49	600	1	12.7
CX1-480160-036-T3-IIB~	3.6	12292	49.45	480	1	7.5
CX1-600160-036-T3-IIB**	3.6	12292	49.45	600	1	6.0

* Unit not available with built-in thermostat. See note below.

~ Special Build

Notes:

1. Heater is functioning normally if, at rated voltage, the current draw is within 10% of the value in this table.
2. Operation at lower voltages than rated will result in reduced output and current draw.
Actual Output (kW) = [(Supply Voltage)² ÷ (Rated Voltage)²] × Rated Unit Wattage (kW)
3. Add suffix "T" for optional built-in thermostat.
4. With XCT built-in thermostat - Class I, Div. 1 & 2, Groups C & D; Zones 1 & 2, Groups IIA and IIB
5. Remote mounted, Defender, explosion-proof room thermostats are not suitable for Group B & IIC applications.
6. Remote contactors are required on all 600-volt heaters, and heaters with a current draw greater than 22 amps (supplied & installed by others), when utilizing XT-311 remote thermostat.
7. Temperature code ratings: T2A - 300°C (536°F), T3 - 200°C (392°F)

CX1 ProVector® Performance Data

Model (See Note #3)	Unit Wattage (kW)	Unit Output (BTU/hr)	Cabinet Length (inches)	Unit Voltage (volts)	Phase	Unit Current (amps)
Without built-in room thermostat (See Note #4)						
CX1-120160-012-T2A-IIC	1.2	4097	31.34	120	1	10.0
CX1-208160-012-T2A-IIC	1.2	4097	31.34	208	1	5.8
CX1-240160-012-T2A-IIC	1.2	4097	31.34	240	1	5.0
CX1-277160-012-T2A-IIC	1.2	4097	31.34	277	1	4.3
CX1-480160-012-T2A-IIC	1.2	4097	31.34	480	1	2.5
CX1-600160-012-T2A-IIC	1.2	4097	31.34	600	1	2.0
CX1-120160-018-T2A-IIC	1.8	6146	31.34	120	1	15.0
CX1-208160-018-T2A-IIC	1.8	6146	31.34	208	1	8.7
CX1-240160-018-T2A-IIC	1.8	6146	31.34	240	1	7.5
CX1-277160-018-T2A-IIC	1.8	6146	31.34	277	1	6.5
CX1-480160-018-T2A-IIC	1.8	6146	31.34	480	1	3.8
CX1-600160-018-T2A-IIC	1.8	6146	31.34	600	1	3.0
CX1-208160-036-T2A-IIC	3.6	12292	31.34	208	1	17.3
CX1-240160-036-T2A-IIC	3.6	12292	31.34	240	1	15.0
CX1-277160-036-T2A-IIC	3.6	12292	31.34	277	1	13.0
CX1-480160-036-T2A-IIC	3.6	12292	31.34	480	1	7.5
CX1-600160-036-T2A-IIC	3.6	12292	31.34	600	1	6.0
CX1-208160-048-T2A-IIC*	4.8	16389	49.45	208	1	23.1
CX1-240160-048-T2A-IIC	4.8	16389	49.45	240	1	20.0
CX1-277160-048-T2A-IIC	4.8	16389	49.45	277	1	17.3
CX1-480160-048-T2A-IIC	4.8	16389	49.45	480	1	10.0
CX1-600160-048-T2A-IIC	4.8	16389	49.45	600	1	8.0
CX1-208160-076-T2A-IIC*	7.6	25950	59.49	208	1	36.5
CX1-240160-076-T2A-IIC*	7.6	25950	59.49	240	1	31.7
CX1-277160-076-T2A-IIC*	7.6	25950	59.49	277	1	27.4
CX1-480160-076-T2A-IIC	7.6	25950	59.49	480	1	15.8
CX1-600160-076-T2A-IIC	7.6	25950	59.49	600	1	12.7
CX1-480160-036-T3-IIC*	3.6	12292	49.45	480	1	7.5
CX1-600160-036-T3-IIC*	3.6	12292	49.45	600	1	6.0

* Unit not available with built-in thermostat. See note below.

Notes:

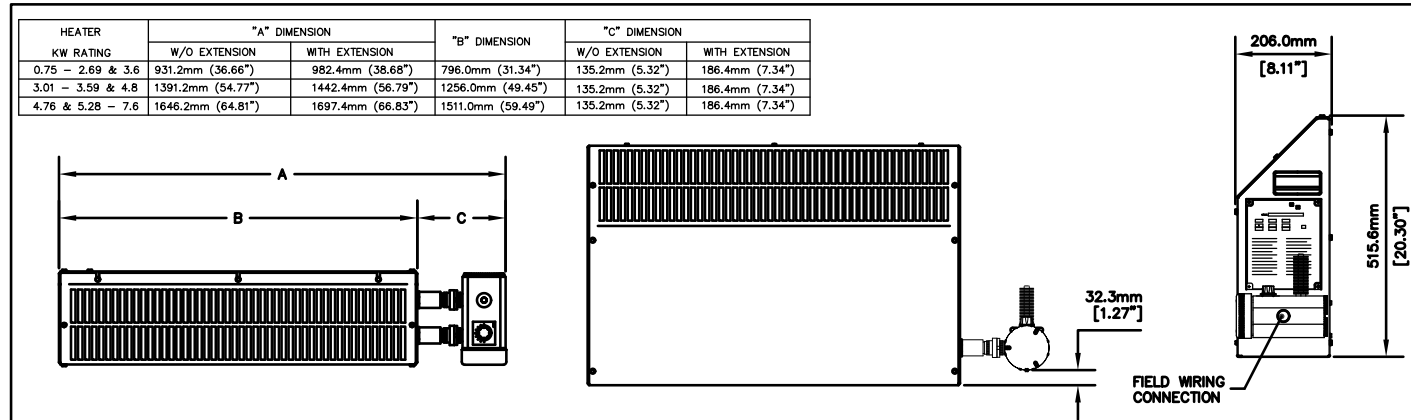
1. Heater is functioning normally if, at rated voltage, the current draw is within 10% of the value in this table.
2. Operation at lower voltages than rated will result in reduced output and current draw.
Actual Output (kW) = [(Supply Voltage)² ÷ (Rated Voltage)²] × Rated Unit Wattage (kW)
3. IIC Grouping units come with x-Max® housing.
4. Add suffix "T" for optional built-in thermostat.
5. Remote contactors are required on all 600-volt heaters, and heaters with a current draw greater than 22 amps (supplied & installed by others), when utilizing XT-311 remote thermostat.
6. With XT built-in thermostat - Class I, Div. 1 & 2, Groups A,B,C & D; Zones 1 & 2, Groups IIA, IIB, IIC
7. Temperature code ratings: T2A - 300°C (536°F), T3 - 200°C (392°F)

CX1 ProVector® General Specifications

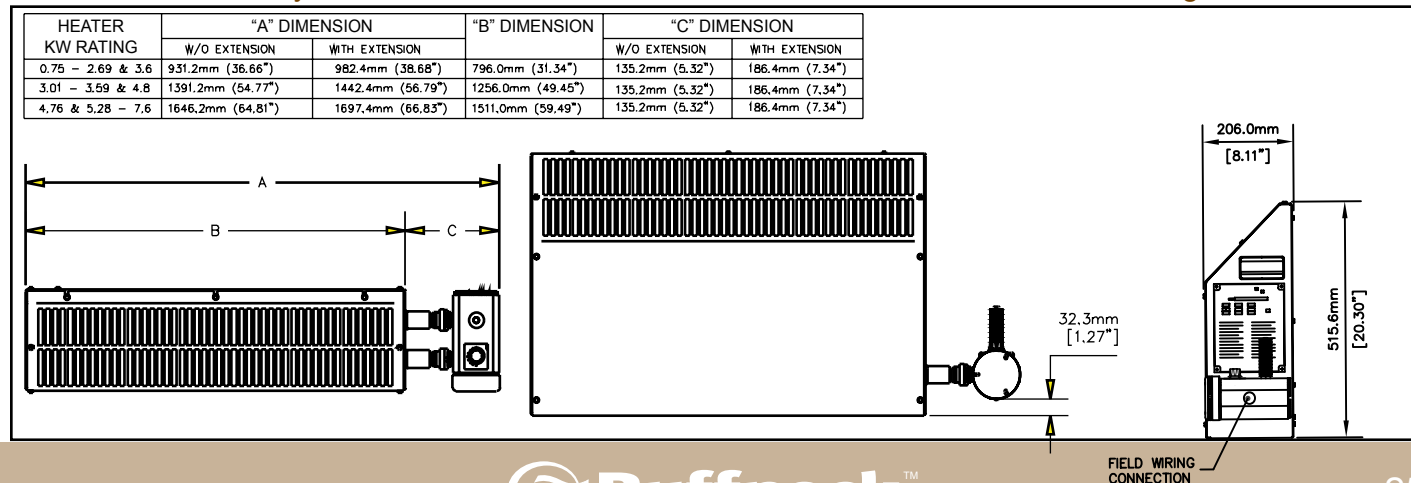
Nominal kW		1.2	1.8	3.6	4.8	7.6
Net weight	(lbs.)	54.0	54.0	54.0	79.4	91.5
	(kg)	24.5	24.5	24.5	36.0	41.5
Shipping weight	(lbs.)	61.3	61.3	61.3	88.4	104.3
	(kg)	27.8	27.8	27.8	40.1	47.3

Approvals	
Enclosure	Defender housing is cast aluminum with bolt on cover. Groups IIB. x-Max® housing is extruded aluminum with two screwed on covers. The x-Max® housing offers IP55 moisture ingress protection. Groups IIC.
Mounting brackets	Two 14-gauge (0.075 in. / 1.90 mm) galvanized steel brackets for standard cabinet. Stainless steel brackets provided with optional stainless steel cabinet.
Heating elements	Two incoloy 840 sheathed elements.
Cabinet material	14 gauge (0.075 in. / 1.90mm) epoxy coated steel with galvanized rear panel. Optional - Gauge 304 stainless steel cabinet and mounting hardware available.
Temperature code rating	Temperature Code T2A – 280°C (536°F) or T3 – 200°C (392°F).
Hazardous location classifications	Without built-in thermostat Defender housing Class I, Div. 1 & 2, Groups B, C, & D; Zones 1 & 2, Groups IIA, IIB + H ₂ x-Max® housing Class I, Div. 1 & 2, Groups A, B, C, & D; Zones 1 & 2, Groups IIA, IIB, & IIC
	With built-in thermostat XCT Defender thermostat: Class I, Div. 1 & 2, Groups C & D; Zones 1 & 2, Groups IIA & IIB XT thermostat: Class I, Div. 1 & 2, Groups A, B, C, & D; Zones 1 & 2, Groups IIA, IIB, & IIC
Temperature limitations	Operational: – 45°C to 40°C (– 49°F to 104°F)
	Storage: – 45°C to 80°C (– 49°F to 176°F). Optional up to 149°C (300°F) available

CX1 ProVector® Physical Dimensions for built-in XCT Thermostat with Defender housing

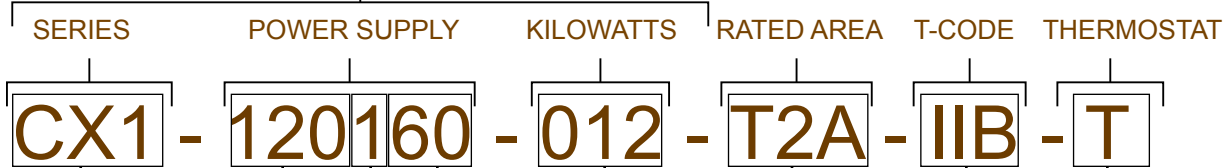


CX1 ProVector® Physical Dimensions for built-in XT Thermostat with x-Max® housing



Model Coding

BASE MODEL



SERIES	
	CX1
	CF1

VOLTAGE			
120V	120	380V	380
208V	208	400V	400
220V	220	415V	415
230V	230	480V	480
240V	240	600V	600
277V	277		

PHASE	
1 Phase	1

FREQUENCY	
50 Hertz	50
60 Hertz	60

KILOWATTS			
007	0.75kW	027	2.69kW
008	0.83kW	030	3.01kW
009	0.90kW	033	3.33kW
011	1.13kW	035	3.59kW
012	1.20kW	036	3.60kW
013	1.25kW	047	4.76kW
014	1.35kW	048	4.80kW
018	1.80kW	053	5.28kW
023	2.26kW	057	5.68kW
025	2.50kW	076	7.60kW

BUILT-IN THERMOSTAT	
YES	T
NO	-

GROUPING	
GROUP C & D	IIB
① GROUP A, B, C, & D	IIC

TEMPERATURE CODE	
280°C	T2A
② 200°C	T3

Note:

- ① Requires x-Max® housing.
- ② CX1 only available in 3.6 kW units with 49" long cabinet.
- ③ CF1 only

Reminder: This nomenclature illustration is intended primarily to explain how a product part number is defined. Not all voltage and/or wattage combinations are available – please consult the catalogue chart(s) for product availability.

CF1 ProVector® Explosion-proof Heaters

For hazardous locations heating, rely on the Ruffneck™ CF1 heater for the most dependable, trouble-free service available. CCI Thermal manufactures explosion-proof air heaters to satisfy the demanding requirements of the oil and gas drilling industry. The harsh operating conditions of this application require the utmost in heater reliability.

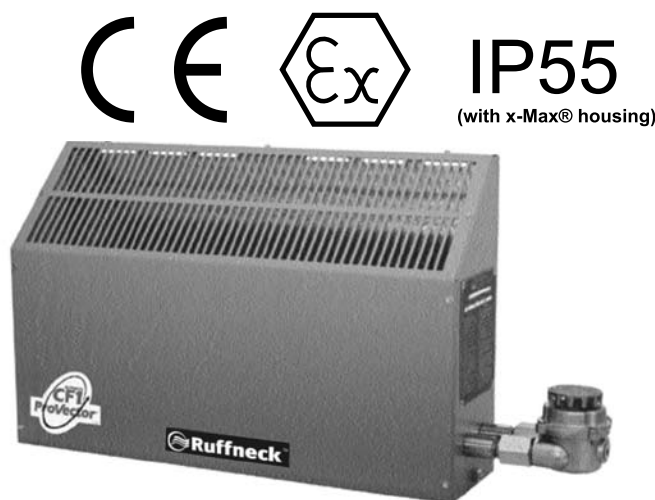
The unique design features and rugged, quality construction details that have made Ruffneck™ heaters the choice of the oil and gas industry are also appreciated by other heavy-duty industries throughout the world. The CF1 ProVector® explosion-proof heater offers the following outstanding features and benefits:

FEATURE

- sloped-top cabinet
- no exposed copper or brass
- high-velocity airflow
- 14-gauge steel cabinet, available with stainless steel construction
- one of the shortest cabinet lengths available
- optional built-in thermostat
- incoloy 840 heating elements
- radial-embossed aluminum plate fins
- galvanized steel mounting brackets
- approvals for groups IIA, IIB & IIC. IP55 moisture ingress protection

BENEFIT

- prevents objects from being set on top which restricts airflow
- corrosion resistant, suitable for H₂S environments
- heats up area faster with better heat distribution
- rugged reliability and unsurpassed corrosion resistance available with stainless steel construction
- smaller profile utilizes less wall and floor space
- reduced field installation costs
- longer life expectancy
- reduced fin warping for better heat transfer capabilities
- quick installation
- industry first approvals for built-in thermostat with group A, B, C, D, IIA, IIB, IIC ratings



CF1 ProVector® General Specifications

Nominal kW		0.75–2.69 & 3.03	3.03 & 3.33–4.03	4.76–6.39
Net weight	(lbs.)	58	84	96
	(kg)	27	38	44
Shipping weight	(lbs.)	66	93	109
	(kg)	30	42	50
Approvals	C E Ex			
Enclosure	Cast or extruded aluminum supplied with either a bolt-on cover or two screwed-on covers. Suitable for either a Defender or XT thermostat. Available with IP55 moisture ingress protection.			
Mounting brackets	Two 14-gauge (0.075 in. / 1.90 mm) galvanized steel brackets for standard cabinet. Stainless steel brackets provided with optional stainless steel cabinet.			
Heating elements	Two incoloy 840 sheathed elements.			
Cabinet material	14 gauge (0.075 in. / 1.90mm) epoxy coated steel with galvanized rear panel. Optional 14 gauge 304 stainless steel cabinet and mounting hardware available.			
Temperature code rating	Temperature Code T2 – 300°C (572°F), T3 – 200°C (392°F) or T4 – 135°C (275°F).			
Hazardous location classifications	Defender housing Class I, Div. 1 & 2, Groups B, C, & D; Zones 1 & 2, Groups IIA, IIB + H ₂			
Without built-in thermostat	x-Max® housing Class I, Div. 1 & 2, Groups A, B, C, & D; Zones 1 & 2, Groups IIA, IIB, & IIC			
With built-in thermostat	XCT thermostat: Class I, Div. 1 & 2, Groups C & D; Zones 1 & 2, Groups IIA & IIB XTWA thermostat: Class I, Div. 1 & 2, Groups A, B, C, & D; Zones 1 & 2, Groups IIA, IIB, & IIC			
Temperature limitations	Operational: –45°C to 40°C (–49°F to 104°F)			
	Storage: –45°C to 80°C (–49°F to 176°F). optional up to 149°C (300°F) available			

Performance Data for CF1 ProVector®

Model	Unit Wattage (kW)	Unit Output (BTU/hr)	Cabinet Length (mm)	Unit Voltage (volts)	Unit Current (amps)	Phase	Temperature Coding
CF1-220150-010-T4-IIB	1.00	3412	796	220	4.60	1	T4
CF1-220150-015-T3-IIB	1.50	5118	796	220	6.90	1	T3
CF1-220150-030-T2-IIB	3.00	10236	796	220	13.8	1	T2
CF1-220150-040-T3-IIB	4.00	13648	1256	220	18.3	1	T3
CF1-220150-064-T2-IIB*	6.40	21837	1511	220	29.0	1	T2
CF1-230150-011-T4-IIB	1.10	3760	796	230	4.80	1	T4
CF1-230150-017-T3-IIB	1.70	5640	796	230	7.20	1	T3
CF1-230150-030-T3-IIB	3.00	10236	1256	230	13.0	1	T3
CF1-230150-033-T2-IIB	3.30	11312	796	230	14.4	1	T2
CF1-230150-044-T2-IIB	4.40	15041	1256	230	19.2	1	T2
CF1-230150-070-T2-IIB*	7.00	23815	1511	230	30.3	1	T2
CF1-240150-012-T4-IIB	1.20	4101	796	240	5.00	1	T4
CF1-240150-018-T3-IIB	1.80	6131	796	240	7.50	1	T3
CF1-240150-036-T2-IIB	3.60	12304	796	240	15.0	1	T2
CF1-240150-030-T3-IIB	3.00	10236	1256	240	12.5	1	T3
CF1-240150-048-T2-IIB	4.80	16364	1256	240	20.0	1	T2
CF1-240150-076-T2-IIB*	7.60	25947	1511	240	31.7	1	T2
CF1-380150-0075-T4-IIB	0.75	2559	796	380	2.00	1	T4
CF1-380150-011-T4-IIB	1.10	3753	796	380	3.00	1	T4
CF1-380150-023-T3-IIB	2.30	7848	796	380	5.90	1	T3
CF1-380150-030-T3-IIB	3.00	10236	1256	380	7.90	1	T3
CF1-380150-048-T2-IIB	4.80	16378	1511	380	12.5	1	T2
CF1-400150-0083-T4-IIB	0.83	2832	796	400	2.10	1	T4
CF1-400150-013-T4-IIB	1.30	4436	796	400	3.10	1	T4
CF1-400150-025-T3-IIB	2.50	8530	796	400	6.30	1	T3
CF1-400150-033-T3-IIB	3.30	11260	1256	400	8.30	1	T3
CF1-400150-053-T2-IIB	5.30	18084	1511	400	13.2	1	T2
CF1-415150-0090-T4-IIB	0.90	3071	796	415	2.20	1	T4
CF1-415150-014-T4-IIB	1.40	4777	796	415	3.20	1	T4
CF1-415150-027-T2-IIB	2.70	9212	796	415	6.50	1	T2
CF1-415150-036-T3-IIB	3.60	12283	1256	415	8.70	1	T3
CF1-415150-057-T2-IIB	5.70	19448	1511	415	13.7	1	T2

* An optional built-in thermostat is not available as it exceeds current capacity.

Notes:

1. Heater is functioning normally; at rated voltage, the current draw is within 10% of the value in this table.
2. Operation at lower voltages than rated will result in reduced output and current draw.
3. Temperature Rating Per Temperature Code: T2: 300°C; T3: 200°C; T4: 135°C
4. IIC Grouping available with optional **x-Max®** housing.
5. Add suffix "T" for optional built-in t-stat.

Performance Data for CF1 ProVector®

Model	Unit Wattage (kW)	Unit Output (BTU/hr)	Cabinet Length (mm)	Unit Voltage (volts)	Unit Current (amps)	Phase	Temperature Coding
CF1-220150-010-T4-IIC	1.00	3412	796	220	4.60	1	T4
CF1-220150-015-T3-IIC	1.50	5118	796	220	6.90	1	T3
CF1-220150-030-T2-IIC	3.00	10236	796	220	13.8	1	T2
CF1-220150-040-T3-IIC	4.00	13648	1256	220	18.3	1	T3
CF1-220150-064-T2-IIC*	6.40	21837	1511	220	29.0	1	T2
CF1-230150-011-T4-IIC	1.10	3760	796	230	4.80	1	T4
CF1-230150-017-T3-IIC	1.70	5640	796	230	7.20	1	T3
CF1-230150-030-T3-IIC	3.00	10236	1256	230	13.0	1	T3
CF1-230150-033-T2-IIC	3.30	11312	796	230	14.4	1	T2
CF1-230150-044-T2-IIC	4.40	15041	1256	230	19.2	1	T2
CF1-230150-070-T2-IIC*	7.00	23815	1511	230	30.3	1	T2
CF1-240150-012-T4-IIC	1.20	4101	796	240	5.00	1	T4
CF1-240150-018-T3-IIC	1.80	6131	796	240	7.50	1	T3
CF1-240150-030-T3-IIC	3.00	10236	1256	240	12.5	1	T3
CF1-240150-036-T2-IIC	3.60	12304	796	240	15.0	1	T2
CF1-240150-048-T2-IIC	4.80	16364	1256	240	20.0	1	T2
CF1-240150-076-T2-IIC*	7.60	25947	1511	240	31.7	1	T2
CF1-380150-0075-T4-IIC	0.75	2559	796	380	2.00	1	T4
CF1-380150-011-T4-IIC	1.10	3753	796	380	3.00	1	T4
CF1-380150-023-T3-IIC	2.30	7848	796	380	5.90	1	T3
CF1-380150-030-T3-IIC	3.00	10236	1256	380	7.90	1	T3
CF1-380150-048-T2-IIC	4.80	16378	1511	380	12.5	1	T2
CF1-400150-0083-T4-IIC	0.83	2832	796	400	2.10	1	T4
CF1-400150-013-T4-IIC	1.30	4436	796	400	3.10	1	T4
CF1-400150-025-T3-IIC	2.50	8530	796	400	6.30	1	T3
CF1-400150-033-T3-IIC	3.30	11260	1256	400	8.30	1	T3
CF1-400150-053-T2-IIC	5.30	18084	1511	400	13.2	1	T2
CF1-415150-009-T4-IIC	0.90	3071	796	415	2.20	1	T4
CF1-415150-014-T4-IIC	1.40	4777	796	415	3.20	1	T4
CF1-415150-027-T2-IIC	2.70	9212	796	415	6.50	1	T2
CF1-415150-036-T3-IIC	3.60	12283	1256	415	8.70	1	T3
CF1-415150-057-T2-IIC	5.70	19448	1511	415	13.7	1	T2

* An optional built-in thermostat is not available as it exceeds current capacity.

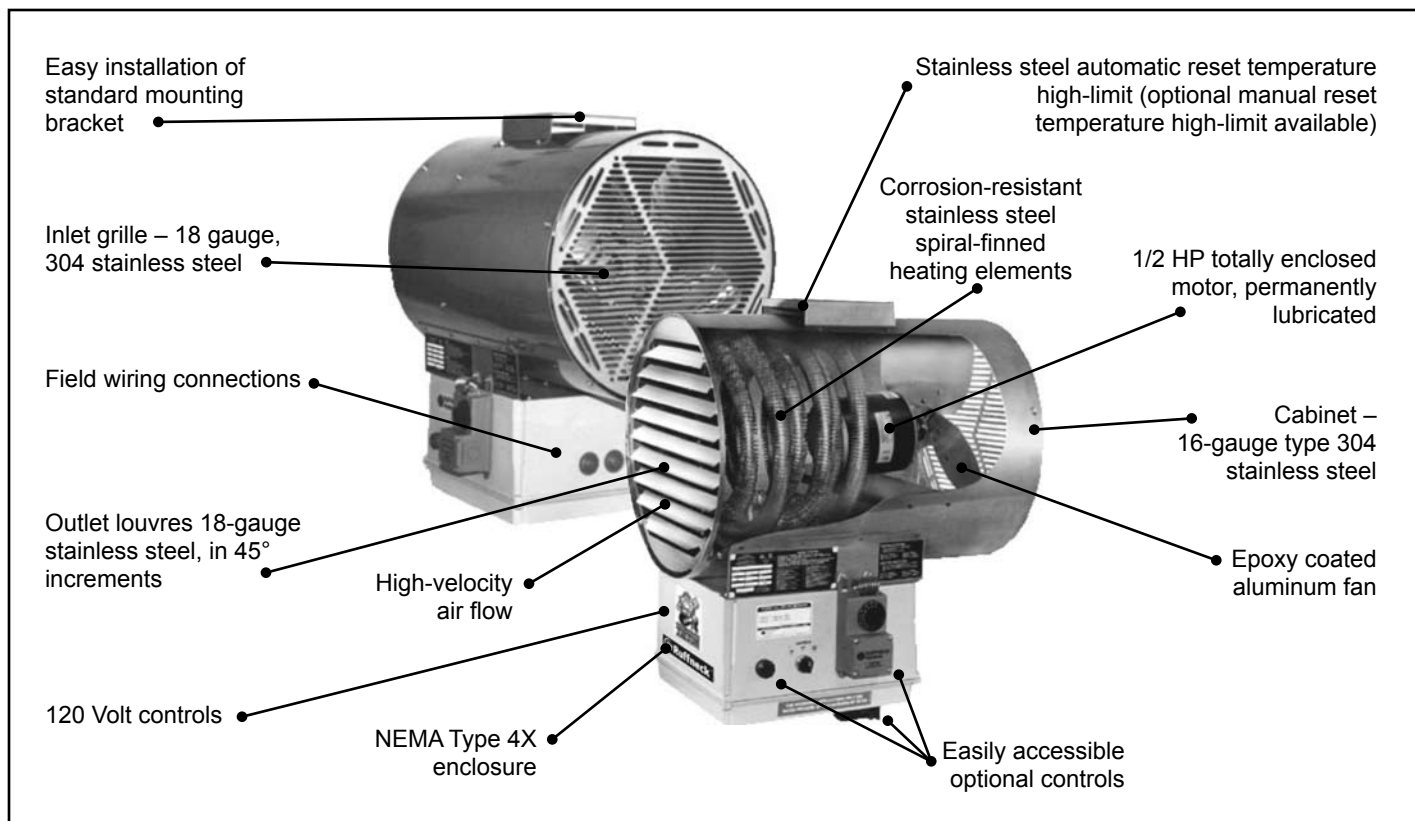
Notes:

1. Heater is functioning normally; at rated voltage, the current draw is within 10% of the value in this table.
2. Operation at lower voltages than rated will result in reduced output and current draw.
3. Temperature Rating Per Temperature Code: T2: 300°C; T3: 200°C; T4: 135°C
4. Add suffix "T" for optional built-in t-stat.

CR1 Triton™ Corrosion-Resistant Washdown Heaters

Ruffneck™ CR1 Triton™ Series is a new generation of NEMA 4X corrosion-resistant washdown heaters. The first UL listed Type 4X heater with models ranging from 3 kW to 39 kW.

IMPORTANT: Ruffneck™ CR1 heaters are suitable for non-hazardous locations only. For washdown applications use water pressure less than 70 PSI.



FEATURE

- entire heater is NEMA Type 4X
- epoxy coated fan blade
- 16-gauge stainless steel cabinet
- custom configured stainless steel elements
- optional built-in accessories
- stainless steel wall/ceiling mounting kit
- 120 volt controls
- stainless steel temperature high-limit

BENEFIT

- increased safety and protection against water penetration
- added corrosion protection
- better resistance to corrosion for longer life
- improved heat distribution and corrosion protection
- flexibility and reduced field installation costs
- flexible options for mounting heater
- better contactor pull-in reliability
- increased safety and reliability

Model Coding

CR1 - 480

3

60

- 200 - T,P,F,D,M, and E

MODEL SERIES

1st GENERATION

VOLTAGE

208 V
240 V
480 V
600 V

PHASE

1
3

HERTZ

60

KILOWATTS

030 – 3 kW	200 – 20 kW
050 – 5 kW	250 – 25 kW
075 – 7.5 kW	300 – 30 kW
100 – 10 kW	350 – 35 kW
150 – 15 kW	390 – 39 kW

BUILT-IN CONTROL OPTIONS

T – Room Thermostat
P – Pilot Light
F – 3-position Fan Switch
D – Door Interlocking Disconnect Switch
M – Manual Reset Temp. High Limit
E – Monel® elements (special order)

CR1 Triton™ 60 Hertz Technical Data

MODEL	NOMINAL POWER (kW)	UNIT VOLTAGE (V)	PHASE	UNIT CURRENT (A)	AIR TEMPERATURE RISE		BTU/hr
					°C	°F	
CR1-208160-030	3	208	1	17.4	7.5	13.5	10250
CR1-240160-030	3	240	1	15.5	7.5	13.5	10250
CR1-208360-030	3	208	3	11.3	7.5	13.5	10250
CR1-240360-030	3	240	3	10.2	7.5	13.5	10250
CR1-480360-030	3	480	3	5.1	7.5	13.5	10250
CR1-600360-030	3	600	3	3.9	7.5	13.5	10250
CR1-208160-050	5	208	1	27.0	12.5	22.5	17050
CR1-240160-050	5	240	1	23.8	12.5	22.5	17050
CR1-208360-050	5	208	3	16.9	12.5	22.5	17050
CR1-240360-050	5	240	3	15.0	12.5	22.5	17050
CR1-480360-050	5	480	3	7.5	12.5	22.5	17050
CR1-600360-050	5	600	3	5.8	12.5	22.5	17050
CR1-208160-075	7.5	208	1	39.1	18.8	33.8	25600
CR1-240160-075	7.5	240	1	34.3	18.8	33.8	25600
CR1-208360-075	7.5	208	3	23.8	18.8	33.8	25600
CR1-240360-075	7.5	240	3	21.0	18.8	33.8	25600
CR1-480360-075	7.5	480	3	10.5	18.8	33.8	25600
CR1-600360-075	7.5	600	3	8.2	18.8	33.8	25600
CR1-240160-100	10	240	1	44.7	25.0	45.0	34100
CR1-208360-100	10	208	3	30.8	25.0	45.0	34100
CR1-240360-100	10	240	3	27.1	25.0	45.0	34100
CR1-480360-100	10	480	3	13.5	25.0	45.0	34100
CR1-600360-100	10	600	3	10.8	25.0	45.0	34100
CR1-208360-150	15	208	3	44.6	18.1	32.6	51200
CR1-240360-150	15	240	3	39.1	18.1	32.6	51200
CR1-480360-150	15	480	3	19.5	18.1	32.6	51200
CR1-600360-150	15	600	3	15.4	18.1	32.6	51200
CR1-480360-200	20	480	3	25.6	24.2	43.6	68250
CR1-600360-200	20	600	3	20.3	24.2	43.6	68250
CR1-480360-250	25	480	3	31.6	20.9	37.5	85300
CR1-600360-250	25	600	3	25.1	20.9	37.5	85300
CR1-480360-300	30	480	3	37.6	25.0	45.1	102350
CR1-600360-300	30	600	3	29.9	25.0	45.1	102350
CR1-480360-350	35	480	3	43.6	29.2	52.6	119400
CR1-600360-350	35	600	3	34.7	29.2	52.6	119400
CR1-480360-390	39	480	3	48.0	32.5	58.6	133100
CR1-600360-390	39	600	3	38.5	32.5	58.6	133100

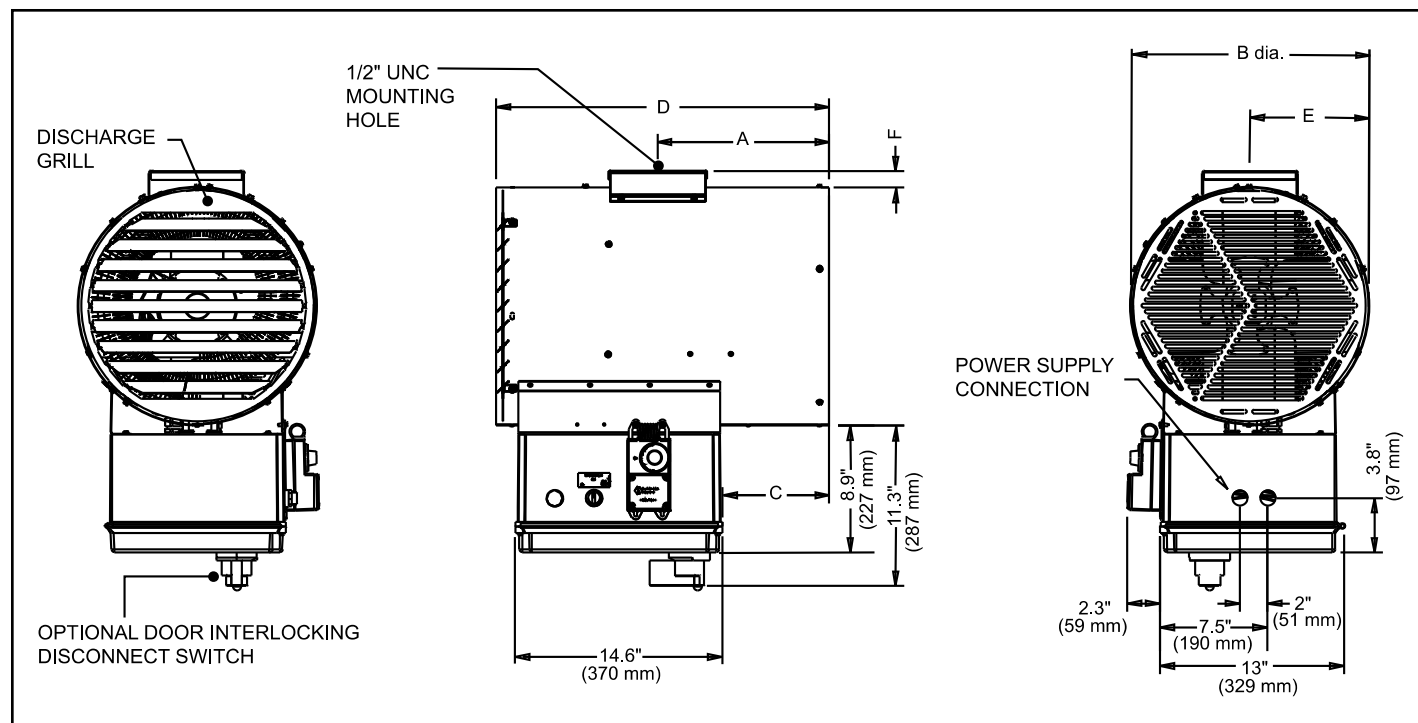
Built-in Control Options:

1. To order a heater with a built-in room thermostat add a "T" suffix to model number.
2. To order a heater with a built-in pilot light add a "P" suffix to model number.
3. To order a heater with a built-in 3-position fan switch (on, off, fan only) add an "F" to model number.
4. To order a heater with a built-in door interlocking disconnect switch add a "D" suffix to model number.
5. To order a heater with a built-in manual reset temperature high-limit add an "M" suffix to model number. Also included is a built-in door interlocking disconnect switch to meet UL requirements. This option replaces the automatic reset temperature high-limit.



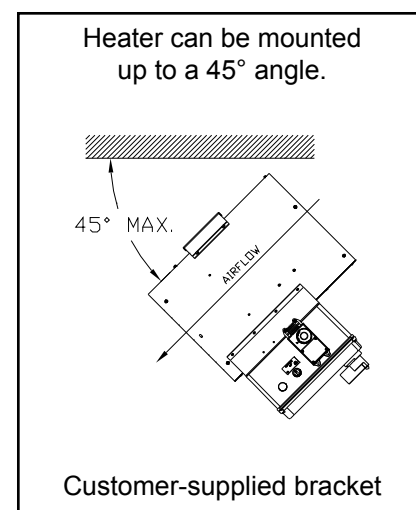
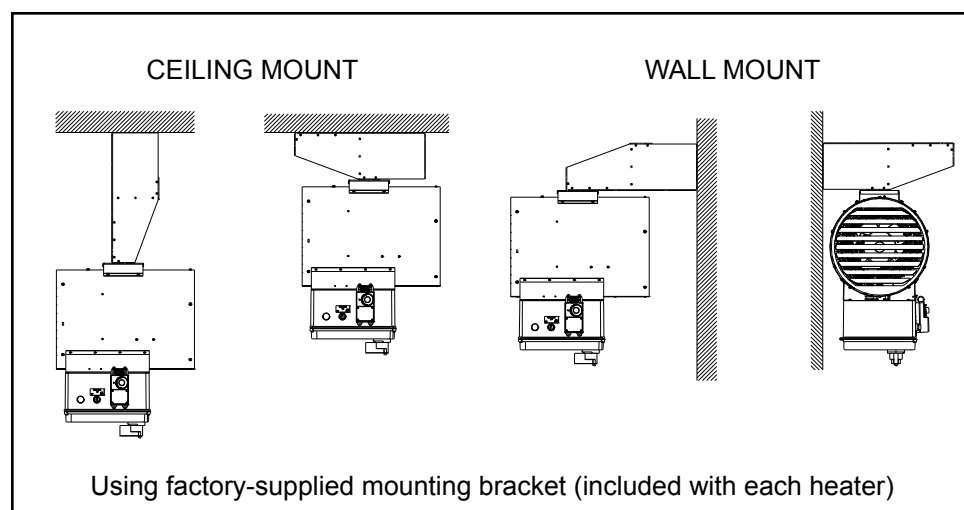
Note: To order a heater that meets U.S. Coast Guard regulations, order built-in control option #5 above.

CR1 Triton™ Physical Dimensions



DIMENSIONS	A	B	C	D	E	F
3 to 10 kW	12.5" (318 mm)	12.8" (325 mm)	8.5" (216 mm)	24.4" (620 mm)	6.4" (162.5 mm)	0.9" (23 mm)
15 and 20 kW	12.1" (307 mm)	16.7" (425 mm)	7.5" (190 mm)	23.4" (595 mm)	8.4" (212.5 mm)	1.2" (30 mm)
25 to 39 kW	12.1" (307 mm)	20.7" (526 mm)	7.5" (190 mm)	23.4" (595 mm)	10.3" (262.5 mm)	1.3" (33 mm)

CR1 Triton™ Mounting Options



CR1 Triton™ General Specifications

Nominal kW		3, 5, 7.5, 10	15, 20	25, 30, 35, 39
Fan Diameter	in. (mm)	12 (305)	16 (406)	20 (508)
Air Delivery	CFM (m³/hr)	700 (1190)	1450 (2465)	2100 (3570)
Approx. Air Velocity	ft./min. (m/s)	785 (4.0)	950 (4.8)	900 (4.6)
Horizontal Throw	ft. (m)	22 (6.7)	35 (10.7)	44 (13.4)
Max. Mounting Height*	ft.	8.5	11.5	12.3
	Horizontal (to underside) m	2.6	3.5	3.7
Max. Mounting Height*	ft.	12.8	18.0	18.8
	45° decline (to underside) m	3.9	5.5	5.7
Min. Mounting Height	ft.	6.0	6.0	6.0
	m	1.8	1.8	1.8
Net Weight	lbs. (kg)	75.0 (34.1)	90.0 (40.9)	130 (59.1)
Shipping Weight	lbs. (kg)	125.0 (56.8)	140.0 (63.6)	180 (81.8)

Approvals	UL listed to U.S. & Canadian safety standards. Type 4X.
	Complies with U.S. Coast Guard electrical engineering regulations subchapter J (46 CFR Parts 110–113) when manual reset temperature high-limit is ordered.
Enclosure	NEMA Type 4X non-metallic enclosure.
Motor Type	Thermally protected, ½ HP, 1725 RPM, permanently lubricated ball bearings.
Fan	Epoxy coated, aluminum blade, steel spider.
Inlet Grille	Type 304 stainless steel, ¼ in. (6.3 mm) maximum openings. Minimum 18-gauge (0.05 in. / 1.21 mm).
Discharge Grille	Type 304 stainless steel. Rotatable in 45° increments. Minimum 18-gauge (0.05 in. / 1.21 mm).
Mounting Bracket	Type 304 stainless steel universal mounting bracket. Minimum 16-gauge (0.06 in. / 1.52 mm).
Heating Elements	Type 321 stainless steel sheath with Type 304 stainless steel spiral fins.
Temperature High-Limit	Automatic reset, stainless steel bulb and capillary.
	Optional manual reset, stainless steel bulb and capillary. Replaces automatic reset.
Control Circuit	120 volts AC.
Optional Built-in Thermostat	NEMA Type 4X thermostat.
Control Transformer	Multi-tap primary, 120-volt secondary, 50 VA.
Contactors	40 or 75 amp. Rated for 500,000 mechanical operations. 120-volt, 15 VA coil.
Cabinet Material	Type 304 stainless steel, 16-gauge (0.06 in. / 1.52 mm). All external fasteners are stainless steel.
Temperature Limitations	Storage: –4°F to 140°F (–20°C to 60°C).
	Operating: –4°F to 104°F (–20°C to 40°C).

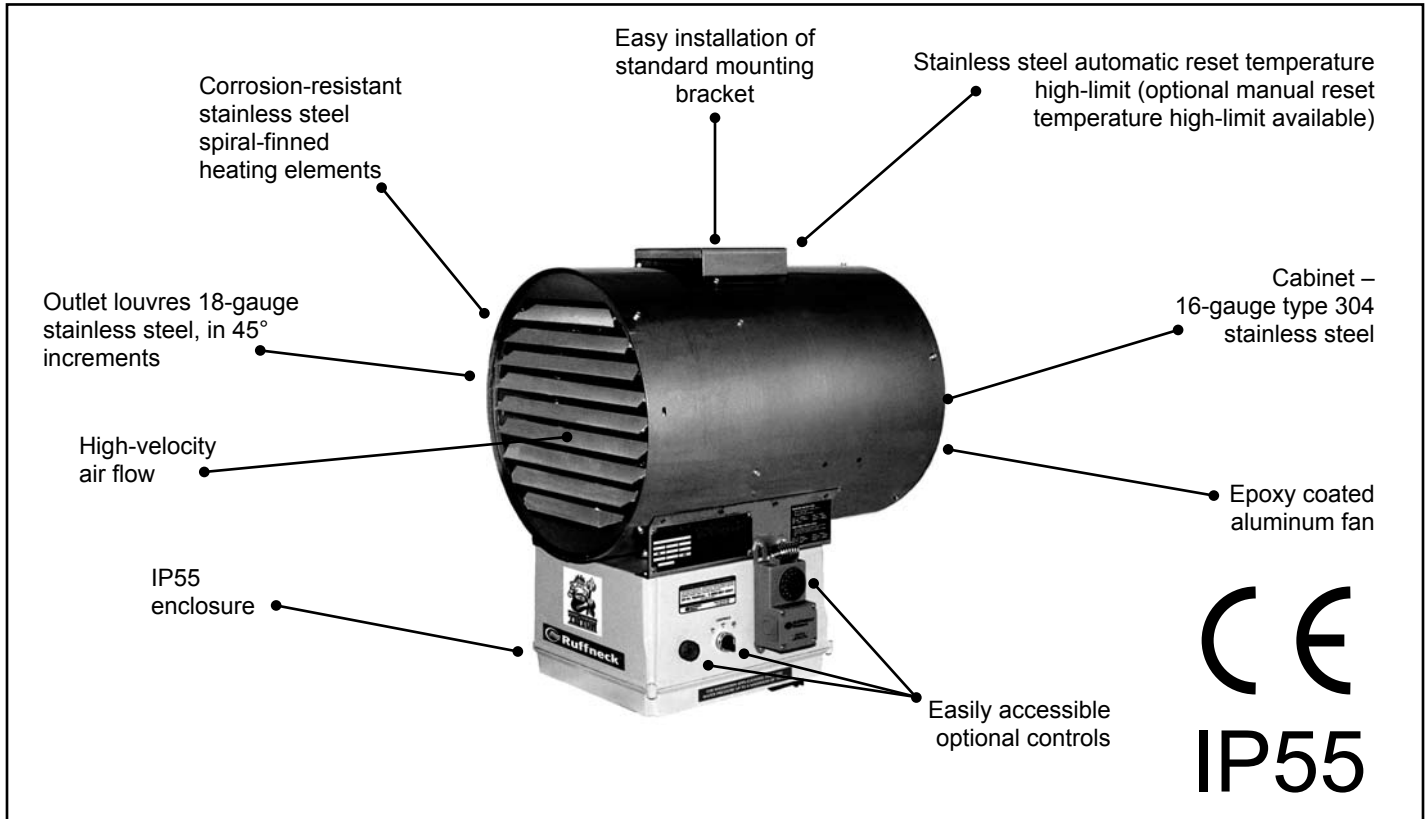
Note: Contact factory for suitable applications.

* Maximum mounting height to ensure warm air reaches the floor.

CRE1 Triton™ Corrosion-Resistant Washdown Heaters

Ruffneck™ CRE1 Triton Series is a new generation of IP55 corrosion-resistant washdown heaters. The first UL listed and European compliant heater with models ranging from 2.5 kW to 40 kW.

IMPORTANT: Ruffneck™ CRE1 heaters are suitable for non-hazardous locations only. For washdown applications use water pressure less than 482 kPa only.



FEATURE

- entire heater is IP55
- epoxy coated fan blade
- 16-gauge stainless steel cabinet
- custom configured stainless steel elements
- optional built-in accessories
- stainless steel wall/ceiling mounting kit
- 120 volt controls
- stainless steel temperature high-limit

BENEFIT

- increased safety and protection against water penetration
- added corrosion protection
- better resistance to corrosion for longer life
- improved heat distribution and corrosion protection
- flexibility and reduced field installation costs
- flexible options for mounting heater
- better contactor pull-in reliability
- increased safety and reliability

Model Coding

CRE1 - 380 3 50 - 200 - TPF DME

MODEL SERIES 1st GENERATION	VOLTAGE 220 V 240 V 380 V 400 V 415 V 600 V	PHASE 1 3 HERTZ	KILOWATTS 025 – 2.5 kW 030 – 3.0 kW 042 – 4.2 kW 047 – 4.7 kW 050 – 5.0 kW 063 – 6.3 kW 070 – 7.0 kW 075 – 7.5 kW 093 – 9.3 kW 094 – 9.4 kW 100 – 10.0 kW 126 – 12.6 kW 139 – 13.9 kW 150 – 15.0 kW 168 – 16.8 kW 186 – 18.6 kW 200 – 20.0 kW 210 – 21.0 kW 232 – 32.2 kW 250 – 25.0 kW 252 – 25.2 kW 279 – 27.9 kW 300 – 30.0 kW 350 – 35.0 kW 400 – 40.0 kW	BUILT-IN CONTROL OPTIONS T – Room Thermostat P – Pilot Light F – 3-position Fan Switch D – Door Interlocking Disconnect Switch M – Manual Reset Temp. High Limit E – Monel® elements (special order)
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CRE1 Triton™ 50 Hertz Technical Data

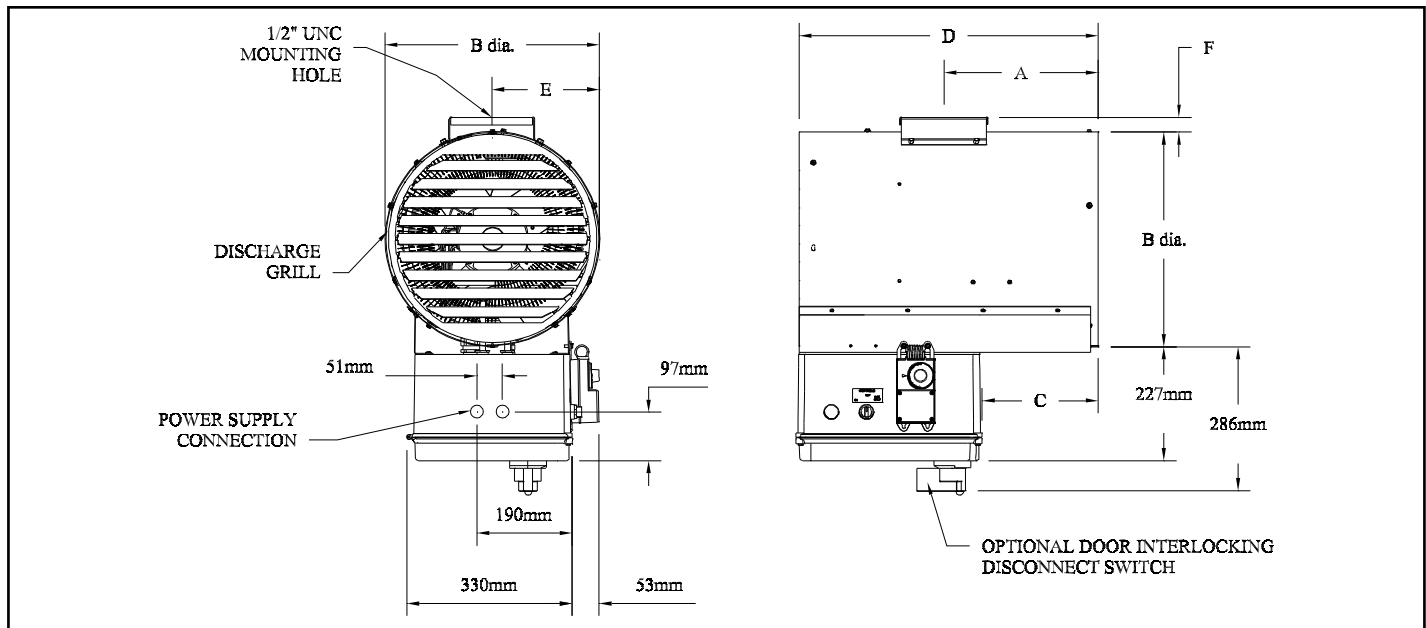
MODEL	NOMINAL POWER (kW)	UNIT VOLTAGE (V)	PHASE	UNIT CURRENT (A)	CABINET SIZE
CRE1-220150-025	2.52	220	1	13.6	12
CRE1-220150-042	4.20	220	1	21.2	12
CRE1-220150-063	6.30	220	1	30.7	12
CRE1-240150-030	3.00	240	1	14.6	12
CRE1-240150-050	5.00	240	1	22.9	12
CRE1-240150-075	7.50	240	1	33.4	12
CRE1-240150-100	10.00	240	1	43.8	12
CRE1-380350-025	2.52	380	3	5.0	12
CRE1-380350-042	4.21	380	3	7.6	12
CRE1-380350-063	6.31	380	3	10.8	12
CRE1-380350-094	8.41	380	3	14.0	12
CRE1-380350-126	12.62	380	3	20.4	16
CRE1-380350-168	16.82	380	3	26.8	16
CRE1-380350-210	21.03	380	3	33.2	20
CRE1-380350-252	25.23	380	3	39.5	20
CRE1-400350-028	2.79	400	3	5.2	12
CRE1-400350-047	4.65	400	3	7.9	12
CRE1-400350-070	6.97	400	3	11.3	12
CRE1-400350-093	9.29	400	3	14.6	12
CRE1-400350-139	13.94	400	3	21.3	16
CRE1-400350-186	18.58	400	3	28.0	16
CRE1-400350-232	23.23	400	3	34.7	20
CRE1-400350-279	27.87	400	3	41.4	20
CRE1-415350-030	3.00	415	3	5.4	12
CRE1-415350-050	5.00	415	3	8.2	12
CRE1-415350-075	7.50	415	3	11.6	12
CRE1-415350-100	10.00	415	3	15.1	12
CRE1-415350-150	15.00	415	3	22.1	16
CRE1-415350-200	20.00	415	3	29.0	16
CRE1-415350-250	25.00	415	3	36.0	20
CRE1-415350-300	30.00	415	3	42.9	20
CRE1-690350-030	3.00	690	3	3.1	12
CRE1-690350-050	5.00	690	3	4.8	12
CRE1-690350-075	7.50	690	3	6.9	12
CRE1-690350-100	10.00	690	3	9.0	12
CRE1-690350-150	15.0	690	3	13.2	16
CRE1-690350-200	20.00	690	3	17.3	16
CRE1-690350-250	25.00	690	3	21.5	20
CRE1-690350-300	30.00	690	3	25.7	20
CRE1-690350-350	35.00	690	3	29.9	20
CRE1-690350-400	40.00	690	3	34.1	20

Built-in Control Options:

1. To order a heater with a built-in room thermostat add a "T" suffix to model number.
2. To order a heater with a built-in pilot light add a "P" suffix to model number.
3. To order a heater with a built-in 3-position fan switch (on, off, fan only) add an "F" to model number.
4. To order a heater with a built-in door interlocking disconnect switch add a "D" suffix to model number.
5. To order a heater with a built-in manual reset temperature high-limit add an "M" suffix to model number. Also included is a built-in door interlocking disconnect switch to meet CE requirements. This option replaces the automatic reset temperature high-limit.



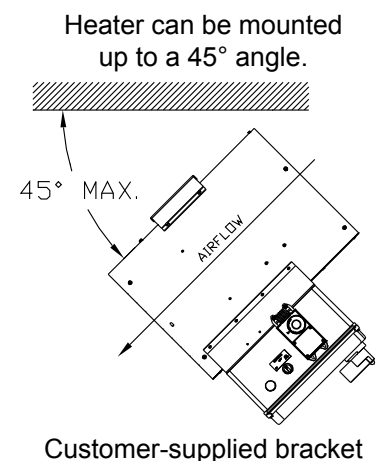
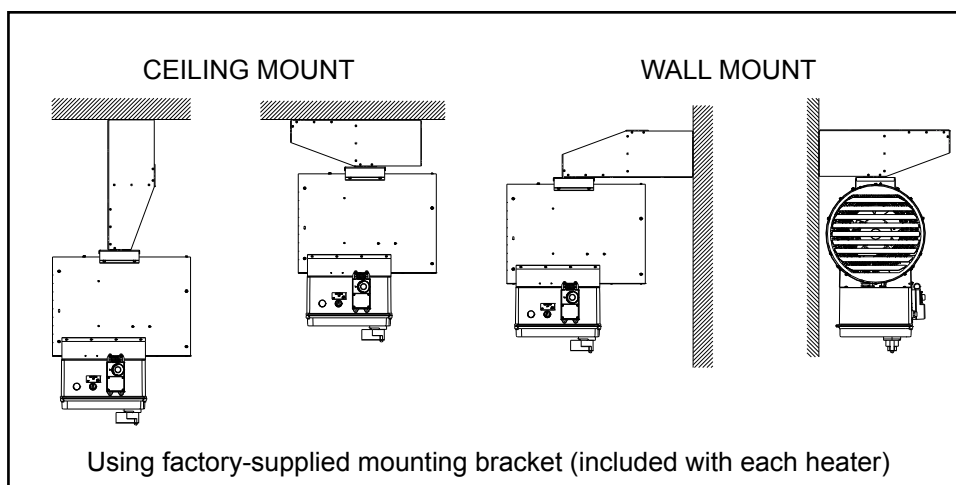
CRE1 Triton™ Physical Dimensions



DIMENSIONS						
HEATING CAPACITY	A	B	C	D	E	F
up to 10 kW	318 mm	325 mm	216 mm	620 mm	162.5 mm	23 mm
15 and 20 kW	307 mm	425 mm	190 mm	595 mm	212.5 mm	30 mm
25 to 40 kW	307 mm	526 mm	190 mm	595 mm	262.5 mm	33 mm

SPECIFICATIONS				
HEATING CAPACITY	AIR DELIVERY (m³/hr.)	AIR VELOCITY (m/s)	HORIZONTAL THROW (m)	NET WEIGHT (kg)
up to 10 kW	1190	4.0	6.7	34
15 and 20 kW	2465	4.8	10.7	41
25 to 40 kW	3570	4.6	13.4	59

CRE1 Triton™ Mounting Options



CRE1 Triton™ General Specifications

Nominal kW		2.5 – 10	12.62 – 20	23.23 – 40
Fan Diameter	mm	305	406	508
Air Delivery	m ³ /hr	1190	2465	3570
Approx. Air Velocity	m/s	4.0	4.8	4.6
Horizontal Throw	m	6.7	10.7	13.4
Max. Mounting Height* Horizontal (to underside)	m	2.6	3.5	3.7
Max. Mounting Height* 45° decline (to underside)	m	3.9	5.5	5.7
Min. Mounting Height	m	1.8	1.8	1.8
Net Weight	kg	34.1	40.9	59.1
Shipping Weight	kg	56.8	63.6	81.8

Approvals	CE Mark complies with European standards EN60335-1 & EN60335-2-30.
Enclosure	IP55 non-metallic enclosure.
Motor Type	Thermally protected, ½ HP, 1725 RPM, permanently lubricated ball bearings.
Fan	Epoxy coated, aluminum blade, steel spider.
Inlet Grille	Type 304 stainless steel, minimum 1.21 mm thick, 6.3 mm maximum openings.
Discharge Grille	Type 304 stainless steel, minimum 1.21 mm thick. Rotatable in 45° increments.
Mounting Bracket	Type 304 stainless steel, minimum 1.21 mm thick. Universal mounting bracket.
Heating Elements	Type 321 stainless steel sheath with Type 304 stainless steel spiral fins.
Temperature High-Limit	Automatic reset, stainless steel bulb and capillary.
	Optional manual reset, stainless steel bulb and capillary. Replaces automatic reset.
Control Circuit	120 volts AC.
Optional Built-in Thermostat	IP55 thermostat.
Control Transformer	Multi-tap primary, 120-volt secondary, 50 VA.
Contactors	40 or 75 amp. Rated for 500,000 mechanical operations. 120-volt, 15 VA coil.
Cabinet Material	Type 304 stainless steel, 16-gauge (0.06 in. / 1.52 mm). All external fasteners are stainless steel.
Temperature Limitations	Storage: –20°C to 60°C.
	Operating: –20°C to 40°C.

Note: Contact factory for suitable applications.

* Maximum mounting height to ensure warm air reaches the floor.

RGE Regular Duty Air Heaters

The Ruffneck™ RGE unit heater is designed by CCI Thermal for use in regular duty industrial and commercial space heating applications. This heater features CCI Thermal's robust design which surpasses the standards of most competitive models.



2–10 kW UNIT
WITH 5 LOUVRES.
UNITS OVER 10 kW
HAVE 7 LOUVRES.

IN CANADA THESE UNITS
ARE MARKETING UNDER THE
CALORITECH™ BRAND NAME.

Features:

- CSA C/US approved for horizontal air flow
- 2 kW to 40 kW output
- 208V to 600V
- field convertible from 1 to 3 phase
- tubular heating elements
- individually adjustable air flow louvers
- permanently lubricated motors
- overheat protection
- phosphate coated 18-gauge steel cabinet
- epoxy painted (ASA 61 Grey)
- optional thermostats and controls
- optional wall bracket
- motors mounted outside element bundle
- ceiling mounting bracket supplied standard

Motors

- 2–10 kW heaters are standard with dual rated motors: 208/240V single phase. Where necessary, transformers are used to provide proper motor voltage.
- 15–40 kW heaters are standard with single phase full voltage rated motors.
- standard motors have permanently lubricated bearings and built-in thermal overloads.
- totally enclosed ball bearing motors are standard.
- motor RPM: 1550 unless otherwise stated.
- motor HP:
 - 2 to 10 kW (1/20 HP)
 - 15 to 40 kW (1/10 HP)
 - other ratings available (check with the factory)

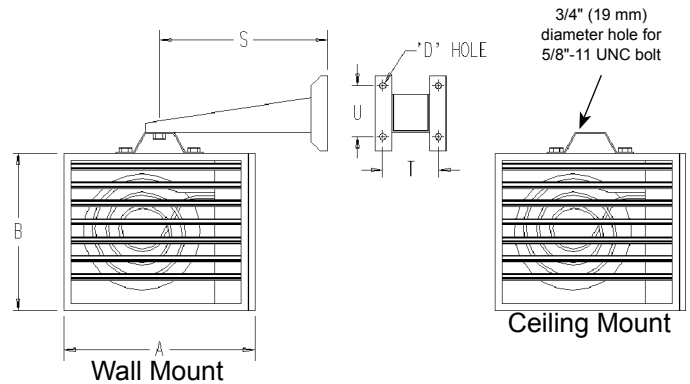
Contactors and Transformers

- Factory installed contactors are available when required.
- Transformers are standard when primary voltage is not suitable for motor operation or contactor coil ratings.
- Standard control voltage is 240V.

Mounting Brackets

(units supplied with ceiling mounting bracket as standard)

RWB210	Wall Mounting Bracket for 2–10 kW heaters
RWB1540	Wall Mounting Bracket for 15–40 kW heaters



Dimensions – in. (mm)

HEATER RATING kW	A	B	C DEPTH	D HOLE DIA.	S	T	U
2–10	17 (432)	14 (356)	15½ (394)	½ (13)	12½ (318)	4½ (114)	4½ (114)
15–40	24 (610)	19½ (495)	22 (559)	5/8 (16)	17½ (445)	6 (152)	6 (152)

Height & Weight

kW	NORMAL MOUNTING HEIGHT ft. (m)	SHIPPING WEIGHT lbs. (kg)
2–10	6 – 8 (1.8 – 2.4)	59 (24)
15–40	8 – 12 (2.4 – 3.0)	104 (47)

Applications

- factories
- warehouses
- parking garages
- boiler rooms
- arenas
- grandstands
- mechanical rooms
- shopping malls
- display areas
- stores



RGE Regular Duty Air Heater Specifications

kW (BTU/hr)	VOLTS	PHASE	CFM	TEMP. RISE F° (C°)	MOTOR VOLTS	CATALOG NUMBER			
						BASIC UNIT	BASIC UNIT WITH		
							CONTACTOR	THERMOSTAT (1-phase only)	CONTACTOR & THERMOSTAT
2 (6824)	208	1 or 3	460	14 (8)	208 / 240	RGE022	RGE022C	RGE022T	RGE022CT
	240	1 or 3	460	14 (8)	208 / 240	RGE023	RGE023C	RGE023T	RGE023CT
3 (10236)	208	1 or 3	465	21 (12)	208 / 240	RGE032	RGE032C	RGE032T	RGE032CT
	240	1 or 3	465	21 (12)	208 / 240	RGE033	RGE033C	RGE033T	RGE033CT
	600	1 or 3	465	21 (12)	208 / 240	RGE038	RGE038C	RGE038T	RGE038CT
4 (13648)	208	1 or 3	475	28 (16)	208 / 240	RGE042	RGE042C	RGE042T	RGE042CT
	240	1 or 3	475	28 (16)	208 / 240	RGE043	RGE043C	RGE043T	RGE043CT
	480	1 or 3	475	28 (16)	208 / 240	RGE047	RGE047C	RGE047T	RGE047CT
	600	1 or 3	475	28 (16)	208 / 240	RGE048	RGE048C	RGE048T	RGE048CT
5 (17060)	208	1 or 3	480	40 (22)	208 / 240	RGE052	RGE052C	RGE052T	RGE052CT
	240	1 or 3	480	40 (22)	208 / 240	RGE053	RGE053C	RGE053T	RGE053CT
	480	1 or 3	480	40 (22)	208 / 240	RGE057	RGE057C	RGE057T	RGE057CT
	600	1 or 3	480	40 (22)	208 / 240	RGE058	RGE058C	RGE058T	RGE058CT
7.5 (25590)	208	1 or 3	590	43 (24)	208 / 240	RGE072	RGE072C	—	RGE072CT
	240	1 or 3	590	43 (24)	208 / 240	RGE073	RGE073C	—	RGE073CT
	480	1 or 3	590	43 (24)	208 / 240	RGE077	RGE077C	—	RGE077CT
	600	1 or 3	590	43 (24)	208 / 240	RGE078	RGE078C	—	RGE078CT
10 (34120)	208	1 or 3	760	45 (25)	208 / 240	RGE102	RGE102C	—	RGE102CT
	240	1 or 3	760	45 (25)	208 / 240	RGE103	RGE103C	—	RGE103CT
	480	1 or 3	760	45 (25)	208 / 240	RGE107	RGE107C	—	RGE107CT
	600	1 or 3	760	45 (25)	208 / 240	RGE108	RGE108C	—	RGE108CT
15 (51180)	208	3	1040	50 (28)	208	RGE152	RGE152C	—	RGE152CT
	240	3	1040	50 (28)	240	RGE153	RGE153C	—	RGE153CT
	480	1 or 3	1040	50 (28)	480	RGE157	RGE157C	—	RGE157CT
	600	1 or 3	1040	50 (28)	600	RGE158	RGE158C	—	RGE158CT
20 (68240)	208	3	1260	55 (31)	208	RGE202	RGE202C	—	RGE202CT
	240	3	1260	55 (31)	240	RGE203	RGE203C	—	RGE203CT
	480	1 or 3	1260	55 (31)	480	RGE207	RGE207C	—	RGE207CT
	600	1 or 3	1260	55 (31)	600	RGE208	RGE208C	—	RGE208CT
25 (85300)	480	3	1500	61 (34)	480	RGE257	RGE257C	—	RGE257CT
	600	3	1500	61 (34)	600	RGE258	RGE258C	—	RGE258CT
30 (102360)	480	3	1500	70 (39)	480	RGE307	RGE307C	—	RGE307CT
	600	3	1500	70 (39)	600	RGE308	RGE308C	—	RGE308CT
40 (136480)	480	3	1500	80 (44)	480	RGE407	RGE407C	—	RGE407CT
	600	3	1500	80 (44)	600	RGE408	RGE408C	—	RGE408CT

Accessories for Field Installation:

- FAT 8 field installed built-in thermostat kit 41°F to 100°F (5°C to 38°C)
- RWB210 wall mount bracket (2–10 kW)
- RWB1540 wall mount bracket (15–40 kW)
- remote thermostats available

To Order Specify:

Catalog Number, Voltage, Phase, Kilowatts,
Optional Features, Accessories

Optional Factory Installed Features:

- built-in thermostat 41°F to 100°F (5°C to 38°C)
- fused control circuit
- manual reset high limit
- “fan only” switch
- low voltage relay for remote 24V thermostat
- epoxy painted fan blade and motor
- special wattages and voltages
- special control voltages (240V is standard)
- available in special finishes.

Regular Duty Electric Unit Heaters Type RGE Specification Sheet

1.0 Scope

- 1.1 Regular duty electric unit heaters, Ruffneck™ model RGE, as manufactured by CCI Thermal Technologies Inc. complete with ratings and features as specified below.

2.0 Ratings

- 2.1 The heater(s) shall be of the regular duty, forced air type, catalog number _____, rated _____ V, _____ phase, _____ Hz, _____ kW.
- 2.2 The heater(s) shall be CSA C/US certified to the following standards:
- CSA C22.2 No. 46-M1988 Electric Air Heaters
 - UL Standard 1025 Electric Air Heaters

3.0 Standard Features

- 3.1 Units rated 2 kW to 10 kW shall use stainless steel tubular heating elements; units rated 15 kW to 40 kW shall use finned tubular heating elements to transfer the heat.
- 3.2 Units shall be field convertible from 1 phase to 3 phase.
- 3.3 Heater cabinets shall be phosphate coated 20 gauge (2–10 kW) or 18 gauge (15–40 kW) steel and painted with ASA 61 grey epoxy for rust protection.
- 3.4 Heaters rated 2–10 kW shall have five (5) individually adjustable, extruded aluminum louvres to direct the outlet airflow. Heaters rated 15–40 kW shall use seven (7) louvres.
- 3.5 Motors shall be mounted outside of the element bundle and be of the totally enclosed type with permanently lubricated ball bearings and built-in thermal overloads with ratings as follows:
- For 2–10 kW heaters, motors shall be 1/20 HP, 1550 RPM dual rated 208/240V single phase. For heater voltages above 240V a transformer shall be included to provide the proper motor voltage.
 - For 15–40 kW heaters, 1/10 HP, 1550 RPM, full voltage rated, single phase.
- 3.6 Standard control voltage shall be 240V. A built-in transformer shall be supplied when the primary voltage differs from the control voltage.
- 3.7 The heater shall be supplied with built-in overheat protection of the auto-reset, bimetal type.
- 3.8 The heater shall be supplied with ceiling mount brackets as standard.
- 3.9 All heaters shall have a 1/2" × 3/4" multiple conduit knockout. Heaters rated 15–40 kW shall be provided with an additional 1" × 1 1/4" multiple conduit knockout.
- 3.10 Approximate heater dimensions and weights shall be as follows:

kW Rating	Height	Width	Depth	Weight
2–10 kW	14" (356 mm)	17" (432 mm)	15 1/2" (394 mm)	59 lbs. (24 kg)
15–40 kW	19 1/2" (495 mm)	24" (610 mm)	22" (559 mm)	104 lbs. (47 kg)

4.0 Optional Factory Installed Features

- 4.1 The following factory installed optional features (indicated with a check) shall be included:
- | | |
|--|---|
| ☐ Built-in bulb and capillary thermostat, 41°F to 100°F (5°C to 38°C)
☐ Definite purpose magnetic contactor
☐ Fused control circuit | ☐ Manual reset high limit
☐ "Fan-only" switch
☐ Low voltage relay for remote 24V control
☐ Epoxy painted fan blade and motor |
|--|---|

5.0 Accessories for Field Installation

- 5.1 The following accessories (indicated with a check) shall be included with the unit for field installation:
- ☐ FAT 8 field installed built-in thermostat kit, 41°F to 100°F (5°C to 38°C)
 - ☐ Wall mount bracket: RWB210 for units rated 2–10 kW; RWB1540 for units rated 15–40 kW.

RGX Heavy Duty Air Heaters

The Ruffneck™ RGX unit heater was designed by CCI Thermal specifically for heavy duty use in industrial environments. This heater will reduce the downtime and maintenance costs usually experienced with heaters of standard design.



**IN CANADA THESE UNITS
ARE MARKED UNDER THE
CALORITECH™ BRAND NAME.**



Applications:

- mine shafts
- pulp & paper mills
- hoist houses
- welding shops
- maintenance shops
- sewage treatment plants
- chemical plants
- repair shops
- wash down areas
- weigh scale pits
- elevator shafts
- high humidity areas
- crane cabs



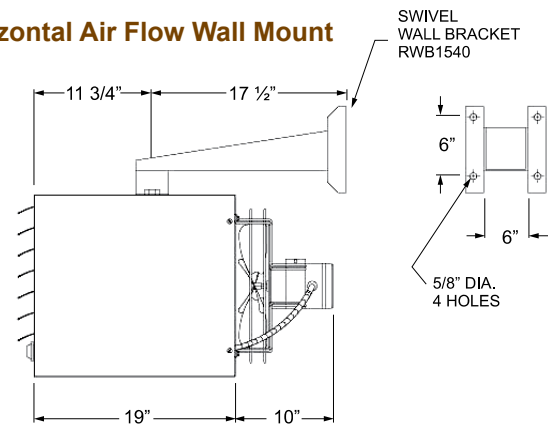
Features:

- CSA C/US approved for horizontal and vertical air flow
- automatic reset high limit
- 15, 20, 25, 30, 40, 50 kW units (optional 10 kW unit)
- 40 and 50 kW units incorporate split loads (50%) for remotely controlled energy management systems
- factory installed transformers, contactors, and thermostats where specified
- individually adjustable air flow louvers
- factory balanced aluminum fan blade
- fan delay in "ON" and "OFF" cycles
- full sized control panel with hinged removable door, constructed to NEMA 12 standards
- "Fan Only" terminals for connection to remote switch
- 14-gauge steel cabinet
- epoxy painted (ASA 61 Grey) for superior resistance to corrosion
- 1/3 HP motor with sealed ball bearings and totally enclosed construction
- ceiling mounting bracket supplied

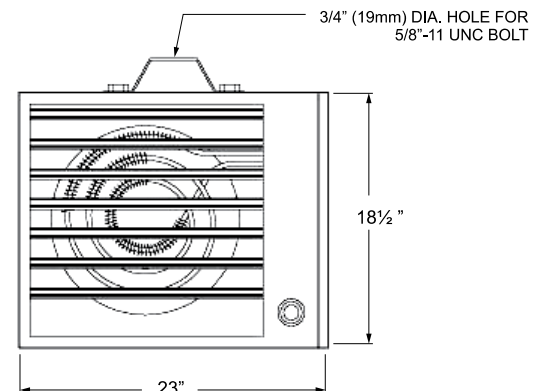
- motor mounted outside of the element bundle thereby eliminating premature failure due to overheating and providing easy access for motor maintenance
- elements are robust KX finned tubular sheathed type with epoxy sealed terminals to eliminate contamination from moisture and airborne impurities

Mounting Configurations

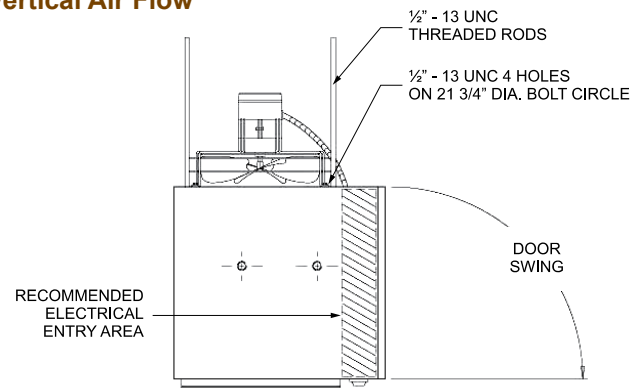
Horizontal Air Flow Wall Mount



Horizontal Air Flow Wall Mount



Vertical Air Flow



RGX Heavy Duty Air Heaters

kW (BTU/hr)	VOLTS	PHASE	CFM	TEMP. RISE F° (C°)	CATALOG NUMBER			NET WEIGHT
					WITHOUT CONTACTOR	WITH CONTACTOR	WITH T'STAT & CONTACTOR	
15 (51180)	208	3	1800	25 (14)	RGX152	RGX152C	RGX152CT	105 lbs. 47.6 kg
	240	3	1800	25 (14)	RGX153	RGX153C	RGX153CT	
	480	3	1800	25 (14)	RGX157	RGX157C	RGX157CT	
	600	3	1800	25 (14)	RGX158	RGX158C	RGX158CT	
20 (68240)	208	3	1800	34 (19)	RGX202*	RGX202C*	RGX202CT*	105 lbs. 47.6 kg
	240	3	1800	34 (19)	RGX203	RGX203C	RGX203CT	
	480	3	1800	34 (19)	RGX207	RGX207C	RGX207CT	
	600	3	1800	34 (19)	RGX208	RGX208C	RGX208CT	
25 (85300)	208	3	1800	41 (24)	RGX252*	RGX252C*	RGX252CT*	105 lbs. 47.6 kg
	240	3	1800	41 (24)	RGX253*	RGX253C*	RGX253CT*	
	480	3	1800	41 (24)	RGX257	RGX257C	RGX257CT	
	600	3	1800	41 (24)	RGX258	RGX258C	RGX258CT	
30 (102360)	480	3	2100	41 (24)	RGX307	RGX307C	RGX307CT	105 lbs. 47.6 kg
	600	3	2100	41 (24)	RGX308	RGX308C	RGX308CT	
40 (136500)	480	3	2100	58 (32)	RGX407	RGX407C	RGX407CT	125 lbs. 56.7 kg
	600	3	2100	58 (32)	RGX408	RGX408C	RGX408CT	
50 (170600)	480	3	2100	72 (40)	RGX507	RGX507C	RGX507CT	125 lbs. 56.7 kg
	600	3	2100	72 (40)	RGX508	RGX508C	RGX508CT	

* These units exceed 48 amps, and may require special split lead feature.

Notes:

1. Motor voltage and phase is same as heater supply.
2. Standard control voltage is 240V. A control transformer is included where required. Other control voltages are available. (Check with factory.)
3. 15, 20, 25, 30 kW units are pre-wired as one circuit. The split load feature (50%) is available as an option.
4. 40 and 50 kW units are pre-wired for split load (50%) control by customer unless specified otherwise.
5. All motors are 1/3 HP, totally enclosed ball bearing type, permanently lubricated, thermally protected.

Optional Factory Installed Features:

- built-in thermostat 41°F to 100°F (5°C to 38°C)
- disconnect switch with door interlock
- HRC main load fuses
- fused control circuit
- manual reset high limit
- "Fan Only" switch
- low voltage relay for remote 24V thermostat
- epoxy painted fan blade and motor
- special wattages and voltages
- special control voltages (240V is standard)
- available in special finishes
- split load feature 15, 20, 25, 30 kW units
- alloy elements with brazed alloy fins
- nickel plated elements
- NEMA 4 construction
- stainless steel cabinet

Accessories for Field Installation:

- FAT 8A field installed built-in thermostat kit 41°F to 100°F (5°C to 38°C)
- RWB210 wall mount bracket (2–10 kW)
- RWB1540 wall mount bracket (15–40 kW)
- air diffuser (vertical air flow)
- "Fan Only" switch and cover plate
- remote thermostats available

To Order Specify:

Catalog Number, Voltage, Phase, Kilowatts,
Optional Features and Accessories

Heavy Duty Electric Unit Heaters Type RGX Specification Sheet

1.0 Scope

- 1.1 Heavy duty electric unit heaters, Ruffneck™ model RGX, as manufactured by CCI Thermal Technologies Inc. complete with ratings and features as specified below.

2.0 Ratings

- 2.1 The heater(s) shall be of the heavy duty, forced air type, catalog number _____, rated _____ V, _____ phase, _____ Hz, _____ kW.
- 2.2 The heater(s) shall be CSA C/US certified to CSA Standard C22.2 No. 46-M1988 Electric Air Heaters, and UL Standard 1025 Electric Air Heaters.

3.0 Standard Features

- 3.1 Heavy duty unit heaters shall be approved for horizontal and vertical airflow.
- 3.2 Heaters shall use Caloritech™ type KX finned tubular elements to transfer the heat. Elements shall have epoxy sealed terminals to eliminate the possibility of contamination from moisture and airborne impurities.
- 3.3 Heaters rated 40 kW and 50 kW shall be provided (as standard) with 50% split loads for remotely controlled energy management systems. Split load feature shall be provided if specified on 15 kW to 30 kW units.
- 3.4 Heater cabinets shall be phosphate coated 14 gauge steel, painted with ASA 61 grey epoxy for superior corrosion protection. The cabinet shall also incorporate a full sized control panel with hinged removable door, constructed to NEMA 12 standards.
- 3.5 The heater shall have seven (7) individually adjustable, extruded aluminum louvres to direct the outlet airflow.
- 3.6 Motors shall be of the totally enclosed type with permanently lubricated ball bearings and built-in thermal overload, rated 1/3 HP, 1725 RPM with the voltage rating the same as the heater. The motor shall be mounted outside of the element bundle to eliminate premature failure due to overheating and to provide easy access for maintenance.
- 3.7 A factory balanced aluminum fan blade shall provide the airflow through the heater.
- 3.8 The standard control voltage shall be 240 V. A built in transformer shall be supplied when required.
- 3.9 Heavy duty unit heaters shall incorporate a fan delay in the “On” and “Off” cycles. “Fan-only” terminals for connection to a remote switch shall also be supplied as standard.
- 3.10 The heater shall be supplied with built-in overheat protection of the auto-reset, bimetal type.
- 3.11 The heater shall be equipped with ceiling mount brackets as standard.
- 3.12 Approximate heater dimensions shall be 18½" (470 mm) high × 23" (584 mm) wide × 30" (762 mm) long.
- 3.13 Shipping weight shall be 105 lbs. (48 kg) for 15 kW to 30 kW and 125 lbs. (57 kg) for 40 kW & 50 kW units.

4.0 Optional Factory Installed Features

- 4.1 The following factory installed optional features (indicated with a check) shall be included:
- | | |
|--|--|
| ☐ Built-in bulb and capillary thermostat, 41°F to 100°F (5°C to 38°C) | ☐ Low voltage relay for remote 24V thermostat |
| ☐ Disconnect switch with door interlock | ☐ Epoxy painted fan blade and motor |
| ☐ HRC main load fuses | ☐ Split load feature, 15 kW to 30 kW units |
| ☐ Manual reset high limit | ☐ NEMA 4 construction |
| ☐ “Fan-only” switch | ☐ Nickel plated elements |
| | ☐ Stainless steel cabinet |

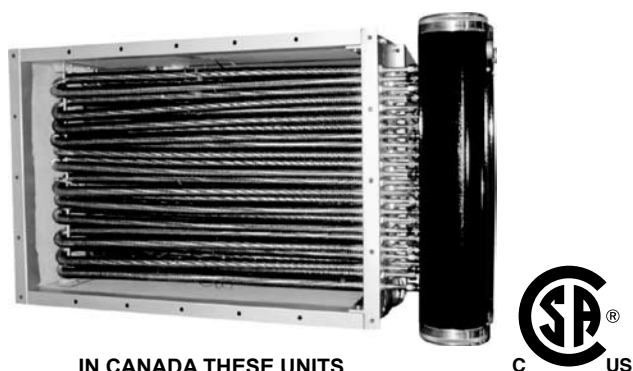
5.0 Accessories for Field Installation

- 5.1 The following accessories (indicated with a check) shall be included with the unit for field installation:
- | | |
|---|--|
| ☐ FAT 8A field installed built-in thermostat kit 41°F to 100°F (5°C to 38°C) | ☐ Air diffuser for vertical air flow. |
| ☐ Wall mount bracket: model RWB1540. | |

Explosion-Proof Duct Heaters Type RXDF

Ruffneck™ type RXDF duct heaters are designed for heating air or gases which contain potentially explosive substances. RXDF heaters feature the unique Ruffneck™ approach to explosion-proof electric heater design which embodies safety, reliability and economy.

The RXDF is a factory pre-wired explosion-proof duct heater. Standard models are available in three duct sizes, with either a single or double bank of heating modules. RXDF heaters are available as standard units with T2D, T3A or T3B hazardous area temperature codes.



IN CANADA THESE UNITS
ARE MARKED UNDER THE
CALORITECH™ BRAND NAME.
REFER TO CALORITECH™
CATALOGUE SECTION C.

Construction

The RXDF explosion-proof duct heater utilizes heavy walled carbon steel finned tubular elements with nickel plated finish to provide safe, efficient, low temperature heat transfer. Standard units have a painted steel duct with mounting holes provided for attachment to the duct section.



RXDF heaters feature the unique copper free aluminum extruded x-Max® terminal housing (U.S. Pat. No. 5,798,910, CDN. Pat. No. 2,212,500). A track and trolley system and threaded covers at each end allow easy access to wiring terminal connections. Units are approved for mounting in a horizontal duct section.

Wattage

Units are available in wattages up to 50 kW.

Designed for Application in Hazardous Environments, such as:

- oil refineries
- coal mines
- pulp and paper mills
- petrochemical plants
- grain elevators
- sewage treatment plants

Control Panels

For information on control panels please contact the factory.

Thermostats

CCI Thermal Technologies Inc. offers a wide variety of explosion proof thermostats to suit most every need. All model RXDF heaters are available with remote externally adjustable thermostats which are field convertible to tamper-proof.

Heater Selection

Standard Ruffneck™ RXDF duct heaters may be operated in hazardous areas where the ambient temperature does not exceed 104°F (40°C) and the maximum heater surface temperature does not exceed the temperature code rating. Use the following steps for heater selection.

1. Determine the class, divisions, and group required.
2. **Determine temperature code rating.** Standard heaters are available for T2D, T3A or T3B areas.
3. **Determine kW rating.** Standard heaters are available up to 50kW.
4. **Determine duct size.** Three standard sizes are available and transition sections can be provided for other duct sizes.
5. **Verify air flow requirements.** Table 2, page 38 lists the minimum air flow (SCFM) required for each heater type.

6. Verify temperature rise using the following formula:

F° Temperature Rise	C° Temperature Rise
$F^{\circ} \text{ temp. rise} = \frac{\text{kW} \times 3000}{\text{SCFM}}$	$C^{\circ} \text{ temp. rise} = \frac{\text{kW} \times 1667}{\text{SCFM}}$

7. **Determine power supply voltage and phase.**

Standard units are available in 208, 240, 480 or 600 V, 3-phase. Optional 1-phase units also available.

Standard Heater Features:

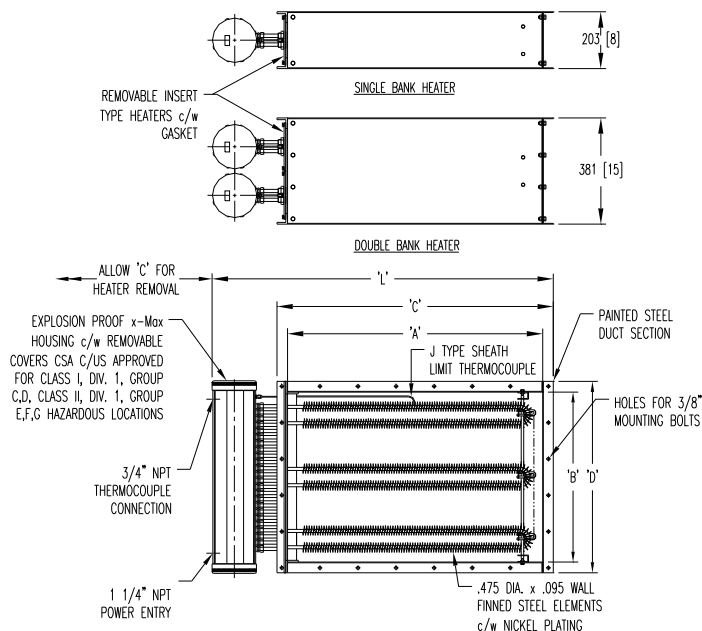
- T2D, T3A or T3B temperature code
- painted steel duct section
- differential pressure switch
- factory installed high limit sensing thermocouples
- extra heavy wall (0.095") finned tubular heating elements with nickel plated finish.

Optional Features:

- transition sections
- stainless steel duct section
- special temperature code
- outlet air thermostat
- outlet air thermocouple

Table 1: Dimensions in inches (mm)

DUCT SIZE	A	B	C	D	L
24" x 12" (610 x 305)	24 (610)	12 (305)	27 (686)	15 (381)	36½ (927)
30" x 18" (762 x 457)	30 (762)	18 (457)	33 (838)	21 (533)	42½ (1080)
36" x 24" (914 x 610)	36 (914)	24 (610)	39 (991)	27 (686)	48½ (1232)

**Table 2: Heater Specifications**

DUCT SIZE A × B	NUMBER OF HEATING BANKS	kW	AVAILABLE VOLTAGES				HIGH TEMP. RISE UNITS – T2D (215°C)					LOW TEMP. RISE UNITS – T3A (180°C) or T3B (165°C)					NET WEIGHT lbs. (kg)
							Class I, Div. 1 & 2, Groups C & D					Class I, Div. 1 & 2, Groups C & D Class II, Div. 1 & 2, Groups E & F Class II, Div. 1 & 2, Group G (T3B units only)					
			208 V 3 φ	240 V 3 φ	480 V 3 φ	600 V 3 φ	TEMP. CODE	CATALOG NO.	MAX. TEMP. RISE		MIN. AIR FLOW SCFM	TEMP. CODE	CATALOG NO.	MAX. TEMP. RISE		MIN. AIR FLOW SCFM	
									F°	C°				F°	C°		
24" × 12" 610 × 305 mm	1	2.5	✓	✓	✓	✓	T2D	RXDF1-24x12-025T2D	13.9	7.7	540	T3B	RXDF1-24x12-025T3B	6.8	3.8	1107	90 (41)
		3.75	✓	✓	✓	✓	T2D	RXDF1-24x12-038T2D	20.8	11.6	540	T3B	RXDF1-24x12-038T3B	8.4	4.7	1334	
		5	✓	✓	✓	✓	T2D	RXDF1-24x12-050T2D	19.7	11.0	761	T3B	RXDF1-24x12-050T3B	9.6	5.3	1562	
		7.5	✓	✓	✓	✓	T2D	RXDF1-24x12-075T2D	18.0	10.0	1247	T3A	RXDF1-24x12-075T3A	13.0	7.2	1728	
	2	5	✓	✓	✓	✓	T2D	RXDF2-24x12-050T2D	27.8	15.4	540	T3B	RXDF2-24x12-050T3B	13.6	7.5	1107	160 (73)
		7.5	✓	✓	✓	✓	T2D	RXDF2-24x12-075T2D	41.7	23.2	540	T3B	RXDF2-24x12-075T3B	16.9	9.4	1334	
		10	✓	✓	✓	✓	T2D	RXDF2-24x12-100T2D	39.4	21.9	761	T3B	RXDF2-24x12-100T3B	19.2	10.7	1562	
		15	✓	✓	✓	✓	T2D	RXDF2-24x12-150T2D	36.1	20.1	1247	T3A	RXDF2-24x12-150T3A	26.0	14.5	1728	
30" × 18" 762 × 457 mm	1	5	✓	✓	✓	✓	T2D	RXDF1-30x18-050T2D	14.8	8.2	1013	T3B	RXDF1-30x18-050T3B	7.1	4.0	2109	135 (61)
		6.25	✓	✓	✓	✓	T2D	RXDF1-30x18-063T2D	18.5	10.3	1013	T3B	RXDF1-30x18-063T3B	8.0	4.5	2331	
		7.5	✓	✓	✓	✓	T2D	RXDF1-30x18-075T2D	22.2	12.3	1013	T3B	RXDF1-30x18-075T3B	8.8	4.9	2553	
		10	✓	✓	✓	✓	T2D	RXDF1-30x18-100T2D	19.5	10.8	1538	T3B	RXDF1-30x18-100T3B	10.0	5.6	2991	
		12.5	✓	✓	✓	✓	T2D	RXDF1-30x18-125T2D	18.9	10.5	1989	T3B	RXDF1-30x18-125T3B	10.9	6.1	3434	
		15	✓	✓	✓	✓	T2D	RXDF1-30x18-150T2D	18.4	10.2	2440	T3A	RXDF1-30x18-150T3A	13.5	7.5	3333	
	2	10	✓	✓	✓	✓	T2D	RXDF2-30x18-100T2D	29.6	16.5	1013	T3B	RXDF2-30x18-100T3B	14.2	7.9	2109	250 (114)
		12.5	✓	✓	✓	✓	T2D	RXDF2-30x18-125T2D	37.0	20.6	1013	T3B	RXDF2-30x18-125T3B	16.1	8.9	2331	
		15	✓	✓	✓	✓	T2D	RXDF2-30x18-150T2D	44.5	24.7	1013	T3B	RXDF2-30x18-150T3B	17.6	9.8	2553	
		20	✓	✓	✓	✓	T2D	RXDF2-30x18-200T2D	39.0	21.7	1538	T3B	RXDF2-30x18-200T3B	20.1	11.1	2991	
		25	✓	✓	✓	✓	T2D	RXDF2-30x18-250T2D	37.7	21.0	1989	T3B	RXDF2-30x18-250T3B	21.8	12.1	3434	
		30	✓	✓	✓	✓	T2D	RXDF2-30x18-300T2D	36.9	20.5	2440	T3A	RXDF2-30x18-300T3A	27.0	15.0	3333	
36" × 24" 914 × 610 mm	1	7.5	✓	✓	✓	✓	T2D	RXDF1-36x24-075T2D	13.9	7.7	1620	T3B	RXDF1-36x24-075T3B	6.9	3.8	3256	180 (82)
		10	✓	✓	✓	✓	T2D	RXDF1-36x24-100T2D	18.5	10.3	1620	T3B	RXDF1-36x24-100T3B	8.1	4.5	3690	
		12.5	✓	✓	✓	✓	T2D	RXDF1-36x24-125T2D	23.2	12.9	1620	T3B	RXDF1-36x24-125T3B	9.1	5.1	4125	
		15	✓	✓	✓	✓	T2D	RXDF1-36x24-150T2D	20.2	12.9	2230	T3B	RXDF1-36x24-150T3B	9.9	5.5	4559	
		20	✓	✓	✓	✓	T2D	RXDF1-36x24-200T2D	19.3	10.7	3115	T3B	RXDF1-36x24-200T3B	11.1	6.1	5428	
		25	—	✓	✓	✓	T2D	RXDF1-36x24-250T2D	18.8	10.4	4000	T3A	RXDF1-36x24-250T3A	13.8	7.7	5427	
	2	15	✓	✓	✓	✓	T2D	RXDF2-36x24-150T2D	27.8	15.4	1620	T3B	RXDF2-36x24-150T3B	13.8	7.7	3256	325 (148)
		20	✓	✓	✓	✓	T2D	RXDF2-36x24-200T2D	37.0	20.6	1620	T3B	RXDF2-36x24-200T3B	16.3	9.0	3690	
		25	✓	✓	✓	✓	T2D	RXDF2-36x24-250T2D	46.3	25.7	1620	T3B	RXDF2-36x24-250T3B	18.2	10.1	4125	
		30	✓	✓	✓	✓	T2D	RXDF2-36x24-300T2D	40.4	22.4	2230	T3B	RXDF2-36x24-300T3B	19.7	11.0	4559	
		40	✓	✓	✓	✓	T2D	RXDF2-36x24-400T2D	38.5	21.4	3115	T3B	RXDF2-36x24-400T3B	22.1	12.3	5426	
		50	—	✓	✓	✓	T2D	RXDF2-36x24-500T2D	37.5	20.8	4000	T3A	RXDF2-36x24-500T3A	27.6	15.4	5427	

To Order: Specify quantity, catalog no., voltage and phase, wattage, hazardous location designation, temperature code, control package and optional features.

Control Panels for RXDF Duct Heaters Type RCPXD

Ruffneck™ type RXDF duct heaters are normally supplied with a type RCPXD control panel. These control panels are available in two basic types – type 4 moisture resistant or explosion proof – and with four different control packages as listed.

Standard Features

All RCPXD control panels are supplied with magnetic contactors, HRC fusing, fused 120V control transformer, high limit controls, control circuit, ON/OFF switch, control ON light, high limit indicator light, high limit push-to-reset, terminals for connection of temperature controls and differential air pressure switch.

Enclosure Types

RCPXD control panels are available with either type 4 moisture resistant enclosures or explosion-proof enclosures rated Class I, Div. 1 & 2, Groups C, D and Class II, Div. 1 & 2, Groups E, F, G.

Table 3: Control Panel Specifications

ENCLOSURE TYPE	NUMBER OF CIRCUITS	kW	AVAILABLE VOLTAGES				CATALOG NUMBER			
			208V 3 φ	240V 3 φ	480V 3 φ	600V 3 φ	PACKAGE #1	PACKAGE #2	PACKAGE #3	PACKAGE #4
TYPE 4 MOISTURE RESISTANT	1	2.5	✓	✓	✓	✓	RCPXD1-025R	RCPXD1-025TR	RCPXD1-025SR	RCPXD1-025STR
		3.75	✓	✓	✓	✓	RCPXD1-038R	RCPXD1-038TR	RCPXD1-038SR	RCPXD1-038STR
		5	✓	✓	✓	✓	RCPXD1-050R	RCPXD1-050TR	RCPXD1-050SR	RCPXD1-050STR
		6.25	✓	✓	✓	✓	RCPXD1-063R	RCPXD1-063TR	RCPXD1-063SR	RCPXD1-063STR
		7.5	✓	✓	✓	✓	RCPXD1-075R	RCPXD1-075TR	RCPXD1-075SR	RCPXD1-075STR
		10	✓	✓	✓	✓	RCPXD1-100R	RCPXD1-100TR	RCPXD1-100SR	RCPXD1-100STR
		12.5	✓	✓	✓	✓	RCPXD1-125R	RCPXD1-125TR	RCPXD1-125SR	RCPXD1-125STR
		15	✓	✓	✓	✓	RCPXD1-150R	RCPXD1-150TR	RCPXD1-150SR	RCPXD1-150STR
		20	✓	✓	✓	✓	RCPXD1-200R	RCPXD1-200TR	RCPXD1-200SR	RCPXD1-200STR
		25	—	✓	✓	✓	RCPXD1-250R	RCPXD1-250TR	RCPXD1-250SR	RCPXD1-250STR
	2	5	✓	✓	✓	✓	RCPXD2-050R	RCPXD2-050TR	RCPXD2-050SR	RCPXD2-050STR
		7.5	✓	✓	✓	✓	RCPXD2-075R	RCPXD2-075TR	RCPXD2-075SR	RCPXD2-075STR
		10	✓	✓	✓	✓	RCPXD2-100R	RCPXD2-100TR	RCPXD2-100SR	RCPXD2-100STR
		12.5	✓	✓	✓	✓	RCPXD2-125R	RCPXD2-125TR	RCPXD2-125SR	RCPXD2-125STR
		15	✓	✓	✓	✓	RCPXD2-150R	RCPXD2-150TR	RCPXD2-150SR	RCPXD2-150STR
		20	✓	✓	✓	✓	RCPXD2-200R	RCPXD2-200TR	RCPXD2-200SR	RCPXD2-200STR
		25	—	✓	✓	✓	RCPXD2-250R	RCPXD2-250TR	RCPXD2-250SR	RCPXD2-250STR
		30	—	—	✓	✓	RCPXD2-300R	RCPXD2-300TR	RCPXD2-300SR	RCPXD2-300STR
		40	—	—	✓	✓	RCPXD2-400R	RCPXD2-400TR	RCPXD2-400SR	RCPXD2-400STR
		50	—	—	✓	✓	RCPXD2-500R	RCPXD2-500TR	RCPXD2-500SR	RCPXD2-500STR
		2.5	✓	✓	✓	✓	RCPXD1-025X	RCPXD1-025TX	RCPXD1-025SX	RCPXD1-025STX
EXPLOSION PROOF CLASS I, GROUP C & D CLASS II, GROUP E, F, & G	1	3.75	✓	✓	✓	✓	RCPXD1-038X	RCPXD1-038TX	RCPXD1-038SX	RCPXD1-038STX
		5	✓	✓	✓	✓	RCPXD1-050X	RCPXD1-050TX	RCPXD1-050SX	RCPXD1-050STX
		6.25	✓	✓	✓	✓	RCPXD1-063X	RCPXD1-063TX	RCPXD1-063SX	RCPXD1-063STX
		7.5	✓	✓	✓	✓	RCPXD1-075X	RCPXD1-075TX	RCPXD1-075SX	RCPXD1-075STX
		10	✓	✓	✓	✓	RCPXD1-100X	RCPXD1-100TX	RCPXD1-100SX	RCPXD1-100STX
		12.5	✓	✓	✓	✓	RCPXD1-125X	RCPXD1-125TX	RCPXD1-125SX	RCPXD1-125STX
		15	✓	✓	✓	✓	RCPXD1-150X	RCPXD1-150TX	RCPXD1-150SX	RCPXD1-150STX
		20	✓	✓	✓	✓	RCPXD1-200X	RCPXD1-200TX	RCPXD1-200SX	RCPXD1-200STX
		25	—	—	✓	✓	RCPXD1-250X	RCPXD1-250TX	RCPXD1-250SX	RCPXD1-250STX
	2	5	✓	✓	✓	✓	RCPXD2-050X	RCPXD2-050TX	RCPXD2-050SX	RCPXD2-050STX
		7.5	✓	✓	✓	✓	RCPXD2-075X	RCPXD2-075TX	RCPXD2-075SX	RCPXD2-075STX
		10	✓	✓	✓	✓	RCPXD2-100X	RCPXD2-100TX	RCPXD2-100SX	RCPXD2-100STX
		12.5	✓	✓	✓	✓	RCPXD2-125X	RCPXD2-125TX	RCPXD2-125SX	RCPXD2-125STX
		15	✓	✓	✓	✓	RCPXD2-150X	RCPXD2-150TX	RCPXD2-150SX	RCPXD2-150STX
		20	✓	✓	✓	✓	RCPXD2-200X	RCPXD2-200TX	RCPXD2-200SX	RCPXD2-200STX
		25	—	✓	✓	✓	RCPXD2-250X	RCPXD2-250TX	RCPXD2-250SX	RCPXD2-250STX
		30	—	—	✓	✓	RCPXD2-300X	RCPXD2-300TX	RCPXD2-300SX	RCPXD2-300STX
		40	—	—	✓	✓	RCPXD2-400X	RCPXD2-400TX	RCPXD2-400SX	RCPXD2-400STX
		50	—	—	✓	✓	RCPXD2-500X	RCPXD2-500TX	RCPXD2-500SX	RCPXD2-500STX

Note: For optional disconnect switch, add suffix 'D' to end of catalog number.

Control Packages

Package #1 – Basic Unit (ON/OFF Control)

All standard features. Terminals are provided for connection to a remote ON/OFF temperature controller and connection of differential air pressure switch.

Package #2 – Built-in Temperature Controller

Same features as Package #1 except with factory installed digital temperature controller for control of outlet air temperature.

Package #3 – SCR with Remote Temperature Controller

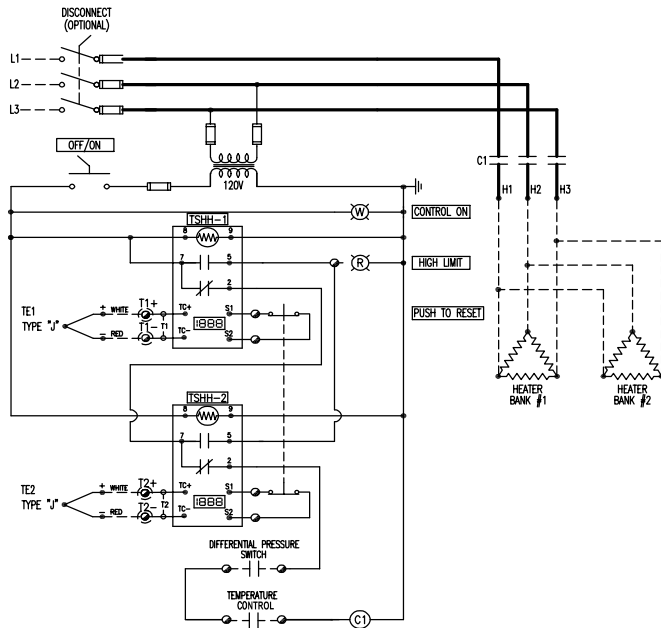
All standard features and a factory installed full load zero fired SCR with terminals provided for remote 4–20 mA temperature control signal and connection of differential air pressure switch.

Package #4 – SCR with Built-in Temperature Controller

Same features as Package #3 except with factory installed digital temperature controller for control of outlet air temperature.

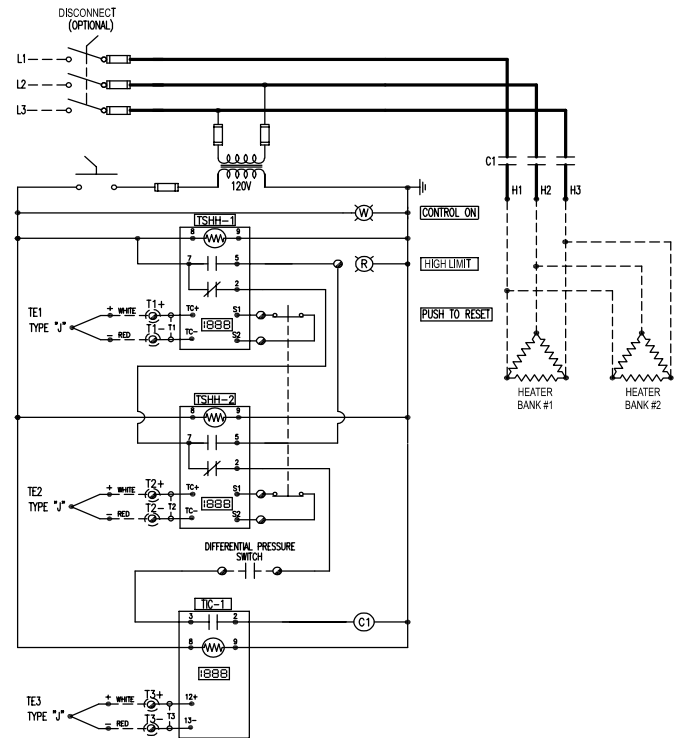
Note: Some amperage limits apply to packages #3 and #4 in E.P. Enclosure. Consult factory for details.

Package #1 – Basic Unit (ON/OFF Control)



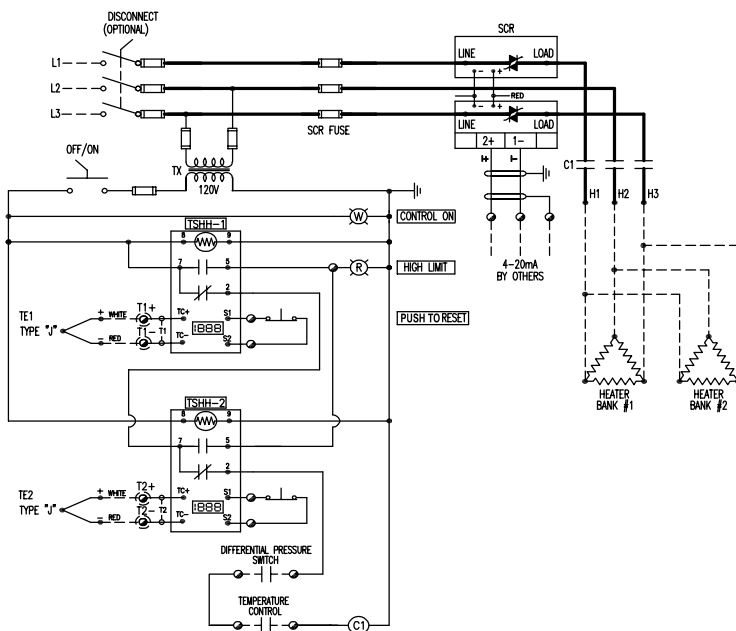
Notes:
ONE HIGH LIMIT CONTROL PROVIDED ON SINGLE BANK HEATERS.
TWO HIGH LIMIT CONTROLS PROVIDED ON DOUBLE BANK HEATERS.

Package #2 – Built-in Temperature Controller



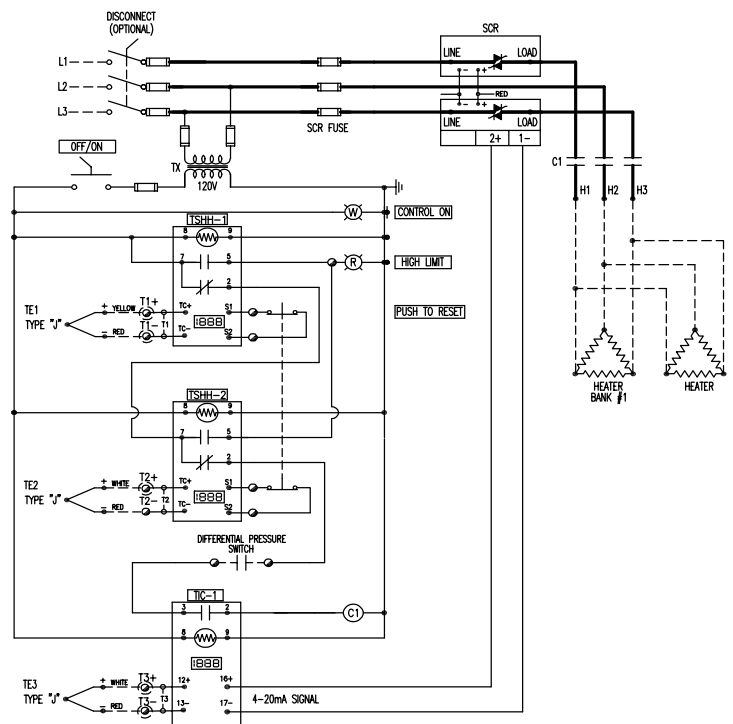
Notes:
ONE HIGH LIMIT CONTROL PROVIDED ON SINGLE BANK HEATERS.
TWO HIGH LIMIT CONTROLS PROVIDED ON DOUBLE BANK HEATERS.

Package #3 – SCR with Remote Temperature Controller



Notes:
ONE HIGH LIMIT CONTROL PROVIDED ON SINGLE BANK HEATERS.
TWO HIGH LIMIT CONTROLS PROVIDED ON DOUBLE BANK HEATERS.

Package #4 – SCR with Built-in Temperature Controller



Notes:
ONE HIGH LIMIT CONTROL PROVIDED ON SINGLE BANK HEATERS.
TWO HIGH LIMIT CONTROLS PROVIDED ON DOUBLE BANK HEATERS.

Explosion-proof Heaters Type RXDF Specification Sheet

1.0 Scope

Electric explosion-proof duct heaters shall be **Ruffneck™ type RXDF**, as manufactured by **CCI Thermal Technologies**, complete with all standard equipment and optional features as specified below.

2.0 General

2.1 The heater is to be CSA C/US certified with ratings as specified in 3.0.

2.2 The heater shall be provided with standard features and optional features as outlined in 4.0 and 6.0.

3.0 Specifications and Ratings

3.1 The duct heater shall be designed to heat air at _____ SCFM from _____°F to _____°F (_____°C to _____°C).

3.2 The heater shall be of the explosion-proof, duct type, catalog number _____,
rated _____ V, _____ Phase, _____ Hz, _____ kW with the following hazardous locations rating.

☐ Class _____, Divisions _____, Groups _____;

☐ Class _____, Divisions _____, Groups _____.

3.3 The duct heater shall be marked with a _____ temperature code, or maximum surface temperature of _____.

3.4 The minimum rated airflow through the duct heater shall be _____ SCFM.

3.5 The maximum outlet temperature of the duct heater shall not exceed _____°F (_____°C).

3.6 The duct heater is to be mounted in a horizontal duct section ☐ downstream / ☐ upstream from the customer supplied blower.

3.7 The duct heater shall be suitable for operation in a -40°F (-40°C) min. to 104°F (40°C) max. ambient temperature.

4.0 Standard Features – Duct Heater

4.1 The duct heater shall be supplied with a _____" (W) × _____" (H) × _____" (L) carbon steel duct section with 1" wide mounting flange and painted ASA61 gray epoxy outside and high temperature aluminum inside.

4.2 The heating elements shall be 0.475" dia., extra heavy wall (0.095") finned tubular steel with nickel plated finish. Fins are to be fully brazed to the element sheath for maximum performance and efficiency.

4.3 The heating elements shall extend through CCI Thermal Technologies certified explosion-proof compression fittings into a patented **x-Max®** explosion-proof, extruded copper-free aluminum terminal housing(s) with 1¼" NPT power conduit entry and ¾" NPT conduit entry for high limit thermocouple connection.

4.4 The heating elements shall be mounted as _____ removable heating bank(s) and wired to terminal blocks for
_____ × _____ kW, _____ V, _____ phase heating circuits to be ☐ fully SCR controlled, or ☐ ON/OFF control.

4.5 The duct heater shall be supplied with _____ 'J' type sheathed thermocouples welded or brazed to the element sheath for connection to ☐ customer supplied / ☐ factory installed certified high limit controllers. High limit set points will be factory preset.

4.6 An explosion-proof differential pressure switch is supplied as standard for field wiring to the remote control panel. Switch is intended to prove that the minimum airflow is maintained at all times. The differential pressure switch is to be:

☐ factory mounted on the heater

☐ supplied loose for field installation.

4.7 The duct heater shall be mounted in a horizontal duct section with the terminal box(es) at the side.

4.8 The approximate weight of the duct heater shall be _____ lbs.

5.0 Standard Features – Control Package

5.1 Enclosure type (check one):

☐ Type 4 – moisture-proof

☐ Explosion-proof

5.2 Temperature control (check one):

☐ Basic unit – customer supplied temperature control signal

☐ Built-in temperature controller

☐ SCR controller – customer supplied 4–20 mA control signal

☐ SCR controller with built-in temperature controller

6.0 Optional Features and Equipment (check as desired)

☐ Stainless steel duct section

☐ Transition sections to _____" (H) × _____" (W) duct or _____" round duct.

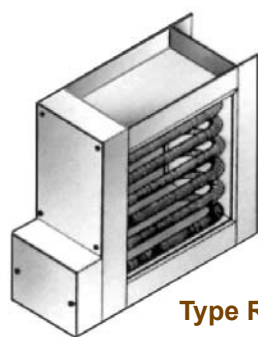
☐ Special temperature code of _____.

Air Duct Heaters Types RDFF, RDIF, RDFT & RDIT

Application

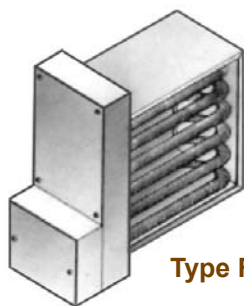
Ruffneck™ air duct heaters are for use in comfort heating applications. Typical applications include:

- make-up air heating
- air pre-heating
- air handling equipment
- fan coils
- terminal reheating
- multi-zone reheating
- heat pump auxiliary systems
- return air heating



Type RDFF

IN CANADA THESE UNITS
ARE MARKETING UNDER THE
CALORITECH™ BRAND NAME.
REFER TO CALORITECH™
CATALOGUE SECTION C.



Type RDIF



Type RDFF is a flanged duct heater with finned tubular heating elements.

Type RDIF is an insert duct heater with finned tubular heating elements.

Type RDFT is a flanged duct heater with incoloy (nonfinned) tubular heating elements.

Type RDIT is an insert duct heater with tubular heating elements.

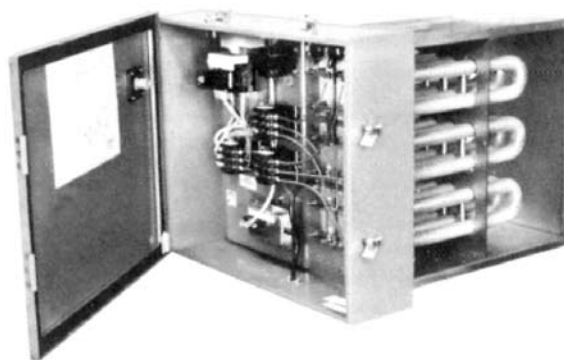
Standard Features

- Primary linear cutout:
160°F (71°C)
277/600 VAC, 25/10 amp non-inductive
- Secondary linear cutout: Manual reset complete with back-up magnetic contactor on units under 300V, 30 kW and less, 225°F (107°C) 277/600 VAC, 25/10 amp non-inductive

Optional Auxiliary Duct Heater Controls

These controls are available as factory installed on the duct heater or as an EEMAC rated (specify) control panel for wall mount:

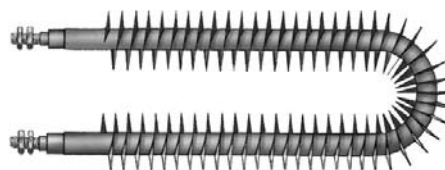
- wall thermostats –
T498A
T6051A (1 stage)
T6052A (2 stage)
T921A (0–135 ohm)
- duct thermostats –
T675A (1 stage)
T678A (2 stage)
T991A (0–135 ohm)
- bulb holders
- silent contactors
- SCR controllers
- sail switch
- differential pressure switch
- main disconnect
- pneumatic electric switches
- on-off switch
- magnetic contactors
- step controllers
- HRC fusing
- control transformers
- fan interlock relay
- pilot lights



Element Types

The finned tubular element design is the most popular. It incorporates the highest wattage per cross-sectional duct area, thus making it more economical than the incoloy tubular design.

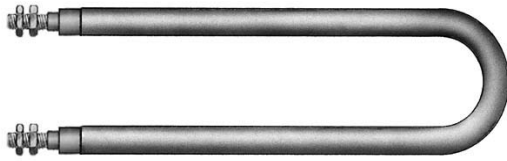
Fig. 1 – Finned Tubular Elements



Finned tubular elements are constructed using a steel tube with a corrugated steel fin wrapped around it and brazed together. This increases the heat transfer surface of the element resulting in a lower operating temperature than tubular designs.

Element Types (continued)

Fig. 2 – Tubular Elements



Incoloy tubular elements are similarly constructed, but without the steel fin in order to increase the corrosion resistance.

The incoloy design should be chosen where high humidity or slightly corrosive chemical contaminants are present in the air stream. These units are made and approved on special order only.

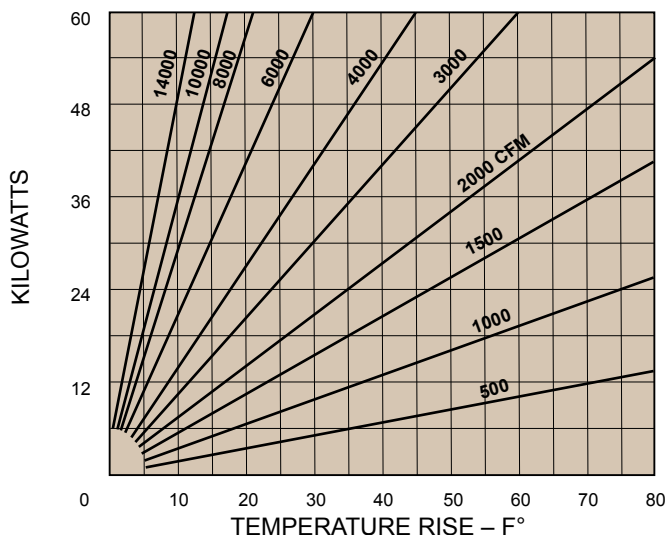
Both element types are designed to provide many years of maintenance free service.

Unlike open coil designs, duct heaters fitted with tubular elements are not subject to hazards of electrical shock which allows installation close to a register or grille.

Recommended Kilowatts

In order to select the proper kW for your application, use Figure 3 below.

Fig. 3 – Recommended Kilowatts



Wiring and Auxiliary Controls

Ruffneck™ electric duct heaters are available for supply voltages up to 600 V, 3 phase. Multi-staging to provide increments of temperature rise can be incorporated where dimensional space and element spacing allows. Special electrical features are available providing simple or sophisticated temperature control to suit individual requirements. See optional controls on previous page.

Construction

Two basic heater frame constructions are available, flange type or insert type (see Figures 4 and 5 below).

Fig. 4 – Insert Type

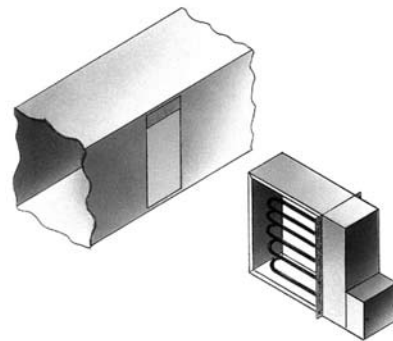
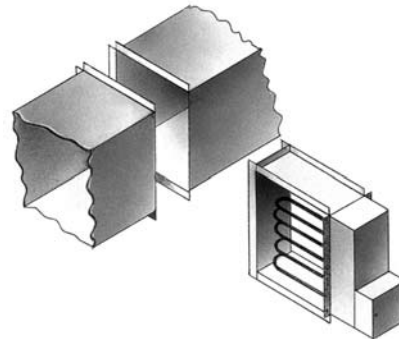


Fig. 5 – Flange Type



All frames are fabricated from 16-gauge satin-coat steel. Specially constructed stainless steel frames are also available.

A unique modular construction using stock frame components is employed using vertical and horizontal dimensional increments of two inches, ensuring rapid delivery.

Air Duct Heaters (continued)

Standard Dimensions

Insert type duct heaters are slightly undersized to permit installation in ducts having the A and B dimensions listed in Table 1.

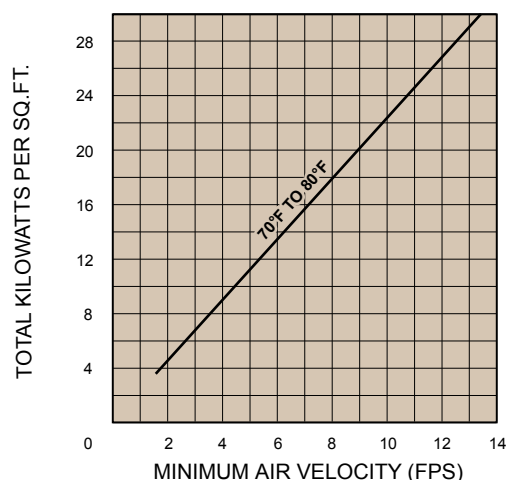


Selection and Installation

Finned tubular duct heaters are approved for horizontal duct installation where the maximum inlet air temperature does not exceed 25°C (77°F) and the maximum rating does not exceed 120 kW.

Multiple heaters can be installed in tandem (series) provided that the inlet temperature to any heater section (one heater) is not more than 25°C (77°F) and the air velocity is not less than the requirements of Figure 6. Check factory if you require assistance.

Fig. 6 – Air Velocity Requirements



See Table 1 for typical duct heater sizes and kW ratings based on an air flow velocity of 500 ft/min or higher.

If the flow velocity is less than 500 ft/min, the typical maximum kW ratings in the table must be derated using Figure 7.

Multiply the kW ratings shown in Table 1 by the appropriate derating factor from Figure 7.

Fig.7 – Derating Factors

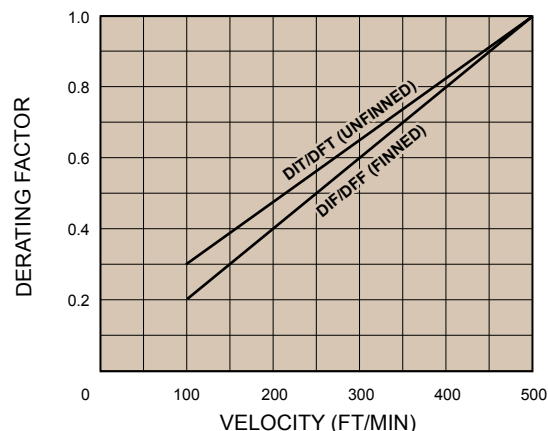


Table 1 below lists some of the more common heater sizes with maximum kilowatt ratings for each size. Stock modular frames allow quick delivery for other sizes in increments of 2".

Table 1 – Maximum Single Heater kW Rating for Typical Duct Heater Sizes

DIMENSIONS (Inches) A × B	Types RDIF / RDFF		Types RDIT / RDFT	
	MAX. kW	MAX. No. OF ELEMS.	MAX. kW	MAX. No. OF ELEMS.
6× 6	2.5	3	1.5	6
8× 6	3	3	3.0	6
10× 6	4	3	2.5	6
10× 8	5.5	4	3.5	8
12× 6	5	3	3.5	6
12× 8	6.5	4	4.5	8
12×10	8	5	5.5	10
14× 8	7.5	4	5.5	8
14×10	9.5	5	6.5	10
14×12	11.5	6	8.0	12
16×10	11	5	7.5	10
16×12	13	6	9.0	12
16×14	15.5	7	10.5	14
18×12	15	6	10.5	12
18×14	17.5	7	12	14
18×16	20	8	14	16
20×14	19	7	13.5	14
20×16	22	8	13.5	16
20×18	25	9	17.5	18
22×16	24	8	17	16
22×18	27.5	9	19	18
22×20	30.5	10	21	20
24×18	30	9	21	18
24×20	33	10	23	20
24×22	36.5	11	25.5	22
26×20	36	10	25	20
26×22	39.5	11	27.5	22
26×24	43	12	30	24
28×22	42.5	11	29.5	22
28×24	46.5	12	32.5	24
28×26	50.5	13	35	26
30×24	50	12	35	24
30×26	54	13	37.5	26
30×28	58	14	40.5	28
30×30	62.5	15	43.5	30

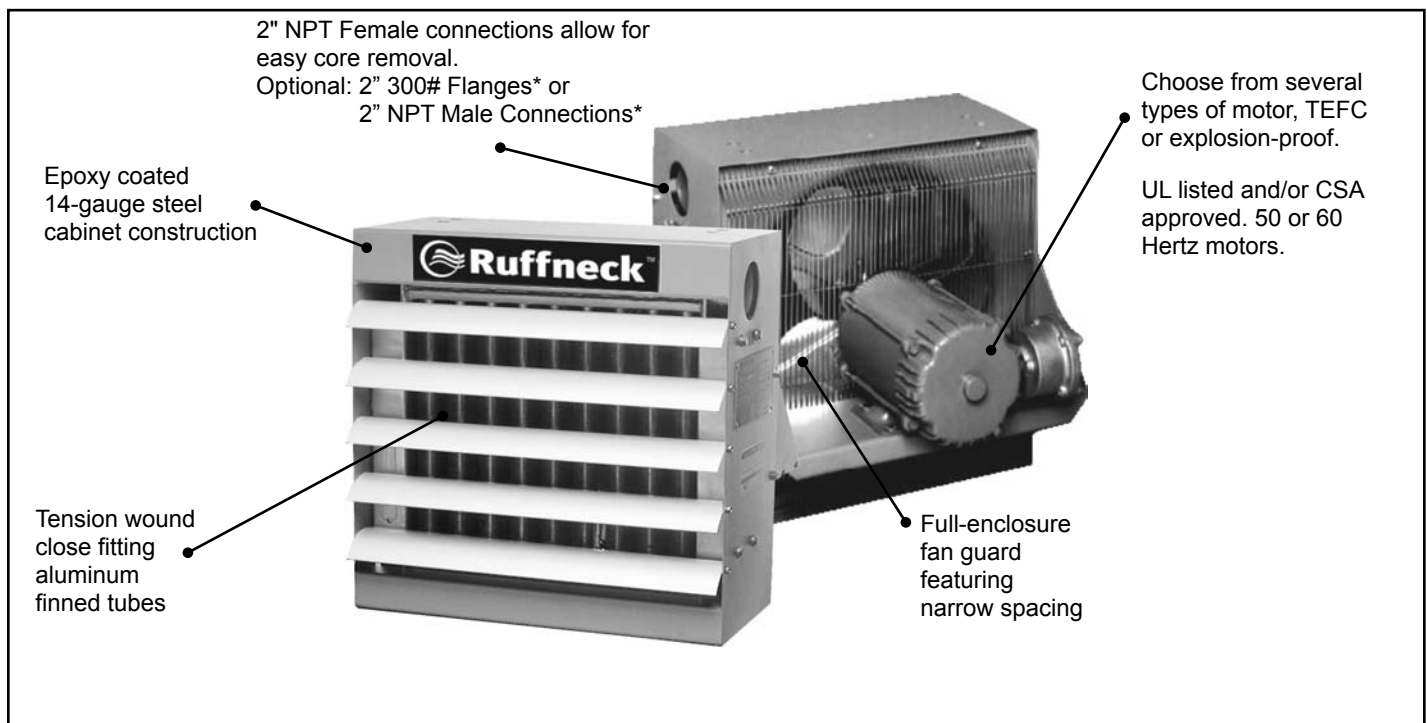
HP / FR Heat Exchanger Unit Heater

Ruffneck™ HP / FR Heat Exchanger Unit Heaters are designed for rugged industrial applications with all features being extra heavy duty to meet the most demanding service and long life requirements. Heavy gauge steel construction is used throughout the heater. Ruffneck™ heaters are suitable for a wide range of heating fluids and are perfect for steam, hot water, glycol, etc. They are also efficient for use with other fluids such as oil, for both space heating and liquid cooling applications.

Engineered for ease of maintenance, all parts are easily removed. All fasteners are plated capscrews; no sheet metal screws are used. Heat exchanger cores are of steel

construction with tension wound, close fitting aluminum fins. They are resistant to corrosive agents (including hydrogen sulphide).

All units are equipped with a narrow-gap, epoxy coated fan guard. Choose from several optional UL listed and/or CSA approved motors with various voltages, phases and frequencies. All HP And FR models have Canadian CRN approvals.



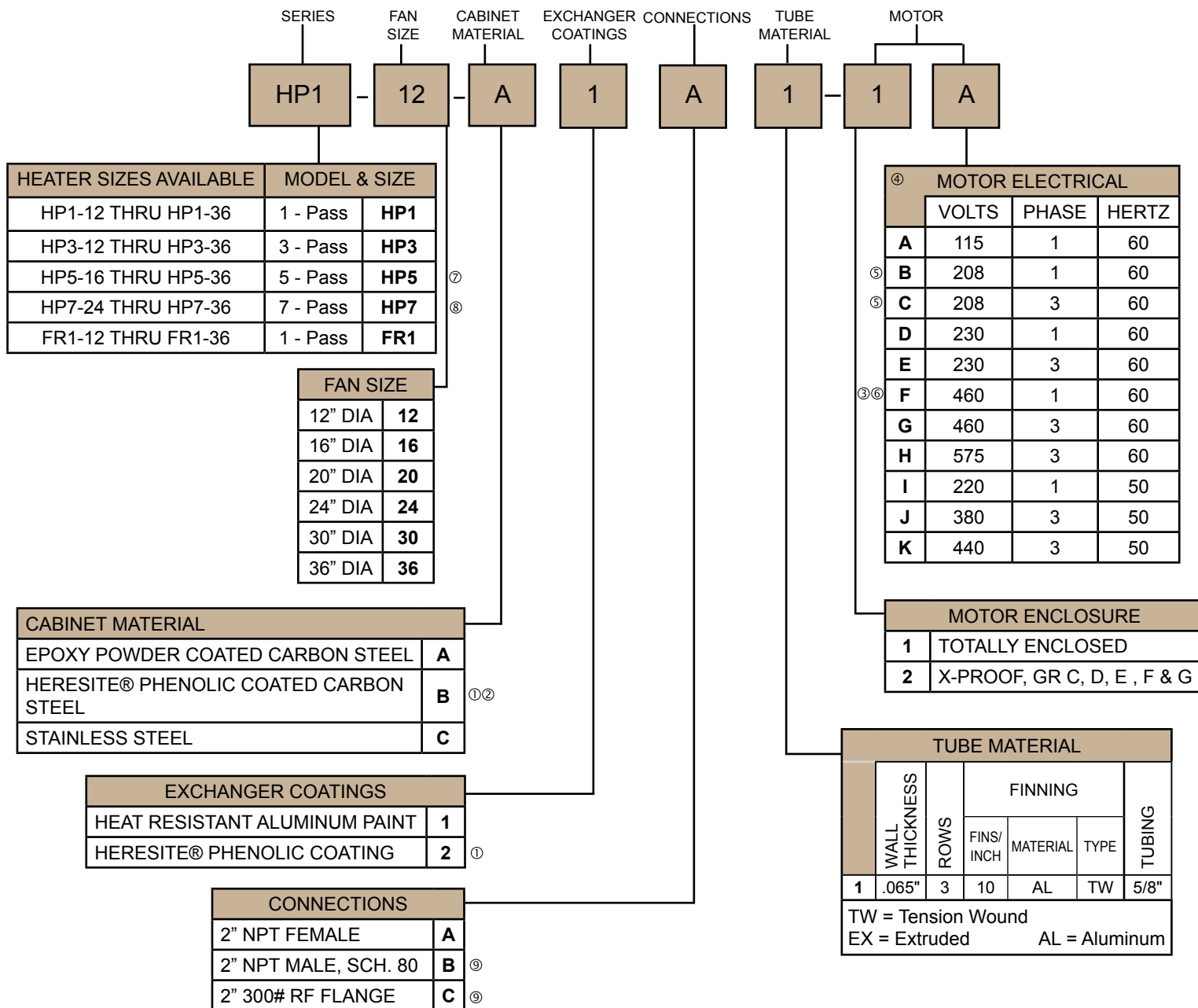
Heresite® is a registered trademark of Heresite® Protective Coatings Inc.

1 - YEAR WARRANTY

* 2" 300# Flanges and 2" NPT Male Connections increase difficulty in core removal.

HP/FR Heat-Exchanger Unit Heaters

Model Coding

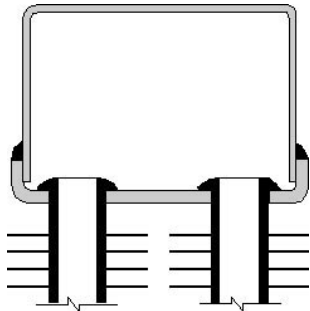


Note: CCI Thermal units utilize a standard motor. Specifying any other O.E.M Motor may result in longer lead times.

- ① Heresite® coated exchangers and cabinets: contact factory for lead time.
- ② Louvres and fan blades are also Heresite® coated.
- ③ Contact factory for shipping lead time.
- ④ Motor designed to be used at rated voltage with tolerances of ±15%.
- ⑤ Motor may be marked 230 volts, but is suitable for 208 volt operation.
- ⑥ 460 1 phase motors are only certified for groups D, F & G
- ⑦ Only available in 16" and larger units
- ⑧ Only available in 24" and larger units
- ⑨ Not available in 36" units

HP/FR Single-Pass & Multi-Pass

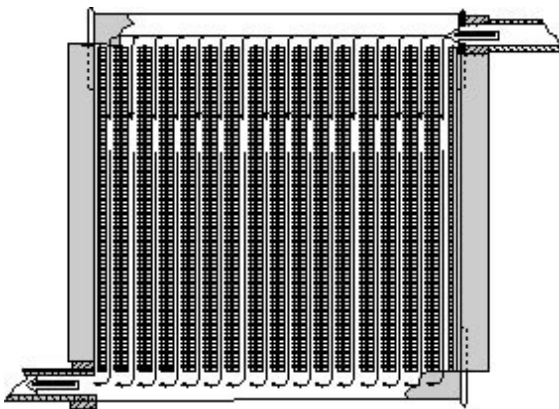
Two basic types of Heat Exchanger configurations are available from CCI Thermal. The FR (Frost Resistant) Series is for steam service to 100 psi and the HP (High Pressure) Series is for steam and liquid service up to 400 PSI (on select models).



FR Series heater shape

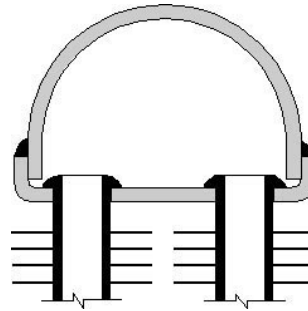
Available in single-pass configurations only. Maximum 100 psi operating pressure.

The FR Series is designed for steam applications that may be subject to freezing conditions. Maximum operating pressure is 100 psi. These units gain their resistance to frost damage through the use of rectangular top and bottom headers. During accidental freeze-up, the headers will distort to a circular shape due to ice expansion. This feature is of particular value for outdoor applications, such as on drilling rigs, where boiler failure or crew neglect may result in an accidental freeze-up of the heating system.



Single-Pass for FR and HP Series

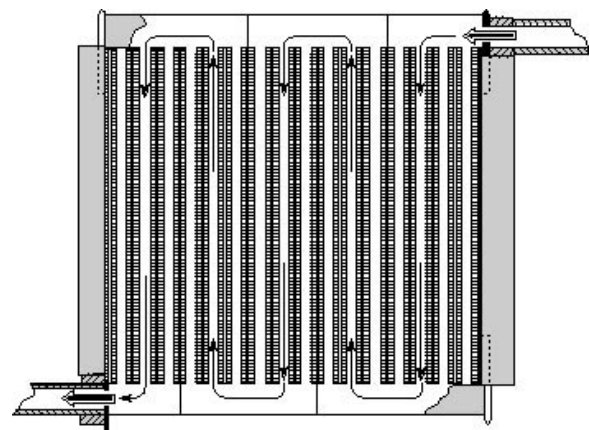
Typical single-pass heat exchanger configurations are available for both the FR and HP series units. Note that the fluid flow is divided among all tubes. This is best suited to steam and high flow rate liquid applications.



HP Series heater shape

Available in one, three, five and seven pass configurations depending on model. Pressure up to 400 psi. Operating pressure on select models.

The HP Series is designed for pressures up to 400 PSI (on select models). These units have semicircular headers that can withstand high operating pressures for steam or liquid service. The HP series is available in single-pass and multi-pass configurations. Single-pass units are desirable for high flow rate liquid service requiring a low pressure drop or for steam applications. Multi-pass units are intended for liquid service only. They are baffled in the top and bottom headers such that the heat transfer liquid will flow through groups of tubes in series within the core. This causes the liquid to travel a longer distance at a higher velocity, thereby increasing the heat transfer rate due to increased turbulence. Units with the greatest number of tube-side passes will always have the highest heat output, but will also have the highest pressure drop. Depending on the application, an HP model in a one, three, five, or seven pass core configuration may be recommended.



Multi-pass for HP Series only.

Typical multi-pass heat exchanger configuration available for the HP series units only. Note that the flow is baffled into groups of tubes to increase fluid velocity and thermal efficiency. Suitable for liquid service only.

FR1-12 & HP1-12 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)				57.3	54.1	50.8	47.7	44.6	41.5	38.4
		COND. (lbs./hr.)				57.9	54.6	51.4	48.2	45.0	41.9	38.8
		FAT (°F)				67.4	75.7	83.8	91.9	100.0	107.9	115.8
10	239	OUTPUT (MBH)				63.7	60.4	57.1	53.8	50.6	47.5	44.4
		COND. (lbs./hr.)				65.3	61.8	58.5	55.2	51.9	48.7	45.5
		FAT (°F)				72.7	81.0	89.3	97.4	105.5	113.5	121.4
20	259	OUTPUT (MBH)			73.6	70.1	66.7	63.3	60.0	56.8	53.6	50.4
		COND. (lbs./hr.)			76.3	72.7	69.2	65.7	62.3	58.9	55.5	52.3
		FAT (°F)			69.7	78.1	86.5	94.7	102.9	111.0	119.1	127.1
40	287	OUTPUT (MBH)		86.3	82.7	79.1	75.6	72.2	68.8	65.4	62.2	58.9
		COND. (lbs./hr.)		91.4	87.5	83.8	80.0	76.4	72.8	69.2	65.7	62.3
		FAT (°F)		68.7	77.2	85.7	94.1	102.5	110.7	118.9	127.0	135.1
60	307	OUTPUT (MBH)	96.7	92.9	89.3	85.6	82.1	78.6	75.1	71.7	68.3	65.0
		COND. (lbs./hr.)	104.2	100.1	96.1	92.2	88.3	84.5	80.8	77.1	73.5	69.9
		FAT (°F)	65.4	74.0	82.7	91.2	99.7	108.0	116.3	124.6	132.7	140.8
80	324	OUTPUT (MBH)	102.4	98.6	94.9	91.2	87.5	84.0	80.5	77.0	73.6	70.2
		COND. (lbs./hr.)	111.8	107.6	103.5	99.4	95.5	91.6	87.7	83.9	80.2	76.5
		FAT (°F)	69.9	78.6	87.3	95.9	104.4	112.8	121.2	129.4	137.6	145.8
100	338	OUTPUT (MBH)	107.1	103.3	99.5	95.7	92.1	88.5	84.9	81.4	77.9	74.5
		COND. (lbs./hr.)	118.3	114.1	109.8	105.7	101.6	97.6	93.7	89.8	86.0	82.2
		FAT (°F)	73.6	82.4	91.1	99.7	108.3	116.8	125.1	133.5	141.7	149.9
150	366	OUTPUT (MBH)	116.6	112.6	108.8	104.9	101.2	97.5	93.8	90.3	86.7	83.3
		COND. (lbs./hr.)	132.2	127.7	123.3	118.9	114.6	110.4	106.3	102.2	98.2	94.2
		FAT (°F)	81.2	90.1	98.8	107.5	116.2	124.7	133.2	141.6	149.9	158.1
200	387	OUTPUT (MBH)	123.7	119.7	115.8	111.9	108.0	104.3	100.6	96.9	93.3	89.8
		COND. (lbs./hr.)	143.3	138.6	134.0	129.5	125.0	120.7	116.3	112.1	107.9	103.8
		FAT (°F)	86.9	95.8	104.7	113.4	122.1	130.7	139.2	147.7	156.0	164.3
250	406	OUTPUT (MBH)	130.2	126.1	122.1	118.1	114.3	110.4	106.7	103.0	99.3	95.8
		COND. (lbs./hr.)	154.1	149.2	144.4	139.7	135.1	130.5	126.0	121.6	117.3	113.0
		FAT (°F)	92.1	101.0	109.9	118.8	127.5	136.2	144.7	153.2	161.7	170.0

HP models are mandatory for service above 100 psi.

For applications over 250 psi, please contact the factory. For 50 Hz power supply, derate output by 10%.

FR1-16 & HP1-16 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)				95.3	89.8	84.5	79.2	74.0	68.9	63.8
		COND. (lbs./hr.)				96.8	91.2	85.8	80.4	75.2	70.0	64.8
		FAT (°F)				69.8	77.9	86.0	94.0	101.9	109.8	117.6
10	239	OUTPUT (MBH)			111.5	105.8	100.3	94.8	89.4	84.1	78.9	73.7
		COND. (lbs./hr.)			114.8	109.0	103.3	97.6	92.1	86.6	81.2	75.9
		FAT (°F)			67.1	75.3	83.5	91.7	99.7	107.7	115.6	123.4
20	259	OUTPUT (MBH)			122.2	116.4	100.7	105.2	99.7	94.2	88.9	83.6
		COND. (lbs./hr.)			127.4	121.4	115.5	109.6	103.9	98.2	92.7	87.2
		FAT (°F)			72.7	81.0	89.2	97.4	105.5	113.5	121.4	129.3
40	287	OUTPUT (MBH)		143.3	137.3	131.4	125.5	119.8	114.1	108.5	103.1	97.6
		COND. (lbs./hr.)		152.6	146.1	139.8	133.6	127.4	121.4	115.5	109.6	103.9
		FAT (°F)		72.1	80.5	88.9	97.2	105.5	113.6	121.7	129.7	137.7
60	307	OUTPUT (MBH)	160.5	154.3	148.1	142.1	136.1	130.3	124.5	118.8	113.2	107.7
		COND. (lbs./hr.)	173.9	167.1	160.4	153.9	147.4	141.0	134.8	128.6	122.6	116.6
		FAT (°F)	69.1	77.7	86.2	94.7	103.0	111.3	119.5	127.7	135.7	143.7
80	324	OUTPUT (MBH)	170.0	163.6	157.4	151.2	145.2	139.2	133.4	127.6	121.9	116.4
		COND. (lbs./hr.)	186.6	179.6	172.7	165.9	159.3	152.7	146.2	140.0	133.7	127.6
		FAT (°F)	73.8	82.5	91.1	99.6	108.0	116.3	124.6	132.7	140.8	148.9
100	338	OUTPUT (MBH)	177.8	171.3	165.0	158.8	152.7	146.6	140.7	134.9	129.1	123.5
		COND. (lbs./hr.)	197.6	190.4	183.3	176.4	169.5	162.8	156.2	149.7	143.3	137.0
		FAT (°F)	77.8	86.5	95.1	103.6	112.1	120.4	128.7	136.9	145.1	153.1
150	366	OUTPUT (MBH)	193.4	186.8	180.3	173.9	167.7	161.5	155.4	149.5	143.6	137.8
		COND. (lbs./hr.)	220.6	213.0	205.6	198.3	191.1	184.1	177.1	170.3	163.6	157.0
		FAT (°F)	85.7	94.4	103.1	111.8	120.3	128.7	137.1	145.4	153.6	161.8
200	387	OUTPUT (MBH)	205.1	198.4	191.8	185.3	179.0	172.7	166.5	160.4	154.5	148.6
		COND. (lbs./hr.)	239.2	231.3	223.6	216.0	208.5	201.1	194.0	186.8	179.8	172.9
		FAT (°F)	91.6	100.5	109.2	117.9	126.5	135.0	143.5	151.8	160.1	168.3
250	406	OUTPUT (MBH)	215.8	209.0	202.3	195.7	189.2	182.9	176.6	170.4	164.4	158.4
		COND. (lbs./hr.)	257.0	248.8	240.8	232.9	225.2	217.5	210.1	202.7	195.4	188.3
		FAT (°F)	97.0	106.0	114.8	123.5	132.2	140.7	149.2	157.6	166.0	174.2

HP models are mandatory for service above 100 psi.

Above figures are based on calculations at sea level and are intended as reference material only. Results may vary due to customer applications.

FR1-20 & HP1-20 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)				161.1	151.9	142.9	134.0	125.2	116.5	108.0
		COND. (lbs./hr.)				164.4	155.0	145.8	136.7	127.8	119.0	110.2
		FAT (°F)				68.3	76.5	84.6	92.7	100.7	108.6	116.5
10	239	OUTPUT (MBH)			188.4	178.9	169.5	160.3	151.2	142.2	133.4	124.7
		COND. (lbs./hr.)			195.2	185.3	175.6	166.0	156.6	147.3	138.1	129.7
		FAT (°F)			65.4	73.7	82.0	90.1	98.3	106.3	114.3	122.2
20	259	OUTPUT (MBH)			206.6	196.9	187.3	177.9	168.6	159.4	150.4	141.5
		COND. (lbs./hr.)			216.7	206.4	196.4	186.5	176.7	167.1	157.7	148.3
		FAT (°F)			70.8	79.2	87.5	95.7	103.9	112.0	120.0	128.0
40	287	OUTPUT (MBH)		242.3	232.2	222.2	212.3	202.6	193.0	183.7	174.4	165.3
		COND. (lbs./hr.)		259.4	248.5	237.8	227.2	216.8	206.6	196.5	186.6	176.8
		FAT (°F)		69.9	78.5	86.9	95.3	103.6	111.8	120.0	128.0	136.0
60	307	OUTPUT (MBH)	271.4	260.9	250.5	240.3	230.3	220.4	210.7	201.1	191.6	182.3
		COND. (lbs./hr.)	295.7	284.2	272.9	261.7	250.8	240.0	229.4	218.9	208.6	198.5
		FAT (°F)	66.7	75.4	84.0	92.5	100.9	109.3	117.5	125.7	133.9	141.9
80	324	OUTPUT (MBH)	287.4	276.7	266.1	255.8	245.6	235.6	225.7	216.0	206.4	196.9
		COND. (lbs./hr.)	317.4	305.5	293.8	282.3	271.1	260.0	249.0	238.3	227.7	217.3
		FAT (°F)	71.4	80.1	88.7	97.3	105.7	114.1	122.4	130.7	138.9	146.9
100	338	OUTPUT (MBH)	300.6	289.7	279.1	268.6	258.2	248.1	238.1	228.2	218.5	209.0
		COND. (lbs./hr.)	336.0	323.9	311.9	300.1	288.6	277.2	266.0	255.0	244.1	233.4
		FAT (°F)	75.2	83.9	92.6	101.2	109.7	118.1	126.5	134.8	143.0	151.1
150	366	OUTPUT (MBH)	327.0	315.9	305.0	294.2	283.6	273.2	263.0	252.9	243.0	233.2
		COND. (lbs./hr.)	375.4	362.6	350.0	337.6	325.4	313.5	301.7	290.1	278.7	267.4
		FAT (°F)	82.9	91.7	100.5	109.1	117.7	126.2	134.7	143.0	151.3	159.5
200	387	OUTPUT (MBH)	346.9	335.6	324.5	313.5	302.8	292.2	281.8	271.5	261.4	251.5
		COND. (lbs./hr.)	407.1	398.7	380.6	367.7	355.0	342.6	330.3	318.3	306.4	294.7
		FAT (°F)	88.7	97.6	106.4	115.1	123.8	132.3	140.8	149.3	157.6	165.8
250	406	OUTPUT (MBH)	365.0	353.4	342.1	331.1	320.1	309.4	298.8	288.4	278.1	268.0
		COND. (lbs./hr.)	437.5	423.6	410.0	396.6	383.5	370.6	357.9	345.3	333.0	320.9
		FAT (°F)	93.9	102.9	111.8	120.6	129.3	137.9	146.5	154.9	163.3	171.6

HP models are mandatory for service above 100 psi.

For applications over 250 psi, please contact the factory. For 50 Hz power supply, derate output by 10%.

FR1-24 & HP1-24 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)	384.4	364.4	344.7	325.4	306.4	287.7	269.4	251.4	233.7	216.3
		COND. (lbs./hr.)	393.6	373.0	352.8	333.0	313.6	294.5	275.7	257.3	239.2	221.3
		FAT (°F)	79.7	86.0	93.9	100.9	107.7	114.4	121.1	127.6	134.0	140.3
10	239	OUTPUT (MBH)	421.4	400.9	380.7	360.9	341.5	322.4	303.6	285.2	267.1	249.3
		COND. (lbs./hr.)	437.8	416.4	395.4	374.9	354.7	334.8	315.3	296.2	277.4	258.8
		FAT (°F)	88.6	95.8	103.0	110.0	116.9	123.6	130.3	136.9	143.4	149.7
20	259	OUTPUT (MBH)	458.5	437.5	416.9	396.6	376.7	357.2	338.1	319.2	300.7	282.5
		COND. (lbs./hr.)	482.3	460.1	438.4	417.1	396.2	375.6	355.4	335.6	316.1	297.0
		FAT (°F)	97.6	104.9	112.1	119.1	126.1	132.9	139.7	146.3	152.8	159.2
40	287	OUTPUT (MBH)	510.6	488.9	467.6	446.8	426.3	406.2	386.5	367.1	348.0	329.3
		COND. (lbs./hr.)	548.3	525.0	502.1	479.7	457.6	436.0	414.8	394.0	373.5	353.4
		FAT (°F)	110.3	117.7	125.0	132.1	139.2	146.1	152.9	159.6	166.2	172.7
60	307	OUTPUT (MBH)	547.8	525.7	504.0	482.7	461.8	441.3	421.2	401.1	382.0	362.9
		COND. (lbs./hr.)	598.7	574.5	550.7	527.4	504.5	482.0	460.0	438.4	417.2	396.3
		FAT (°F)	119.5	127.0	134.3	141.5	148.6	155.6	162.5	169.2	175.9	182.4
80	324	OUTPUT (MBH)	579.5	557.0	534.9	513.3	492.1	471.2	450.8	430.7	410.9	391.5
		COND. (lbs./hr.)	641.9	616.9	592.4	568.4	544.8	521.7	499.0	476.7	454.8	433.3
		FAT (°F)	127.3	134.8	142.2	149.5	156.7	163.7	170.6	177.5	184.2	190.8
100	338	OUTPUT (MBH)	605.7	582.8	560.5	538.5	517.0	495.9	475.2	454.8	434.8	415.2
		COND. (lbs./hr.)	679.3	653.6	628.4	603.8	579.6	555.8	532.5	509.7	487.2	465.2
		FAT (°F)	133.8	141.4	148.8	156.2	163.4	170.4	177.4	184.3	191.0	197.7
150	366	OUTPUT (MBH)	658.0	634.6	611.6	589.1	567.0	545.4	524.1	503.2	482.7	462.6
		COND. (lbs./hr.)	757.8	730.7	704.2	678.2	652.7	627.7	603.2	579.1	555.4	532.2
		FAT (°F)	146.9	154.5	162.1	169.5	176.8	184.0	191.1	198.0	204.9	211.6
200	387	OUTPUT (MBH)	697.3	673.4	650.0	627.1	604.6	582.5	560.9	539.6	518.8	498.3
		COND. (lbs./hr.)	820.9	792.7	765.0	737.9	711.4	685.3	659.8	634.7	610.0	585.9
		FAT (°F)	156.7	164.5	172.1	179.6	187.0	194.3	201.4	208.4	215.4	222.1
250	406	OUTPUT (MBH)	732.9	708.6	684.8	661.5	638.6	616.2	594.2	572.6	551.4	530.6
		COND. (lbs./hr.)	881.5	852.2	823.5	795.3	767.7	740.7	714.1	688.1	662.5	637.4
		FAT (°F)	165.7	173.5	181.3	188.8	196.3	203.6	210.8	217.9	224.9	231.8

HP models are mandatory for service above 100 psi.

Above figures are based on calculations at sea level and are intended as reference material only. Results may vary due to customer applications.

FR1-30 & HP1-30 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)	559.5	530.0	501.1	472.7	444.9	417.6	390.8	364.5	338.6	331.2
		COND. (lbs./hr.)	573.7	543.4	513.7	484.6	456.1	428.1	400.6	373.6	347.1	321.0
		FAT (°F)	87.7	94.6	101.3	107.9	114.4	120.8	127.1	133.3	139.4	145.4
10	239	OUTPUT (MBH)	612.7	582.5	552.9	523.8	495.4	467.4	440.0	413.1	386.7	360.7
		COND. (lbs./hr.)	637.5	606.0	575.2	544.9	515.3	486.2	457.7	429.7	402.1	375.1
		FAT (°F)	97.4	104.3	111.1	117.8	124.3	130.8	137.1	143.3	149.5	155.5
20	259	OUTPUT (MBH)	666.0	635.1	604.8	575.1	546.0	517.4	489.4	461.9	434.9	408.4
		COND. (lbs./hr.)	701.7	669.1	637.1	605.8	575.1	545.0	515.4	486.4	458.0	430.0
		FAT (°F)	107.1	114.1	120.9	127.7	134.3	140.8	147.2	153.5	159.6	165.7
40	287	OUTPUT (MBH)	740.7	708.9	677.7	647.1	617.1	587.7	558.8	530.5	502.7	474.5
		COND. (lbs./hr.)	796.8	762.5	728.9	695.9	663.6	631.9	600.9	570.4	540.5	511.1
		FAT (°F)	120.8	127.9	134.8	141.7	148.4	155.0	161.4	167.8	174.1	180.2
60	307	OUTPUT (MBH)	794.2	761.7	729.8	698.6	668.0	638.0	608.6	579.7	551.4	523.6
		COND. (lbs./hr.)	869.5	833.8	798.8	764.6	731.1	698.2	665.9	634.4	603.2	572.8
		FAT (°F)	130.7	137.9	144.9	151.8	158.5	165.2	171.7	178.2	184.5	190.7
80	324	OUTPUT (MBH)	839.6	806.6	774.2	742.4	711.3	680.8	650.9	621.6	592.8	564.5
		COND. (lbs./hr.)	931.7	894.9	858.9	823.6	789.0	755.1	721.9	689.3	657.3	625.9
		FAT (°F)	139.2	146.4	153.5	160.4	167.2	173.9	180.5	187.0	193.4	199.6
100	338	OUTPUT (MBH)	877.1	843.6	810.7	778.6	747.0	716.1	685.8	656.1	627.0	598.3
		COND. (lbs./hr.)	985.5	947.7	910.7	874.5	839.0	804.2	770.1	736.7	703.9	671.7
		FAT (°F)	146.2	153.4	160.6	167.6	174.4	181.2	187.8	194.4	200.8	207.0
150	366	OUTPUT (MBH)	952.0	917.6	883.9	850.9	818.6	786.9	755.8	725.3	695.4	666.1
		COND. (lbs./hr.)	1099.0	1059.0	1020.0	981.5	944.1	907.4	871.5	836.3	801.7	767.8
		FAT (°F)	160.3	167.6	174.9	182.0	189.0	195.8	202.5	209.2	215.7	222.0
200	387	OUTPUT (MBH)	1008.0	973.2	938.9	905.2	872.3	840.0	808.4	777.3	746.9	717.0
		COND. (lbs./hr.)	1189.0	1148.0	1107.0	1067.0	1028.0	990.2	952.8	916.1	880.1	844.8
		FAT (°F)	170.9	178.4	185.7	192.9	199.9	206.8	213.7	220.3	226.9	233.4
250	406	OUTPUT (MBH)	1059.0	1024.0	988.6	954.4	920.9	888.1	855.9	824.4	793.5	763.1
		COND. (lbs./hr.)	1277.0	1233.0	1191.0	1150.0	1109.0	1070.0	1031.0	992.7	955.3	918.7
		FAT (°F)	180.6	188.1	195.5	202.8	209.9	216.9	223.8	230.5	237.2	243.7

HP models are mandatory for service above 100 psi.

For applications over 250 psi, please contact the factory. For 50 Hz power supply, derate output by 10%.

FR1-36 & HP1-36 Performance Data

ENTERING STEAM PARAMETERS		ENTERING AIR TEMPERATURE °F										
PSIG	°F		-10	0	10	20	30	40	50	60	70	80
2	219	OUTPUT (MBH)	935.4	886.2	837.9	790.6	744.2	698.6	653.8	609.9	566.7	524.2
		COND. (lbs./hr.)	961.3	910.7	861.1	812.4	764.7	717.8	671.8	626.6	582.2	538.6
		FAT (°F)	85.4	92.3	99.2	105.9	112.5	119.0	125.4	131.6	137.8	143.9
10	239	OUTPUT (MBH)	1025.0	974.2	924.8	876.3	828.8	782.1	736.3	691.3	647.2	603.8
		COND. (lbs./hr.)	1069.0	1016.0	964.4	913.8	864.2	815.5	767.7	720.8	674.7	619.5
		FAT (°F)	94.8	101.8	108.7	115.5	122.1	128.7	135.1	141.5	147.7	153.8
20	259	OUTPUT (MBH)	1114.0	1062.0	1012.0	962.3	913.6	866.0	819.1	773.2	728.0	683.7
		COND. (lbs./hr.)	1177.0	1122.0	1069.0	1016.0	964.7	914.3	864.9	816.3	767.6	721.8
		FAT (°F)	104.3	111.4	118.3	125.2	131.9	138.5	145.0	151.4	157.6	163.8
40	287	OUTPUT (MBH)	1239.0	1186.0	1134.0	1083.0	1033.0	983.7	935.6	888.3	841.8	796.2
		COND. (lbs./hr.)	1337.0	1279.0	1223.0	1168.0	1114.0	1061.0	1009.0	957.5	907.4	858.2
		FAT (°F)	117.7	124.9	131.9	138.9	145.7	152.4	158.9	165.4	171.8	178.0
60	307	OUTPUT (MBH)	1329.0	1275.0	1222.0	1169.0	1118.0	1068.0	1019.0	970.7	923.4	876.9
		COND. (lbs./hr.)	1459.0	1399.0	1341.0	1283.0	1227.0	1172.0	1118.0	1065.0	1013.0	961.9
		FAT (°F)	127.4	134.6	141.7	148.7	155.6	162.4	169.0	175.5	181.9	188.2
80	324	OUTPUT (MBH)	1405.0	1350.0	1296.0	1243.0	1191.0	1140.0	1090.0	1041.0	992.8	945.6
		COND. (lbs./hr.)	1563.0	1502.0	1442.0	1382.0	1325.0	1268.0	1212.0	1158.0	1104.0	1051.0
		FAT (°F)	135.7	143.0	150.1	157.2	164.1	170.9	177.6	184.2	190.7	197.0
100	338	OUTPUT (MBH)	1468.0	1412.0	1357.0	1303.0	1251.0	1199.0	1149.0	1099.0	1050.0	1002.0
		COND. (lbs./hr.)	1654.0	1591.0	1529.0	1468.0	1409.0	1350.0	1293.0	1237.0	1182.0	1128.0
		FAT (°F)	142.5	149.9	157.1	164.2	171.2	178.0	184.7	191.4	197.9	204.3
150	366	OUTPUT (MBH)	1594.0	1536.0	1480.0	1425.0	1371.0	1318.0	1266.0	1215.0	1165.0	1116.0
		COND. (lbs./hr.)	1844.0	1777.0	1712.0	1648.0	1586.0	1524.0	1464.0	1405.0	1347.0	1290.0
		FAT (°F)	156.3	163.7	171.1	178.3	185.3	192.3	199.1	205.8	212.5	218.9
200	387	OUTPUT (MBH)	1688.0	1629.0	1572.0	1516.0	1461.0	1407.0	1354.0	1302.0	1251.0	1201.0
		COND. (lbs./hr.)	1997.0	1927.0	1859.0	1793.0	1727.0	1664.0	1601.0	1539.0	1479.0	1420.0
		FAT (°F)	166.7	174.2	181.6	188.9	196.1	203.1	210.0	216.8	223.5	230.0
250	406	OUTPUT (MBH)	1773.0	1714.0	1656.0	1598.0	1543.0	1488.0	1434.0	1381.0	1330.0	1279.0
		COND. (lbs./hr.)	2144.0	2071.0	2001.0	1932.0	1864.0	1797.0	1732.0	1668.0	1606.0	1544.0
		FAT (°F)	176.2	183.8	191.3	198.6	205.8	212.9	219.9	226.8	233.5	240.1

HP models are mandatory for service above 100 psi.

Above figures are based on calculations at sea level and are intended as reference material only. Results may vary due to customer applications.

HP/FR Heat Exchanger Capacities – 50% Ethylene Glycol, 60°F EAT

MODEL	CHANGE IN GLYCOL TEMPERATURE ΔT °F	ENTERING GLYCOL TEMPERATURE															
		180°F				200°F				220°F				240°F			
		OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
HP1-12*	10	8.09	1.61	66.8	0.00	9.90	1.95	68.3	0.00	11.77	2.29	69.9	0.00	24.1	4.83	81.3	0.01
	20	5.96	.57	64.9	0.00	7.37	0.70	66.0	0.00	8.82	0.83	67.2	0.00	10.3	0.96	68.4	0.00
	40	4.11	.19	63.1	0.00	5.19	.023	64.0	0.00	6.30	0.28	64.8	0.00	7.45	0.33	65.7	0.00
HP3-12	10	23.0	4.88	80.8	0.36	31.3	6.57	88.4	0.64	38.2	7.94	94.8	0.92	45.2	9.28	101.1	1.25
	20	8.82	0.89	67.5	0.01	14.9	1.52	73.0	0.04	24.8	2.54	82.0	0.10	34.9	3.56	91.4	0.20
	40	6.13	0.30	65.0	0.00	7.73	0.37	66.3	0.00	9.40	0.45	67.7	0.00	11.1	0.53	69.2	0.01
HP1-16*	10	15.0	3.07	68.2	0.00	17.9	3.64	69.7	0.01	39.1	8.07	82.0	0.02	53.3	10.9	90.3	0.04
	20	11.1	1.11	65.9	0.00	13.7	1.35	67.3	0.00	16.3	1.60	68.7	0.00	19.1	1.85	70.2	0.00
	40	7.54	0.36	63.8	0.00	9.52	0.46	64.9	0.00	11.6	0.55	65.9	0.00	13.7	0.64	67.0	0.00
HP3-16	10	44.5	9.52	85.5	0.83	55.9	11.8	92.1	1.25	67.2	14.1	98.7	1.75	78.5	16.3	105.3	2.32
	20	20.9	2.19	71.6	0.05	36.9	3.88	80.9	0.15	52.7	5.50	90.0	0.29	64.3	6.64	96.8	0.41
	40	11.3	0.57	66.0	0.01	14.3	0.72	67.6	0.01	17.4	0.86	69.3	0.01	20.4	0.99	70.9	0.01
HP5-16	10	50.2	10.8	88.8	4.70	61.4	13.0	95.3	6.79	72.5	15.2	101.9	9.19	83.7	17.3	108.4	11.9
	20	36.9	3.95	81.0	0.68	50.4	5.34	88.8	1.21	61.9	6.48	95.5	1.75	73.3	7.59	102.1	2.38
	40	13.5	0.69	67.3	0.03	18.7	0.95	70.2	0.05	37.3	1.93	80.9	0.17	51.0	2.63	88.9	0.31
HP1-20*	10	31.0	6.52	69.9	0.01	61.3	12.9	80.0	0.04	84.4	17.7	87.6	0.08	109.2	22.6	95.9	0.13
	20	19.9	2.05	66.2	0.00	24.6	2.51	67.7	0.00	29.4	2.97	69.2	0.00	34.4	3.42	70.8	0.00
	40	12.6	0.63	63.8	0.00	17.0	0.85	65.2	0.00	20.7	1.02	66.3	0.00	24.5	1.20	67.5	0.00
HP3-20	10	81.3	17.5	86.8	1.91	100.5	21.4	93.2	2.81	119.6	25.2	99.6	3.83	138.7	28.9	106.0	4.99
	20	53.4	5.73	77.4	0.23	78.9	8.40	85.9	0.47	98.6	10.4	92.4	0.69	118.1	12.3	99.0	0.96
	40	20.3	1.06	66.4	0.01	25.6	1.32	68.0	0.02	42.9	2.22	73.7	0.04	71.5	3.70	83.2	0.10
HP5-20	10	89.1	19.2	89.4	10.3	—	—	—	—	—	—	—	—	—	—	—	—
	20	72.7	7.84	83.9	1.82	92.0	9.8	90.3	2.79	111.3	11.7	96.7	3.92	130.5	13.6	103.2	5.21
	40	23.7	1.25	67.5	0.06	55.5	2.95	78.0	0.29	82.3	4.35	87.0	0.59	102.2	5.34	93.6	0.86
HP1-24*	10	96.9	20.8	85.9	0.04	144.2	30.7	98.9	0.08	193.7	40.8	112.6	0.13	232.4	48.4	123.4	0.18
	20	45.4	4.78	71.8	0.00	56.1	5.83	74.6	0.00	67.1	6.89	77.5	0.01	133.3	13.8	95.6	0.02
	40	27.0	1.39	66.8	0.00	38.9	2.00	69.9	0.00	47.4	2.40	72.1	0.00	56.1	2.82	74.4	0.00
HP3-24	10	168.6	36.5	105.9	2.65	206.5	44.1	116.3	3.79	243.5	51.5	126.7	5.08	280.6	58.6	137.1	6.55
	20	122.9	13.3	93.1	0.39	169.2	18.1	105.9	0.69	207.6	22.0	116.5	0.99	245.7	25.7	127.2	1.33
	40	46.1	2.44	72.0	0.02	58.1	3.04	75.2	0.03	121.4	6.39	92.5	0.10	168.8	8.82	105.5	0.18
HP5-24	10	181.5	39.3	109.5	13.6	—	—	—	—	—	—	—	—	—	—	—	—
	20	152.9	16.6	101.5	2.60	190.8	20.4	112.0	3.85	228.5	24.2	122.4	5.30	265.9	27.8	132.9	6.93
	40	81.8	4.41	81.8	0.22	129.3	6.93	94.8	0.50	177.5	9.42	108.1	0.88	216.3	11.35	118.9	1.24
HP7-24	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	163.5	17.7	104.4	7.89	201.1	21.5	114.8	11.4	—	—	—	—	—	—	—	—
	40	110.2	5.97	89.3	1.00	156.3	8.40	102.3	1.88	194.8	10.4	113.0	2.78	233.0	12.2	123.6	3.82
HP1-30*	10	178.0	38.4	95.9	0.09	247.9	53.0	110.3	0.16	302.7	64.0	121.7	0.23	357.2	74.6	133.1	0.30
	20	77.6	8.26	75.3	0.01	95.7	10.1	78.8	0.01	183.5	19.3	96.8	0.03	253.4	26.4	111.2	0.04
	40	42.5	2.22	68.1	0.00	61.2	3.18	71.8	0.00	81.9	4.23	75.9	0.00	96.9	4.95	78.9	0.00
HP3-30	10	252.7	54.8	11.4	4.19	305.7	65.5	122.5	5.85	358.5	75.9	133.5	7.73	411.1	86.0	144.6	9.83
	20	207.0	22.5	101.9	0.77	261.5	28.1	113.2	1.16	315.6	33.5	124.4	1.61	369.4	38.7	135.7	2.12
	40	78.0	4.17	75.3	0.04	151.5	8.10	90.3	0.12	219.3	11.6	104.2	0.22	290.7	15.3	119.0	0.37
HP5-30	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	232.3	25.2	107.2	4.23	285.8	30.7	118.3	6.08	339.0	36.0	129.4	8.19	392.0	41.1	140.5	10.6
	40	151.9	8.25	90.5	0.52	220.9	11.9	104.7	1.01	276.1	14.7	116.1	1.49	330.7	17.4	127.5	2.04
HP7-30	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	244.1	26.5	109.6	12.4	—	—	—	—	—	—	—	—	—	—	—	—
	40	186.3	10.2	97.6	2.00	241.0	13.0	108.9	3.16	295.5	15.7	120.2	4.52	349.5	18.4	131.5	6.05
HP1-36*	10	354.9	77.0	102.0	.024	446.6	95.8	113.1	0.36	537.7	114.0	124.2	0.49	628.2	131.7	135.3	0.64
	20	139.0	14.9	76.1	0.01	275.3	29.5	92.3	0.04	388.9	41.2	106.0	0.08	511.0	53.6	120.8	0.12
	40	69.6	3.7	67.9	0.00	101.5	5.3	71.6	0.00	147.0	7.7	76.9	0.00	174.0	9.0	80.0	0.00
HP3-36	10	437.5	95.1	112.1	8.6	526.1	113.0	122.8	11.8	—	—	—	—	—	—	—	—
	20	370.7	40.3	103.9	1.7	461.3	49.6	114.9	2.48	551.4	58.6	125.9	3.37	641.0	67.4	136.9	4.35
	40	201.6	11.0	83.6	0.16	315.9	17.0	97.2	0.34	431.9	23.0	111.2	0.58	524.6	27.7	122.5	0.81
HP5-36	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	405.4	44.2	108.2	8.81	494.7	53.3	119.0	12.4	—	—	—	—	—	—	—	—
	40	292.7	16.0	94.5	1.31	397.1	21.5	107.1	2.24	488.7	26.1	118.2	3.21	579.6	30.6	129.3	4.3
HP7-36	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	40	333.4	18.2	99.4	4.4	424.8	23.0	110.4	6.7	515.4	27.6	121.4	9.4	605.3	32.0	132.4	12.4

* Single-pass heaters are not recommended for liquid service. In many cases, a smaller multi-pass model would be a more economical choice.

Note: For 50 Hz power supply, derate output by 10%. Above figures are based on calculations at sea level and are intended as reference material only. Results may vary due to customer applications.

Metric or Customary?

This chart has been produced using customary units of measurement. We would be pleased to provide any information required in metric units.

HP/FR Heat Exchanger Capacities – Water 60°F EAT

MODEL	CHANGE IN WATER TEMPERATURE ΔT F°	ENTERING WATER TEMPERATURE															
		180°F				200°F				220°F				240°F			
		OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
HP1-12*	10	19.3	3.66	77.2	0.01	27.1	5.15	84.4	0.01	35.6	6.77	92.2	0.02	42.5	8.07	98.6	0.03
	20	8.84	0.80	67.5	0.00	11.1	1.00	69.4	0.00	15.3	1.40	73.2	0.00	26.2	2.44	83.2	0.00
	40	6.11	0.27	65.0	0.00	7.86	0.34	66.5	0.00	9.72	0.43	68.0	0.00	11.7	0.51	69.7	0.00
HP3-12	10	30.6	5.90	87.9	0.46	37.4	7.18	94.1	0.68	44.1	8.44	100.3	0.93	50.8	9.70	106.5	1.23
	20	23.1	2.21	80.8	0.07	30.1	2.96	88.1	0.12	37.8	3.61	94.4	0.18	44.7	4.25	100.7	0.24
	40	8.84	0.40	67.5	0.00	14.4	0.66	72.5	0.01	23.7	1.11	81.0	0.02	31.6	1.49	88.3	0.03
HP1-16*	10	38.8	7.47	82.1	0.02	52.3	10.1	90.0	0.03	63.6	12.2	96.5	0.05	74.9	14.4	103.1	0.06
	20	16.3	1.15	68.9	0.00	25.8	2.42	74.3	0.00	41.4	3.93	83.4	0.01	54.7	5.20	91.1	0.01
	40	11.5	0.51	66.0	0.00	14.5	0.66	67.7	0.00	17.9	0.81	69.6	0.00	21.5	0.97	71.6	0.00
HP3-16	10	52.9	10.2	90.4	0.84	63.9	12.4	96.8	1.21	74.9	14.4	103.3	1.65	86.0	16.5	109.7	2.15
	20	43.7	4.22	85.0	0.15	54.9	5.29	91.5	0.23	66.1	6.36	98.0	0.33	77.3	7.41	104.5	0.45
	40	19.3	0.91	70.7	0.01	34.5	1.64	79.5	0.02	47.4	2.26	86.9	0.04	61.3	2.93	95.0	0.07
HP5-16	10	55.8	10.8	92.1	4.23	66.7	12.9	98.5	5.98	77.7	15.0	104.9	8.04	88.6	17.0	111.3	10.4
	20	48.7	4.71	87.9	0.84	59.8	5.77	94.4	1.24	70.9	6.82	100.8	1.72	81.9	7.87	107.3	2.28
	40	33.5	1.61	79.0	0.10	46.7	2.25	86.6	0.20	58.0	2.78	93.2	0.30	69.3	3.32	99.8	0.42
HP1-20*	10	76.4	14.8	85.1	0.05	95.4	18.5	91.5	0.07	114.5	22.1	97.8	0.11	133.6	25.8	104.2	0.14
	20	39.3	3.77	72.7	0.00	64.0	6.16	80.9	0.01	85.7	8.25	88.1	0.02	109.7	10.6	96.1	0.03
	40	20.2	0.94	66.3	0.00	25.9	1.21	68.1	0.00	32.1	1.49	70.1	0.00	37.8	1.77	71.9	0.00
HP3-20	10	92.8	18.1	90.7	1.79	111.5	21.7	96.9	2.54	130.2	25.2	103.2	3.43	148.9	28.8	109.5	4.44
	20	79.2	7.71	86.1	0.34	98.2	9.53	92.4	0.52	117.1	11.3	98.7	0.72	136.0	13.1	105.1	0.96
	40	48.6	2.35	75.8	0.04	70.0	3.38	82.9	0.07	92.7	4.48	90.5	0.12	112.0	5.40	96.9	0.17
HP5-20	10	96.8	18.9	92.0	8.78	115.4	22.4	98.3	12.3	—	—	—	—	—	—	—	—
	20	86.1	8.39	88.4	1.81	104.9	10.2	94.7	2.64	123.7	12.0	101.0	3.62	142.4	13.8	107.3	4.75
	40	65.8	3.19	81.6	0.28	84.9	4.12	87.9	0.46	104.0	5.03	94.3	0.67	123.2	5.94	100.7	0.93
HP1-24*	10	160.4	31.3	103.6	0.07	197.8	38.5	113.9	0.10	235.1	45.6	124.3	1.14	272.3	52.7	134.8	0.19
	20	102.4	9.93	87.5	0.01	146.2	14.2	99.5	0.02	193.6	18.8	112.6	0.03	231.7	22.4	123.2	0.04
	40	45.7	2.17	71.9	0.00	58.6	2.78	75.3	0.00	72.3	3.42	78.9	0.00	130.0	6.22	94.7	0.00
HP3-24	10	187.5	36.6	111.1	2.33	224.1	43.7	121.3	3.28	260.6	50.6	131.6	4.38	297.1	57.5	141.9	5.64
	20	16.7	16.0	104.5	0.47	200.8	19.6	114.8	0.69	237.9	23.1	125.1	0.95	274.8	26.6	135.5	1.26
	40	111.2	5.41	89.9	0.06	156.7	7.61	102.4	0.11	194.6	9.44	112.9	0.17	232.5	11.3	123.4	0.24
HP5-24	10	194.0	37.9	113.0	11.2	—	—	—	—	—	—	—	—	—	—	—	—
	20	175.1	17.1	107.7	2.40	211.9	20.6	117.9	3.44	248.6	24.2	128.2	4.67	285.2	27.6	138.5	6.08
	40	138.2	6.74	97.4	0.40	175.8	8.56	107.8	0.63	213.4	10.4	118.2	0.91	250.7	12.1	128.67	1.23
HP7-24	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	180.4	17.6	109.2	6.82	217.1	21.2	119.4	9.72	253.6	24.6	129.6	13.1	—	—	—	—
	40	147.5	7.20	100.0	1.22	184.9	9.01	110.3	1.86	222.2	10.8	120.7	2.63	259.3	12.6	131.0	3.53
HP1-30*	10	243.3	47.6	109.5	0.11	296.2	57.8	120.5	0.16	349.0	67.9	131.5	0.22	401.7	77.9	142.6	0.29
	20	179.3	17.6	96.2	0.02	245.6	23.9	109.8	0.03	299.6	29.1	121.0	0.04	353.4	34.2	132.3	0.06
	40	77.0	3.69	75.2	0.00	98.5	4.72	79.4	0.00	174.8	8.43	95.0	0.00	242.3	11.7	108.9	0.01
HP3-30	10	273.8	53.6	115.8	3.48	325.8	63.6	126.7	4.85	377.6	73.5	137.6	6.42	429.4	83.3	148.5	8.20
	20	244.3	23.9	109.7	0.74	296.9	29.0	120.6	1.06	349.5	34.0	131.6	1.44	401.8	39.0	142.6	1.88
	40	180.9	8.83	96.5	0.11	241.3	11.80	108.9	0.19	295.1	14.1	120.1	0.28	348.7	16.9	131.3	0.38
HP5-30	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	257.1	25.2	112.3	3.62	309.3	30.2	123.2	5.14	361.5	35.2	134.1	6.90	413.4	40.1	145.1	8.91
	40	209.5	10.2	102.4	0.65	263.0	12.8	113.5	1.00	316.2	15.4	124.6	1.40	369.2	17.9	135.7	1.87
HP7-30	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	263.1	25.8	113.6	10.2	—	—	—	—	—	—	—	—	—	—	—	—
	40	220.1	10.8	104.6	1.91	273.3	13.3	115.6	2.86	326.2	15.9	126.6	3.98	378.8	18.4	137.7	5.28
HP1-36*	10	424.5	83.2	110.5	0.24	513.3	100.3	121.2	0.33	601.2	117.2	132.0	0.45	689.2	134.0	142.9	0.57
	20	349.1	34.2	101.3	0.04	439.1	42.9	112.2	0.07	529.1	51.6	123.1	0.09	618.8	60.1	134.1	0.13
	40	137.2	6.60	75.9	0.00	257.0	12.53	90.1	0.01	366.6	17.8	103.3	0.01	467.9	22.7	115.5	0.02
HP3-36	10	466.5	91.5	115.6	6.89	553.6	108.3	126.2	9.51	640.5	124.9	136.9	12.5	—	—	—	—
	20	421.9	41.4	110.2	1.51	510.0	49.9	120.9	2.14	597.8	58.3	131.6	2.88	685.5	66.7	142.4	3.73
	40	334.7	16.4	99.6	0.26	424.9	20.8	110.4	0.41	514.7	25.1	121.3	0.58	604.1	29.4	132.3	0.78
HP5-36	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	439.5	43.1	112.3	7.22	527.0	51.6	123.0	10.2	—	—	—	—	—	—	—	—
	40	365.4	17.9	103.3	1.36	454.9	22.3	114.1	20.3	543.8	26.5	124.9	2.83	632.3	30.8	135.8	3.75
HP7-36	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	40	380.0	18.6	105.1	3.88	469.0	23.0	115.8	5.73	557.5	27.2	126.6	7.93	645.6	31.4	137.4	10.5

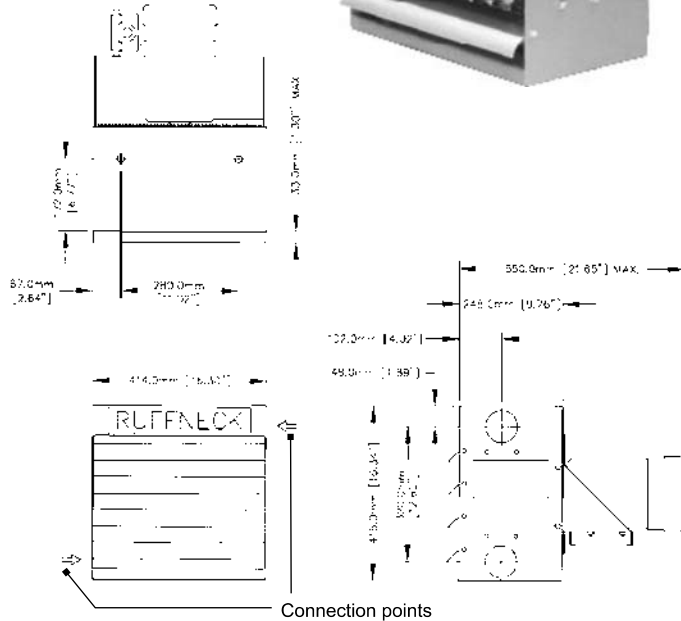
* HP and FR single-pass heaters are not recommended for liquid service. In many cases, a smaller HP multi-pass model would be a more economical choice.

Note: For 50 Hz power supply, derate output by 10%. Above figures are based on calculations at sea level.

Thermal Performance Analysis or Heat Loss Calculation Service: Thermal Performance Analysis service accurately computes performance parameters and output capacities for all Ruffneck™ models. Accompanied with the computerized Heat Loss Calculation for your project, our staff can inform you of the best choice of Ruffneck™ models for your needs.

Also available for use on our web site at www.ccithermal.com.

Specifications: HP1-12, HP3-12 FR1-12



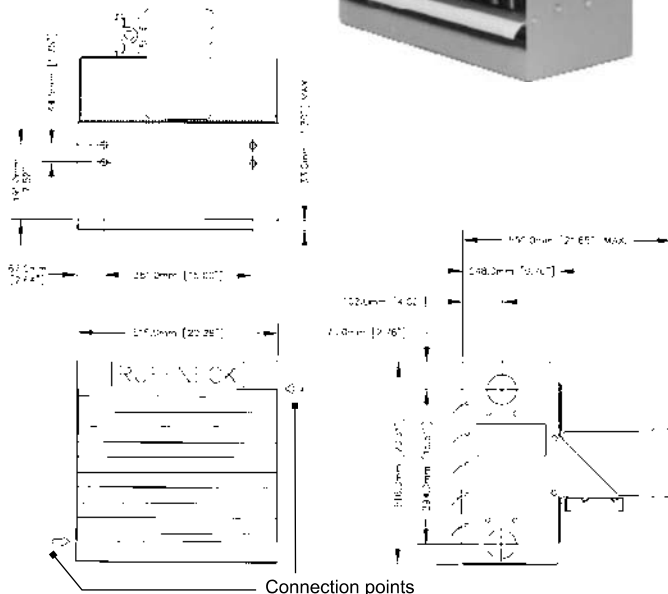
General

Air Delivery*	997 CFM
Air Velocity*	1147 FPM
Air Throw*	40 ft. @ 15 psi stream
Propeller Fan	3 Wing Aluminum, 12" Dia. × 5/8" Bore
Motor Requirements	1/4 HP, 1725 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy 1/4" probe will not enter.
Hanger Connections	5/8" NC Tap – 2 holes
Cabinet Material	0.075" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	75 lbs.
Shipping Weight	102 lbs.

Heat Exchanger

Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	13
Number of Rows	2
Number of Passes	1 or 3
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 400 psi for HP Series
Max. Operating Temp.	572°F

Specifications: HP1-16, HP3-16, HP5-16 & FR1-16



General

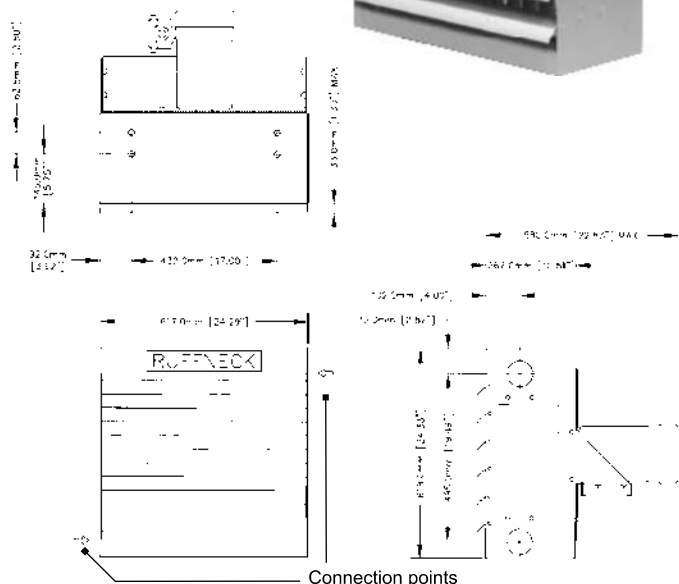
Air Delivery*	1588 CFM
Air Velocity*	1069 FPM
Air Throw*	60 ft. @ 15 psi stream
Propeller Fan	3 Wing Aluminum, 16" Dia. × 5/8" Bore
Motor Requirements	1/4 HP, 1725 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy 1/4" probe will not enter.
Hanger Connections	5/8" NC Tap – 4 holes
Cabinet Material	0.075" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	109 lbs.
Shipping Weight	137 lbs.

Heat Exchanger

Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	17
Number of Rows	2
Number of Passes	1, 3 or 5
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 400 PSI for HP Series
Max. Operating Temp.	572°F

* at 70°F at sea level

Specifications: HP1-20, HP3-20, HP5-20 & FR1-20



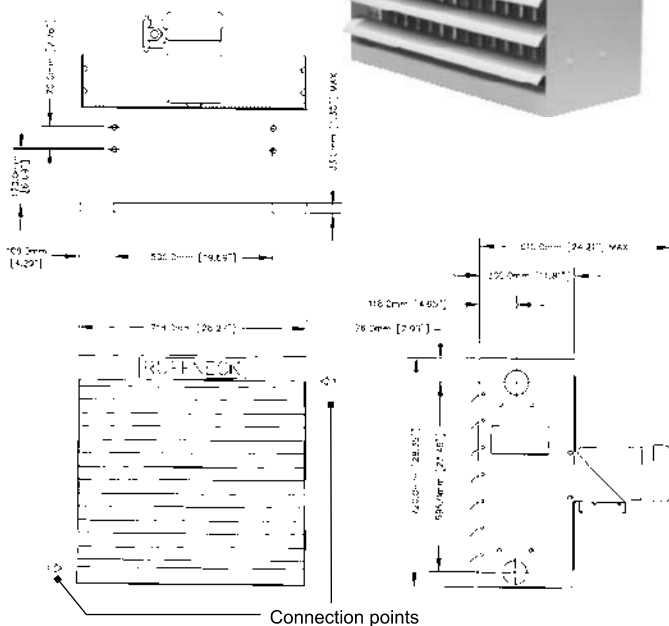
General

Air Delivery*	2780 CFM
Air Velocity*	1153 FPM
Air Throw*	65 ft. @ 15 psi stream
Propeller Fan	3 Wing Aluminum, 20" Dia. x 5/8" Bore
Motor Requirements	1/2 HP, 1725 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy 1/4" probe will not enter.
Hanger Connections	5/8" NC Tap – 4 holes
Cabinet Material	0.075" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	138 lbs.
Shipping Weight	161 lbs.

Heat Exchanger

Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	21
Number of Rows	2
Number of Passes	1, 3 or 5
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 400 psi for HP Series
Max. Operating Temp.	572°F

Specifications: HP1-24, HP3-24, HP5-24, HP7-24 & FR1-24



General

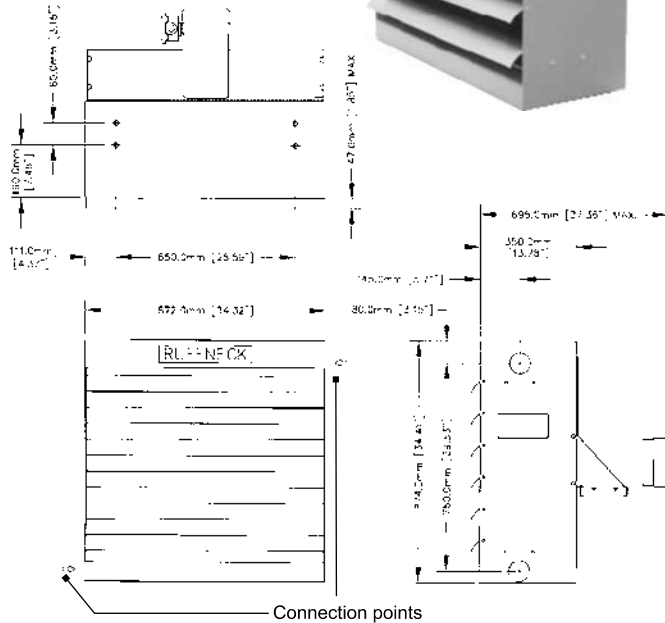
Air Delivery*	3405 CFM
Air Velocity*	981 FPM
Air Throw*	70 ft. @ 15 psi stream
Propeller Fan	3 Wing Aluminum, 24" Dia. x 5/8" Bore
Motor Requirements	1/2 HP, 1725 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy 7/16" probe will not enter.
Hanger Connections	5/8" NC Tap – 4 holes
Cabinet Material	0.075" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	191 lbs.
Shipping Weight	224 lbs.

Heat Exchanger

Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	38
Number of Rows	3
Number of Passes	1, 3, 5 or 7
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 300 psi for HP Series
Max. Operating Temp.	572°F

* at 70°F at sea level

Specifications: HP1-30, HP3-30, HP5-30, HP7-30 & FR1-30



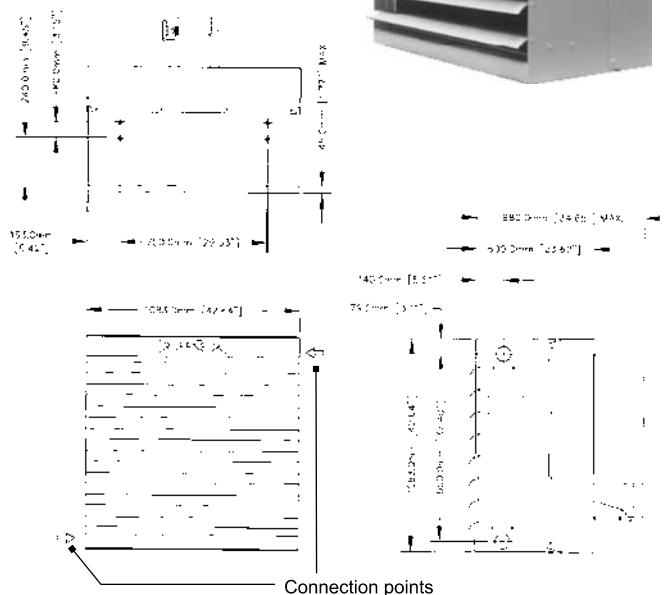
General

Air Delivery*	4569 CFM
Air Velocity*	814 FPM
Air Throw*	70 ft. @ 15 psi stream
Propeller Fan	3 Wing Aluminum, 30" Dia. × 5/8" Bore
Motor Requirements	3/4 HP, 1140 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy 7/16" probe will not enter.
Hanger Connections	5/8" NC Tap – 4 holes
Cabinet Material	0.075" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	286 lbs.
Shipping Weight	345 lbs.

Heat Exchanger

Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	47
Number of Rows	3
Number of Passes	1, 3, 5 or 7
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 300 psi for HP Series
Max. Operating Temp.	572°F

Specifications: HP1-36, HP3-36, HP5-36, HP7-36 & FR1-16



General

Air Delivery*	7830 CFM
Air Velocity*	852 FPM
Air Throw*	65 ft. @ 15 psi stream
Propeller Fan	6 Wing Aluminum, 36" Dia. × 1" Bore
Motor Requirements	1½ HP, 1725 RPM, Frame 56 Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Drive Pulley	B3.6"
Driven Pulley	B9.9"
Drive Belt	B42 V-Belt
Fan Speed	627 RPM
Fan Guard	Steel, Powder Coated Epoxy, 1/2" gap
Hanger Connections	5/8" NC Tap – 4 holes
Cabinet Material	0.105" steel
Louvre Blades	Anodized Extruded Aluminum
Net Weight	534 lbs.
Shipping Weight	597 lbs.

Heat Exchanger

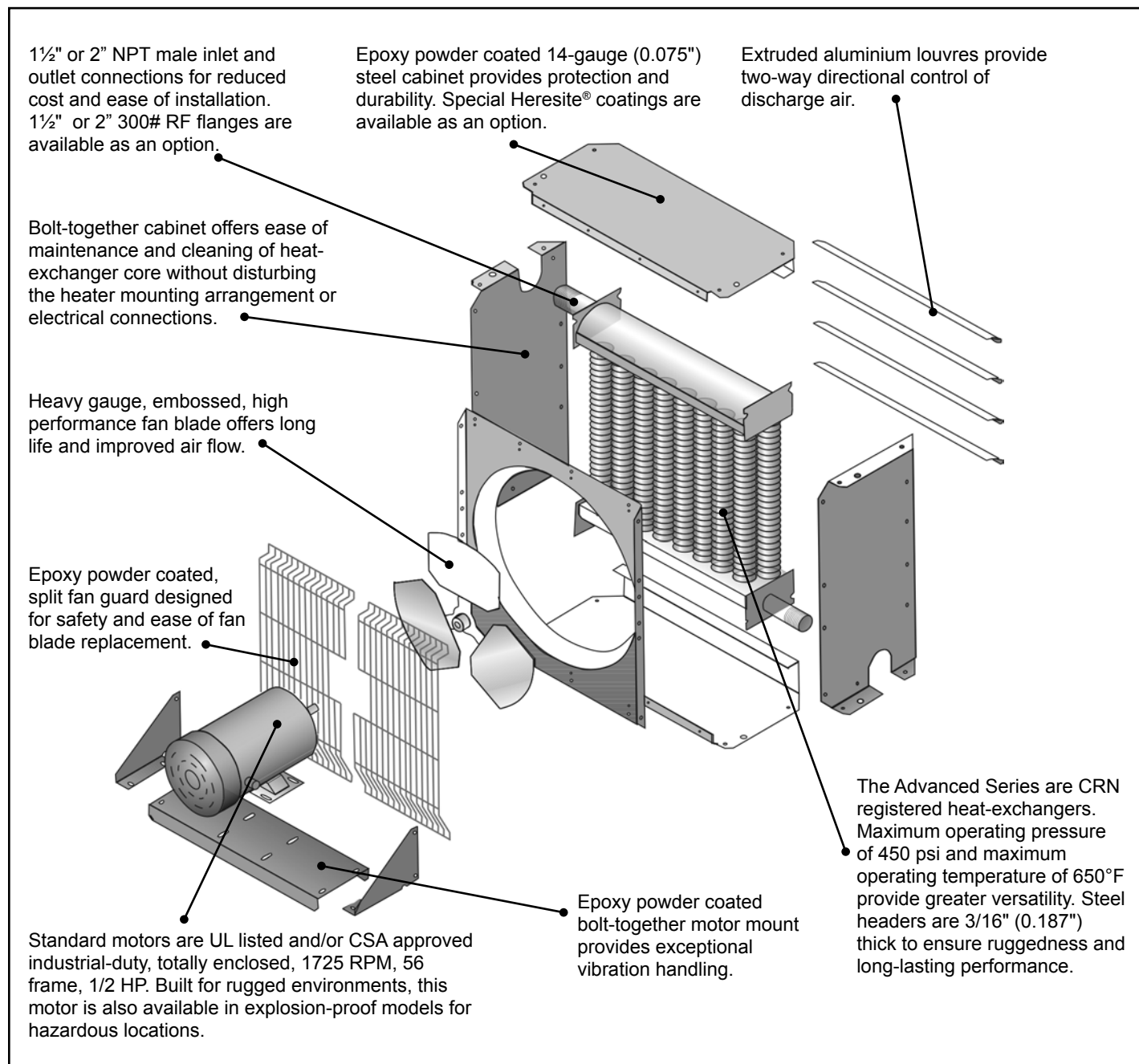
Tube Outside Dia.	0.625"
Tube Wall Thickness	0.065" Average
Tube Material	SA 214 Carbon Steel
Fin Material	1050 Aluminum
Fins Per Inch	10
Number of Tubes	59
Number of Rows	3
Number of Passes	1, 3, 5 or 7
Header Material	Min. 0.075" Steel for FR Series Min. 0.135" Steel for HP Series
Inlet/Outlet	2" NPT Female
Max. Operating Press.	100 psi for FR Series Up to 300 psi for HP Series
Max. Operating Temp.	572°F

* at 70°F at sea level

Advanced Series Heaters

The Ruffneck™ Advanced Series heaters are designed for rugged industrial applications and are available in 37 models from 6,000 to 1,200,000 BTU/hr. With a maximum operating pressure and temperature rating of 450 psi and

650°F respectively, the Advanced Series is perfect for steam, circulating hot water, and glycol heating systems or liquid cooling applications that include: flash stream condensers, lube oil coolers, and pump seal coolers, etc.



AH - Advanced Horizontal Model



The Advanced Horizontal unit heater exchanger can be customised for your application. The heat exchanger is comprised of extruded finned tubing in 10, 9 and 5 fins per inch for varying steam conditions and/or where atmospheric particulate may cause premature fouling of the heater core. Additionally, the AH can handle more pressure than the HP and FR.

AV - Advanced Vertical Model



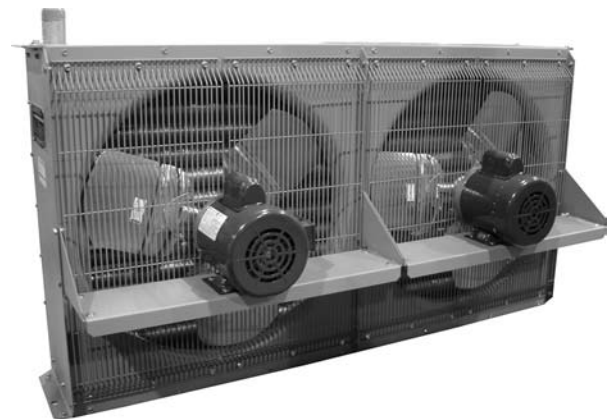
Ruffneck's Advanced Series unit heaters are designed for rugged industrial applications meeting the most demanding service and long life requirements.

While perfect for steam, circulating hot water or glycol heating systems, the Ruffneck™ Vertical Throw heaters are also suitable for a wide range of other heating fluids. In addition, they can be used for both space heating and liquid cooling applications.

AH - Advanced Horizontal Tandem Model



The 24" Tandem Advanced Horizontal Series is the largest unit in our line-up. Rather than expanding the cabinet and heat exchanger in both height and width, we just doubled the width to produce this unique model. This side-by-side arrangement also produces the lowest mounting profile in its class for a heater of equivalent output.



The dual fan arrangement allows for two smaller fans that can be operated at the standard 1725 RPM. Furthermore, dual fans provide for output modulation if separate motor thermostats are used. Separate motor thermostats produce better control of heating during periods of low demand by reducing the output of the heater.

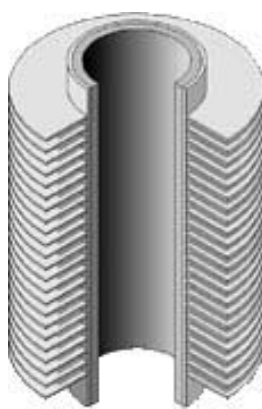
Extruded Finned Tubing Types

5/8" Tension-Wound
Finned Tubing
10 Fins per Inch



Recommended for glycol or water applications, we offer our standard 5/8" outside diameter (16 gauge, 0.065" wall thickness) carbon steel tubes with tension wound aluminum fins (10 per inch). In most cases, the 5/8" tubing will be the most economical choice on a cost per BTU basis.

1" Extruded
Finned Tubing
9 Fins per Inch



Select this configuration of extruded finned tubing for more demanding applications. It utilizes 1" outside diameter (14 gauge, 0.083" wall thickness) carbon steel tubes with extruded aluminum fins (9 per inch).

1" Extruded
Finned Tubing
5 Fins per Inch



For the harshest steam applications and/or where atmospheric particulate may cause premature fouling of the heater core, use the 1" outside diameter (10 gauge, 0.135" wall thickness) carbon steel tubes with extruded aluminum fins (5 per inch).

Advanced Series- General Specifications

Approvals	CRN (Canada) – Steam and HVAC liquids only.
Fan	Three blade aluminum, steel spider and hub with 5/8" bore.
Fan Guard	Two piece design with close wire spacing. 3/8" diameter probe will not enter. Epoxy coated to match cabinet color.
Mounting Holes	9/16" diameter holes, two at top and two at bottom of heater.
Cabinet Material & Nozzle	14-gauge (0.075") epoxy coated steel.
Motors	CSA and/or UL listed 1725 RPM permanently lubricated ball bearing type with rigid base. Explosion-proof or general purpose construction. All 50 and 60 hertz standard voltages are available.
Louvre Blades	Anodized extruded aluminum.
Header Material	3/16" (0.187") carbon steel.
Fluid Connections	1 1/2" or 2" NPT Male or 1 1/2" or 2" 300# RF Flanges.
Max. Operating Press.	450 psi
Max. Operating Temp.	650°F
Finned Tubes	5/8" outside diameter (16-gauge, 0.065" wall thickness) carbon steel tubes. Tension wound aluminum fins @ 10 fins per inch, or 1" outside diameter (14-gauge, 0.083" wall thickness) carbon steel tubes. Extruded aluminum fins @ 9 fins per inch or 1" outside diameter (10-gauge, 0.135" wall thickness) carbon steel tubes. Extruded aluminum fins @ 5 fins per inch.

AH Series – Model Specifications

BASE MODEL	AIR DELIVERY*	AIR THROW AT 15 PSI STREAM	MOTOR† REQUIREMENTS	TUBE PASSES	NET WEIGHT‡	SHIPPING WEIGHT‡	AIR VELOCITY (FT/MIN)	MAX. MOUNTING HEIGHT
AH-12A-A_	1150 CFM	28' (8.5 m)	1/2 HP	1 or 3	102 lbs.	146 lbs.	1441	12'
AH-12A-B_	1160 CFM	28' (8.5m)	1/2 HP	1 or 3	107 lbs.	151 lbs.	1454	12'
AH-12A-C1	1030 CFM	28' (8.5m)	1/2 HP	1	118 lbs.	164 lbs.	1291	12'
AH-16A-A_	1840 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	127 lbs.	174 lbs.	1301	16'
AH-16A-B_	1780 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	138 lbs.	177 lbs.	1259	16'
AH-16A-C1	1840 CFM	40' (12.2m)	1/2 HP	1	153 lbs.	199 lbs.	1301	16'
AH-20A-A_	2930 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	155 lbs.	209 lbs.	1499	18'
AH-20A-B_	2700 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	170 lbs.	209 lbs.	1382	18'
AH-20A-C1	3000 CFM	40' (12.2m)	1/2 HP	1	195 lbs.	242 lbs.	1535	18'
AH-24A-A_	3890 CFM	40' (12.2m)	1/2 HP	1, 3, 5 or 7	189 lbs.	247 lbs.	1288	20'
AH-24A-B_	3640 CFM	40' (12.2m)	1/2 HP	1, 3, 5 or 7	212 lbs.	251 lbs.	1205	20'
AH-24A-C1	3490 CFM	40' (12.2m)	1/2 HP	1	258 lbs.	293 lbs.	1115	20'
AH-24B-A_	7650 CFM	65' (19.8m)	2½ HP	1, 3, 5 or 7	313 lbs.	361 lbs.		20'
AH-24B-B_	7420 CFM	65' (19.8m)	2½ HP	1, 3, 5 or 7	376 lbs.	424 lbs.		20'
AH-24B-C1	6690 CFM	65' (19.8m)	2½ HP	1	440 lbs.	488 lbs.		20'

See page 59 for model coding.

* at 70°F at sea level.

† CCI Thermal reserves the right to substitute motors of higher horsepower.

‡ Add 12 lbs. to flanged units.

AV Series – Model Specifications

BASE MODEL	AIR DELIVERY*	AIR THROW AT 15 PSI STREAM	MOTOR† REQUIREMENTS	TUBE PASSES	NET WEIGHT‡	SHIPPING WEIGHT‡	AIR VELOCITY (FT/MIN)	MAX. MOUNTING HEIGHT
AV-12A-A_	1150 CFM	28' (8.5 m)	1/2 HP	1 or 3	102 lbs.	146 lbs.	1441	12'
AV-12A-B_	1160 CFM	28' (8.5m)	1/2 HP	1 or 3	107 lbs.	151 lbs.	1454	12'
AV-12A-C1	1030 CFM	28' (8.5m)	1/2 HP	1	118 lbs.	164 lbs.	1291	12'
AV-16A-A_	1840 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	127 lbs.	174 lbs.	1301	16'
AV-16A-B_	1780 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	138 lbs.	177 lbs.	1259	16'
AV-16A-C1	1840 CFM	40' (12.2m)	1/2 HP	1	153 lbs.	199 lbs.	1301	16'
AV-20A-A_	2930 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	155 lbs.	209 lbs.	1499	18'
AV-20A-B_	2700 CFM	40' (12.2m)	1/2 HP	1, 3 or 5	170 lbs.	209 lbs.	1382	18'
AV-20A-C1	3000 CFM	40' (12.2m)	1/2 HP	1	195 lbs.	242 lbs.	1535	18'
AV-24A-A_	3890 CFM	40' (12.2m)	1/2 HP	1, 3, 5 or 7	189 lbs.	247 lbs.	1288	20'
AV-24A-B_	3640 CFM	40' (12.2m)	1/2 HP	1, 3, 5 or 7	212 lbs.	251 lbs.	1205	20'
AV-24A-C1	3490 CFM	40' (12.2m)	1/2 HP	1	258 lbs.	293 lbs.	1115	20'

See page 69 for model coding.

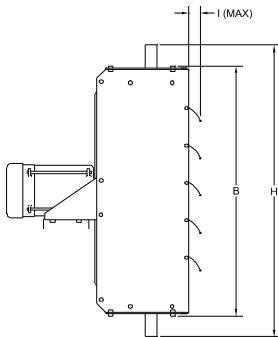
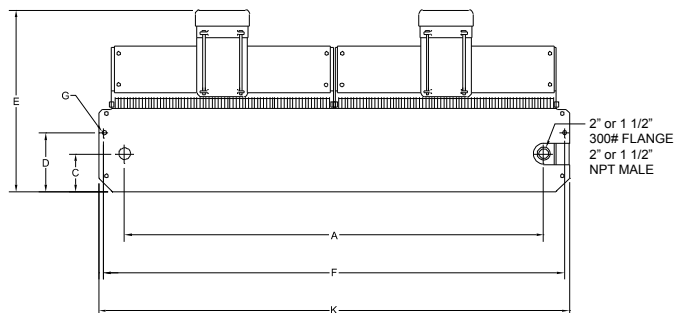
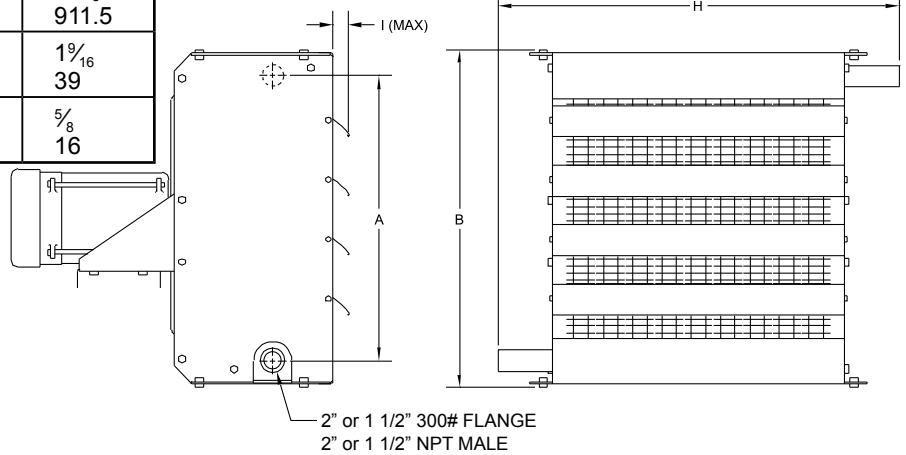
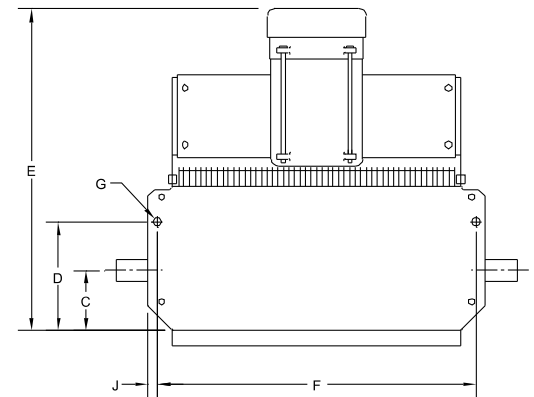
* at 70°F at sea level.

† CCI Thermal reserves the right to substitute motors of higher horsepower.

‡ Add 12 lbs. to flanged units.

AH Physical Dimensions

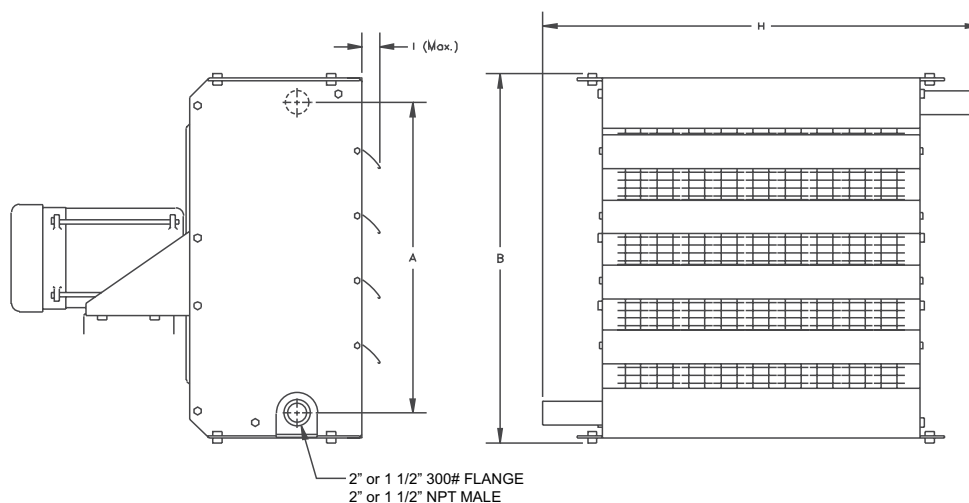
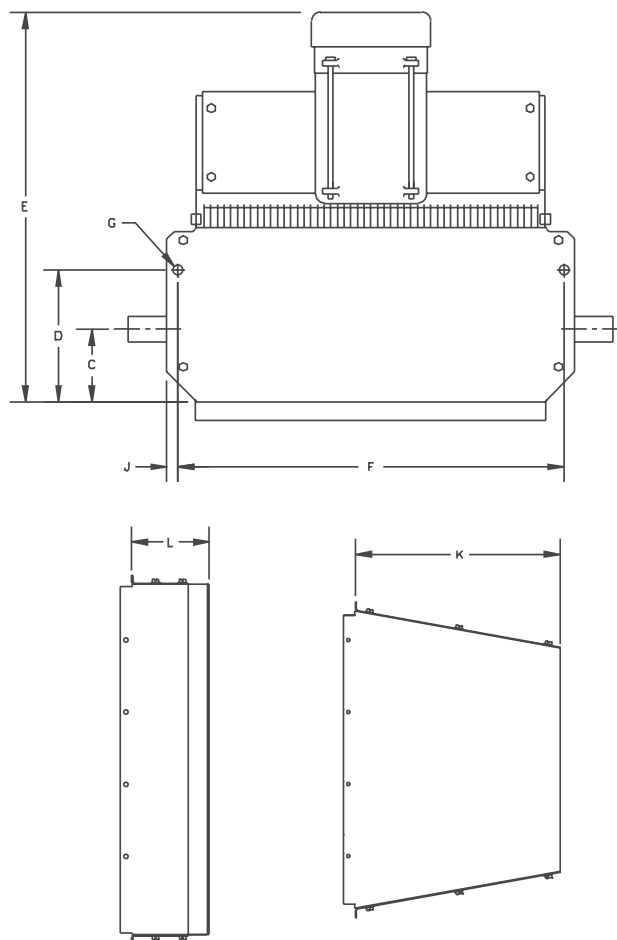
DIM.	AH-12A	AH-16A	AH-20A	AH-24A
A in. mm.	15 ¹³ / ₁₆ 401	19 ¹³ / ₁₆ 503	23 ¹³ / ₁₆ 605	27 ⁷ / ₈ 707
B in. mm.	19 ⁷ / ₁₆ 494	23 ¹ / ₂ 596	27 ¹ / ₂ 698	31 ¹ / ₂ 800
C in. mm.	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107
D in. mm.	7 ¹⁵ / ₁₆ 201	7 ⁹ / ₁₆ 192	7 ³ / ₁₆ 183	6 ⁷ / ₈ 174
E in. mm.	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600
F in. mm.	18 ³ / ₁₆ 462	22 ³ / ₁₆ 564	26 ³ / ₁₆ 665	30 ³ / ₁₆ 766
G in. mm.	9 ¹ / ₁₆ 14.3	9 ¹ / ₁₆ 14.3	9 ¹ / ₁₆ 14.3	9 ¹ / ₁₆ 14.3
H in. mm.	23 ⁷ / ₈ 606.5	27 ⁷ / ₈ 708.5	31 ⁷ / ₈ 809.5	35 ⁷ / ₈ 911.5
I in. mm.	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39
J in. mm.	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16



DIM.	AH-24B TANDEM
A in. mm.	52 ¹ / ₂ 1345
B in. mm.	31 ¹ / ₂ 800
C in. mm.	4 ¹³ / ₁₆ 122
D in. mm.	7 ⁷ / ₁₆ 189
E in. mm.	24 ³ / ₁₆ 615
F in. mm.	58 ¹ / ₄ 1480
G in. mm.	9 ¹ / ₁₆ 14.3
H in. mm.	36 ⁷ / ₈ 937
I in. mm.	2 ¹ / ₁₆ 53
J in. mm.	5 ⁵ / ₈ 16
K in. mm.	59 ¹ / ₂ 1512

AV Physical Dimensions

DIM.	AV-12A	AV-16A	AV-20A	AV-24A
A in. mm.	15 ¹³ / ₁₆ 401	19 ¹³ / ₁₆ 503	23 ¹³ / ₁₆ 605	27 ⁷ / ₈ 707
B in. mm.	19 ⁷ / ₁₆ 494	23 ¹ / ₂ 596	27 ¹ / ₂ 698	31 ¹ / ₂ 800
C in. mm.	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107	4 ³ / ₁₆ 107
D in. mm.	7 ¹⁵ / ₁₆ 201	7 ⁹ / ₁₆ 192	7 ³ / ₁₆ 183	6 ⁷ / ₈ 174
E in. mm.	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600	23 ⁵ / ₈ 600
F in. mm.	18 ³ / ₁₆ 462	22 ³ / ₁₆ 564	26 ³ / ₁₆ 665	30 ³ / ₁₆ 766
G in. mm.	9 ⁹ / ₁₆ 14.3	9 ⁹ / ₁₆ 14.3	9 ⁹ / ₁₆ 14.3	9 ⁹ / ₁₆ 14.3
H in. mm.	23 ⁷ / ₈ 606.5	27 ⁷ / ₈ 708.5	31 ⁷ / ₈ 809.5	35 ⁷ / ₈ 911.5
I in. mm.	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39	1 ⁹ / ₁₆ 39
J in. mm.	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16	5 ⁵ / ₈ 16
K in. mm.	11 ¹³ / ₁₆ 300	11 ¹³ / ₁₆ 300	15 ¹¹ / ₁₆ 398	15 ¹¹ / ₁₆ 398
L in. mm.	4 ¹⁵ / ₁₆ 122	4 ¹⁵ / ₁₆ 122	4 ¹⁵ / ₁₆ 122	4 ¹⁵ / ₁₆ 122



Model Coding

BASE MODEL



SERIES	
Horizontal	AH
Vertical	AV

FAN	
12"	12A
16"	16A
20"	20A
24"	24A
24" tandem	24B ^⑥
A = Standard single fan B = Standard dual fan	

FINNED TUBING						
TUBING	WALL THICKNESS	ROWS	FINNING			
			FINS/ INCH	MATERIAL	TYPE	
5/8"	.065"	3	10	AL	TW	A
1"	.083"	2	9	AL	EX	B
1"	.135"	2	5	AL	EX	C
TW = Tension Wound EX = Extruded AL = Aluminum						

TUBESIDE PASSES	
1 Pass	1
3 Passes	3
5 Passes	5 ^⑧
7 Passes	7 ^⑨

CONNECTIONS	
1½" NPT Male Sch. 40	A
1½" 300# RF flange	B
2" NPT Male Sch. 80	C
2" 300# RF flange	D

EXCHANGER COATINGS	
Heat resistant aluminum paint	1
Heresite® phenolic coating	2 ^①

MOTOR ELECTRICAL SPECIFICATIONS			
	VOLTS	PHASE	HERTZ
A	115	1	60
B	208	1	60
C	208	3	60
D	230	1	60
E	230	3	60
F	460	1	60
G	460	3	60
H	575	3	60
I	220	1	50
J	380	3	50
K	440	3	50

MOTOR ENCLOSURE	
1	Totally enclosed
2	X-proof, groups C, D, E, F, & G

DISCHARGE TYPE	
1	2-way aluminum louvres
2	Nozzle
3	4-way aluminum louvres

CABINET MATERIAL	
A	Epoxy powder coated carbon steel
B	Heresite® phenolic coated carbon steel

Note: CCI units utilize a standard motor. Specifying any other O.E.M Motor may result in longer lead times.

- ① Heresite® coated exchangers and cabinets: contact factory for quote.
- ② Louvres and fan blades are also Heresite® coated.
- ③ Contact factory for shipping lead time.
- ④ Motor designed to be used at rated voltage with tolerances of ±15%.
- ⑤ Motor may be marked 230 volts, but is suitable for 208 volt operation.
- ⑥ Tandem configuration not available on AV models.
- ⑦ 460 1 phase motors are only certified for groups D, F & G
- ⑧ Only available in 16" and larger units
- ⑨ Only available in 24" and larger units


**5/8" Tension-Wound Finned Tubing
(10 fins/inch)**
AH-16A-A1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	194.3	184.5	165.3	146.7	128.6	119.7	111.0
	COND. (lbs./hr.)	199.0	188.9	169.3	150.2	131.7	122.6	113.7
	FAT (°F)	75.9	83.0	97.0	110.6	123.8	130.4	138.8
50	OUTPUT (MBH)	267.6	257.0	236.4	216.4	197.0	187.6	178.0
	COND. (lbs./hr.)	290.0	278.6	256.2	234.5	213.5	203.2	193.0
	FAT (°F)	109.2	116.6	131.0	145.0	158.6	165.3	171.9
100	OUTPUT (MBH)	305.0	294.0	272.7	252.1	232.1	222.3	212.7
	COND. (lbs./hr.)	341.7	329.4	305.5	282.3	259.9	248.9	238.1
	FAT (°F)	126.4	133.9	148.5	162.8	176.6	183.4	190.1
200	OUTPUT (MBH)	351.5	340.2	318.0	296.6	275.9	265.7	255.7
	COND. (lbs./hr.)	412.6	399.2	373.2	348.0	323.6	311.6	299.9
	FAT (°F)	148.0	155.6	170.6	185.1	199.3	206.2	213.0


**1" Extruded Finned Tubing
(9 fins/inch)**
AH-16A-B1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	182.5	173.3	155.2	137.7	120.7	112.4	104.2
	COND. (lbs./hr.)	186.8	177.4	158.9	141.0	123.5	115.0	106.6
	FAT (°F)	73.2	80.4	94.5	108.3	121.8	128.4	135.0
50	OUTPUT (MBH)	251.5	241.5	222.1	203.3	185.0	176.1	167.3
	COND. (lbs./hr.)	272.4	261.6	240.5	220.1	200.3	190.6	181.1
	FAT (°F)	105.4	112.8	127.4	141.6	155.4	162.2	168.9
100	OUTPUT (MBH)	286.7	276.4	256.3	236.9	218.0	208.8	199.8
	COND. (lbs./hr.)	321.0	309.4	286.9	265.1	243.9	233.6	223.4
	FAT (°F)	122.0	129.6	144.4	158.8	172.8	179.7	186.5
200	OUTPUT (MBH)	330.6	319.9	299.0	278.8	259.2	249.7	240.3
	COND. (lbs./hr.)	387.7	375.1	350.5	326.8	303.8	292.6	281.5
	FAT (°F)	142.9	150.6	165.6	180.3	194.7	201.7	208.6


**1" Extruded Finned Tubing
(5 fins/inch)**
AH-16A-C1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	146.4	139.1	124.7	110.8	97.2	90.6	84.0
	COND. (lbs./hr.)	149.5	142.0	127.3	113.1	99.2	92.4	85.7
	FAT (°F)	54.1	61.9	77.5	92.8	107.8	115.3	122.6
50	OUTPUT (MBH)	201.4	193.5	178.2	163.3	148.8	141.7	134.7
	COND. (lbs./hr.)	217.4	208.9	192.3	176.2	160.6	152.9	145.4
	FAT (°F)	78.5	86.6	102.5	118.2	133.6	141.1	148.7
100	OUTPUT (MBH)	229.5	221.4	205.5	190.2	175.3	168.0	160.8
	COND. (lbs./hr.)	256.0	247.0	229.3	212.1	195.5	187.3	179.3
	FAT (°F)	91.1	99.3	115.4	131.3	146.8	154.5	162.1
200	OUTPUT (MBH)	264.5	256.1	239.7	223.8	208.4	200.8	193.4
	COND. (lbs./hr.)	309.1	299.2	280.0	261.3	243.3	234.4	225.7
	FAT (°F)	106.9	115.2	131.6	147.7	163.5	171.3	179.0

For 50 Hz power supply, derate output by 10%. For model coding, refer to page 69. Above figures are based on calculations at sea level.

COND. = Condensate Flow. **FAT** = Final Air Temperature.


**5/8" Tension-wound Finned Tubing
(10 fins/inch)**
AH-12A-A1 Single Pass

Operating Pressure		Entering Air Temperature (°F)					
		-10	0	20	40	60	80
2	OUTPUT (MBH)	117.6	111.6	100.1	88.8	77.9	67.3
	COND. (lbs./hr.)	120.1	114.0	102.2	90.7	79.5	68.7
	FAT (°F)	72.9	80.2	94.4	108.2	121.7	134.9
50	OUTPUT (MBH)	162.0	155.7	143.2	131.2	119.5	108.1
	COND. (lbs./hr.)	175.1	168.2	154.7	141.7	129.0	116.7
	FAT (°F)	105.2	112.6	127.2	141.5	155.4	168.9
100	OUTPUT (MBH)	184.7	178.1	165.3	152.8	140.8	129.0
	COND. (lbs./hr.)	206.3	198.9	184.5	170.6	157.1	143.9
	FAT (°F)	121.8	129.4	144.2	158.7	172.8	186.5
200	OUTPUT (MBH)	213.0	206.2	192.8	179.9	167.4	155.2
	COND. (lbs./hr.)	249.1	241.1	225.4	210.3	195.6	181.3
	FAT (°F)	142.6	150.4	165.5	180.3	194.7	208.7


**1" Extruded Finned Tubing
(9 fins/inch)**
AH-12A-B1 Single Pass

Operating Pressure		Entering Air Temperature (°F)					
		-10	0	20	40	60	80
2	OUTPUT (MBH)	110.0	104.5	93.7	83.2	73.0	63.0
	COND. (lbs./hr.)	112.2	160.6	95.6	84.9	74.5	64.3
	FAT (°F)	66.9	74.3	88.9	103.2	117.2	130.9
50	OUTPUT (MBH)	151.7	145.8	134.2	123.0	112.0	101.4
	COND. (lbs./hr.)	163.8	157.8	144.8	132.7	120.9	109.4
	FAT (°F)	96.8	104.4	119.4	134.1	148.4	162.4
100	OUTPUT (MBH)	173.1	166.9	155.0	143.4	132.1	121.1
	COND. (lbs./hr.)	193.1	186.2	172.8	159.8	147.2	135.0
	FAT (°F)	112.2	119.9	135.1	150.0	164.5	178.7
200	OUTPUT (MBH)	199.7	193.3	180.9	168.8	157.1	145.8
	COND. (lbs./hr.)	233.3	225.8	211.2	197.1	183.4	170.1
	FAT (°F)	131.5	139.4	154.9	170.1	184.8	199.3


**1" Extruded Finned Tubing
(5 fins/inch)**
AH-12A-C1 Single Pass

Operating Pressure		Entering Air Temperature (°F)					
		-10	0	20	40	60	80
2	OUTPUT (MBH)	88.2	83.8	75.1	66.7	58.5	50.5
	COND. (lbs./hr.)	89.7	85.1	76.3	67.8	59.4	51.3
	FAT (°F)	59.1	66.8	82.0	96.9	111.5	125.9
50	OUTPUT (MBH)	121.4	116.7	107.4	98.4	89.6	81.1
	COND. (lbs./hr.)	130.5	125.4	115.4	105.7	96.3	87.7
	FAT (°F)	85.6	93.5	109.1	124.3	139.3	154.0
100	OUTPUT (MBH)	138.4	133.5	123.9	114.6	105.6	96.9
	COND. (lbs./hr.)	153.7	148.3	137.6	127.2	117.2	107.4
	FAT (°F)	99.2	107.3	123.0	138.5	153.7	168.5
200	OUTPUT (MBH)	159.6	154.5	144.6	135.0	125.6	116.6
	COND. (lbs./hr.)	185.6	179.7	168.1	156.8	145.9	135.6
	FAT (°F)	116.3	124.5	140.6	156.3	171.7	186.8

For 50 Hz power supply, derate output by 10%. For model coding, refer to page 69. Above figures are based on calculations at sea level.

COND. = Condensate Flow. **FAT** = Final Air Temperature.


**5/8" Tension-Wound Finned Tubing
(10 fins/inch)**
AH-20A-A1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	285.6	271.2	243.1	215.9	189.3	176.3	163.5
	COND. (lbs./hr.)	293.0	278.3	249.5	221.5	194.2	180.9	167.7
	FAT (°F)	69.4	76.8	91.3	105.4	119.2	126.0	132.7
50	OUTPUT (MBH)	392.5	377.1	347.0	317.9	289.5	275.7	262.0
	COND. (lbs./hr.)	426.3	409.5	376.8	345.1	314.3	299.2	284.4
	FAT (°F)	100.0	107.6	122.5	137.0	151.2	158.2	165.1
100	OUTPUT (MBH)	447.1	431.2	400.1	370.0	340.8	326.6	312.5
	COND. (lbs./hr.)	501.9	484.0	449.1	415.3	382.5	366.4	350.6
	FAT (°F)	115.8	123.5	138.6	153.4	167.8	174.8	181.8
200	OUTPUT (MBH)	514.9	498.4	466.2	435.0	404.8	390.0	375.4
	COND. (lbs./hr.)	605.8	586.3	548.3	511.5	475.9	458.5	441.3
	FAT (°F)	135.5	143.4	158.8	173.9	188.6	195.8	202.9


**1" Extruded Finned Tubing
(9 fins/inch)**
AH-20A-B1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	283.4	269.0	240.8	213.5	187.1	174.1	161.4
	COND. (lbs./hr.)	209.8	276.0	247.1	219.1	191.9	178.6	165.6
	FAT (°F)	74.8	81.9	96.0	109.7	123.0	129.6	136.1
50	OUTPUT (MBH)	390.6	375.0	344.6	315.2	286.8	272.9	259.2
	COND. (lbs./hr.)	424.1	407.2	374.1	342.2	311.3	296.2	281.3
	FAT (°F)	107.6	115.0	129.4	143.5	157.3	164.0	170.6
100	OUTPUT (MBH)	445.3	429.2	397.7	367.3	337.9	323.6	309.4
	COND. (lbs./hr.)	499.9	481.7	446.4	412.2	379.2	363.0	347.2
	FAT (°F)	124.5	132.0	146.7	161.0	175.0	181.8	188.6
200	OUTPUT (MBH)	513.5	496.7	464.0	432.4	401.8	386.9	372.2
	COND. (lbs./hr.)	604.1	584.2	545.6	508.4	472.3	454.8	437.5
	FAT (°F)	145.7	153.4	168.4	183.0	197.2	204.2	211.1


**1" Extruded Finned Tubing
(5 fins/inch)**
AH-20A-C1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	224.9	213.6	191.7	170.3	149.5	139.3	129.2
	COND. (lbs./hr.)	230.2	218.7	196.2	174.3	153.0	142.5	132.2
	FAT (°F)	50.6	58.6	74.4	90.0	105.3	112.9	120.4
50	OUTPUT (MBH)	309.2	297.2	273.7	250.9	228.7	217.9	207.2
	COND. (lbs./hr.)	334.9	321.8	296.4	271.6	247.6	235.9	224.2
	FAT (°F)	73.7	81.9	98.1	114.0	129.7	137.4	145.0
100	OUTPUT (MBH)	352.2	339.8	315.6	292.2	269.4	258.2	247.2
	COND. (lbs./hr.)	394.3	380.4	353.3	326.9	301.4	288.9	276.5
	FAT (°F)	85.6	93.9	110.3	126.4	142.2	150.0	157.8
200	OUTPUT (MBH)	405.9	393.0	368.0	343.7	320.1	308.6	297.2
	COND. (lbs./hr.)	476.0	460.9	431.4	402.8	375.1	361.6	348.2
	FAT (°F)	100.5	108.9	125.6	141.9	158.0	165.9	173.8

For 50 Hz power supply, derate output by 10%. For model coding, refer to page 69. Above figures are based on calculations at sea level.

COND. = Condensate Flow. **FAT** = Final Air Temperature.


**5/8" Tension-Wound Finned Tubing
(10 fins/inch)**
AH-24A-A1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	390.0	370.4	332.0	294.6	258.4	240.6	223.0
	COND. (lbs./hr.)	399.6	379.4	340.0	301.8	264.6	246.4	228.4
	FAT (°F)	71.5	78.8	93.1	107.0	120.7	127.4	134.0
50	OUTPUT (MBH)	536.0	514.9	473.7	433.8	395.0	376.1	357.4
	COND. (lbs./hr.)	581.1	558.2	513.4	470.1	428.1	407.5	387.2
	FAT (°F)	102.8	110.3	125.1	139.4	153.4	160.3	167.1
100	OUTPUT (MBH)	610.5	588.7	546.2	505.0	465.0	445.4	426.2
	COND. (lbs./hr.)	684.1	659.6	611.8	565.6	520.8	498.9	477.3
	FAT (°F)	119.0	126.6	141.6	156.2	170.4	177.4	184.3
200	OUTPUT (MBH)	703.1	680.5	636.4	593.7	552.3	532.1	512.1
	COND. (lbs./hr.)	825.5	798.8	746.9	696.6	647.9	624.1	600.7
	FAT (°F)	139.2	147.0	162.3	177.2	191.7	198.8	205.9


**1" Extruded Finned Tubing
(9 fins/inch)**
AH-24A-B1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	353.9	336.0	300.9	266.9	233.9	217.8	202.8
	COND. (lbs./hr.)	362.2	343.8	307.9	273.1	239.3	222.8	206.5
	FAT (°F)	68.4	75.7	90.3	104.5	118.3	125.2	131.9
50	OUTPUT (MBH)	486.6	467.3	429.6	393.2	357.9	340.6	323.6
	COND. (lbs./hr.)	526.9	505.9	465.1	425.6	387.3	368.6	350.1
	FAT (°F)	98.4	106.0	120.9	135.5	149.8	156.8	163.7
100	OUTPUT (MBH)	554.4	534.4	495.5	457.9	421.4	403.6	386.1
	COND. (lbs./hr.)	620.5	598.0	554.4	512.2	471.3	451.4	431.7
	FAT (°F)	113.8	121.5	136.7	151.5	166.0	173.1	180.1
200	OUTPUT (MBH)	638.9	618.1	577.7	538.6	500.8	482.3	464.2
	COND. (lbs./hr.)	749.0	724.6	677.0	631.1	586.7	565.0	543.6
	FAT (°F)	133.2	141.1	156.5	171.6	186.4	193.6	200.8


**1" Extruded Finned Tubing
(5 fins/inch)**
AH-24A-C1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	290.8	276.2	247.6	219.9	192.9	179.6	166.6
	COND. (lbs./hr.)	296.9	281.9	252.7	224.4	196.8	183.3	170.0
	FAT (°F)	57.2	65.0	80.3	95.3	110.1	117.4	124.6
50	OUTPUT (MBH)	399.3	383.6	353.1	323.4	294.7	280.6	266.7
	COND. (lbs./hr.)	431.1	414.1	381.1	349.1	318.0	302.8	287.7
	FAT (°F)	82.7	90.7	106.4	121.8	136.9	144.4	151.8
100	OUTPUT (MBH)	454.6	438.5	407.0	376.5	346.9	332.4	318.1
	COND. (lbs./hr.)	507.3	489.2	453.9	419.8	386.7	370.5	354.6
	FAT (°F)	95.9	103.9	119.9	135.5	150.8	158.3	165.8
200	OUTPUT (MBH)	523.6	506.9	474.2	442.7	412.0	397.0	382.3
	COND. (lbs./hr.)	611.9	592.3	554.0	516.9	481.0	463.5	446.2
	FAT (°F)	112.3	120.5	136.7	152.6	168.1	175.8	183.4

For 50 Hz power supply, derate output by 10%. For model coding, refer to page 69. Above figures are based on calculations at sea level.

COND. = Condensate Flow. **FAT** = Final Air Temperature.


**5/8" Tension-Wound Finned Tubing
(10 fins/inch)**
AH-24B-A1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	694.1	659.3	591.1	524.8	460.4	428.8	397.6
	COND. (lbs./hr.)	713.3	677.5	607.4	539.3	473.1	440.6	408.5
	FAT (°F)	63.8	71.3	86.2	100.8	115.0	122.1	129.0
50	OUTPUT (MBH)	951.4	914.1	841.3	770.7	702.2	668.6	635.4
	COND. (lbs./hr.)	1035.0	994.4	915.2	838.3	763.7	727.1	691.0
	FAT (°F)	91.9	99.7	114.9	129.9	144.6	151.8	158.9
100	OUTPUT (MBH)	1082.5	1044.1	969.1	896.4	825.8	791.3	757.2
	COND. (lbs./hr.)	1217.6	1174.3	1089.8	1007.9	928.5	889.6	851.2
	FAT (°F)	106.3	114.2	129.7	144.9	159.8	167.1	174.3
200	OUTPUT (MBH)	1245.6	1205.7	1128.1	1052.8	979.9	944.2	909.0
	COND. (lbs./hr.)	1468.2	1421.1	1329.4	1240.5	1154.4	1112.3	1070.7
	FAT (°F)	124.4	132.5	148.3	163.8	178.9	186.4	193.7


**1" Extruded Finned Tubing
(9 fins/inch)**
AH-24B-B1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	637.6	605.5	542.8	481.8	422.6	393.6	364.9
	COND. (lbs./hr.)	654.9	621.9	557.4	494.8	434.0	404.2	374.7
	FAT (°F)	59.7	67.4	82.5	97.4	112.0	119.2	126.3
50	OUTPUT (MBH)	874.3	839.9	772.9	707.9	644.8	614.0	583.5
	COND. (lbs./hr.)	950.4	913.0	840.1	769.4	700.8	667.2	634.1
	FAT (°F)	86.2	94.1	109.6	124.8	139.8	147.1	154.4
100	OUTPUT (MBH)	994.9	959.5	890.4	823.5	758.5	726.8	695.5
	COND. (lbs./hr.)	1118.2	1078.3	1000.5	925.2	852.2	816.4	781.2
	FAT (°F)	99.8	107.8	123.5	139.0	154.1	161.6	169.0
200	OUTPUT (MBH)	1147.2	1108.4	1036.8	967.5	900.3	867.5	835.1
	COND. (lbs./hr.)	1348.7	1305.3	1220.8	1139.0	1059.8	1021.1	982.9
	FAT (°F)	116.8	125.0	141.0	156.7	172.1	179.7	187.2


**1" Extruded Finned Tubing
(5 fins/inch)**
AH-24B-C1 Single Pass

Operating Pressure		Entering Air Temperature (°F)						
		-10	0	20	40	60	70	80
2	OUTPUT (MBH)	499.4	474.3	425.3	377.7	331.4	308.7	286.3
	COND. (lbs./hr.)	511.8	486.1	435.8	387.1	339.6	316.3	293.4
	FAT (°F)	50.3	58.3	74.1	89.7	105.5	112.6	120.1
50	OUTPUT (MBH)	683.6	656.8	604.7	554.1	504.9	480.9	457.1
	COND. (lbs./hr.)	741.3	712.2	655.6	600.7	547.4	521.2	495.5
	FAT (°F)	73.0	81.2	97.4	113.3	128.9	136.7	144.4
100	OUTPUT (MBH)	777.5	750.5	696.3	644.2	593.7	569.0	544.6
	COND. (lbs./hr.)	871.5	840.6	780.3	721.9	665.2	637.4	610.1
	FAT (°F)	84.6	92.9	109.3	125.4	141.3	149.1	156.9
200	OUTPUT (MBH)	894.4	865.9	810.4	756.6	704.4	678.9	653.8
	COND. (lbs./hr.)	1050.4	1016.9	951.5	888.1	826.8	796.7	767.1
	FAT (°F)	99.1	107.6	124.2	140.6	156.7	164.6	172.5

For 50 Hz power supply, derate output by 10%. For model coding, refer to page 69. Above figures are based on calculations at sea level.

COND. = Condensate Flow. **FAT** = Final Air Temperature.

5/8" Tension-Wound Finned Tubing (10 fins/inch)

50% Ethylene Glycol – 60°F EAT

		ENTERING GLYCOL TEMPERATURE											
		180°F				200°F				220°F			
MODEL	ΔT F°	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
AH-12A-A1* <i>One pass</i>	10	17.6	3.69	73.3	0.00	21.5	4.45	76.3	0.00	33.6	6.95	85.8	0.01
	20	13.0	1.35	69.7	0.00	16.1	1.65	72.0	0.00	19.3	1.95	74.4	0.00
	40	8.9	0.45	66.4	0.00	11.2	0.56	68.1	0.00	13.6	0.68	69.9	0.00
AH-12A-A3 <i>Three pass</i>	10	43.0	9.26	93.7	0.31	56.5	12.0	104.5	0.52	68.1	14.3	113.7	0.73
	20	19.0	2.00	74.4	0.02	34.0	3.59	86.3	0.05	48.8	5.12	98.1	0.10
	40	13.3	0.69	69.9	0.00	16.7	0.86	72.5	0.00	20.4	1.04	75.3	0.01
AH-16A-A1* <i>One pass</i>	10	32.1	6.82	75.4	0.01	54.3	11.5	86.4	0.01	80.0	16.8	99.2	0.03
	20	24.0	2.53	71.4	0.00	29.6	3.09	74.1	0.00	35.4	3.65	76.9	0.00
	40	15.8	0.82	67.3	0.00	20.7	1.06	69.6	0.00	25.1	1.28	71.7	0.00
AH-16A-A3 <i>Three pass</i>	10	80.3	17.4	99.5	0.74	99.2	21.2	109.0	1.08	118.1	24.9	118.5	1.48
	20	48.6	5.23	83.6	0.08	72.5	7.73	95.5	0.16	97.3	10.3	107.9	0.27
	40	24.3	1.29	71.5	0.01	30.6	1.61	74.6	0.01	37.2	1.93	77.7	0.01
AH-16A-A5 <i>Five pass</i>	10	88.0	19.1	103.4	3.96	106.7	22.8	112.8	5.60	125.3	26.5	122.2	7.46
	20	69.0	7.46	93.8	0.65	90.9	9.73	104.8	1.08	109.9	11.6	114.3	1.52
	40	28.6	1.53	73.7	0.03	49.5	2.63	84.0	0.09	74.5	3.94	96.4	0.19
AH-20A-A1* <i>One pass</i>	10	61.1	13.1	78.7	0.01	101.6	21.7	91.3	0.03	134.4	28.4	101.6	0.05
	20	40.7	4.34	72.3	0.00	50.1	5.28	75.2	0.00	59.9	6.24	78.1	0.00
	40	25.0	1.32	67.4	0.00	35.0	1.83	70.4	0.00	43.1	2.23	72.9	0.00
AH-20A-A3 <i>Three pass</i>	10	123.0	26.7	98.2	1.09	150.4	32.2	106.8	1.56	177.7	37.6	115.5	3.09
	20	86.9	9.41	86.8	0.15	118.5	12.7	96.7	0.26	151.7	16.07	107.2	0.41
	40	40.8	2.19	72.3	0.01	51.3	2.72	75.5	0.02	79.8	4.21	84.4	0.03
AH-20A-A5 <i>Five pass</i>	10	132.3	28.7	101.2	5.58	159.4	34.2	109.7	7.77	186.4	39.5	118.2	10.3
	20	111.6	12.1	94.6	1.07	139.3	14.9	103.3	1.59	166.8	17.7	112.0	2.18
	40	49.4	2.66	75.0	0.06	91.1	4.89	88.0	0.19	123.6	6.57	98.2	0.33
AH-24A-A1* <i>One pass</i>	10	110.2	23.7	85.4	0.03	156.3	33.3	96.3	0.06	205.1	43.2	107.8	0.09
	20	60.0	6.37	73.6	0.00	73.8	7.75	76.7	0.00	87.7	9.01	79.9	0.01
	40	35.1	1.83	67.8	0.00	49.2	2.56	71.0	0.00	64.0	3.30	74.3	0.00
AH-24A-A3 <i>Three pass</i>	10	173.0	37.4	100.4	1.68	210.1	44.9	109.1	2.37	247.1	52.2	117.9	3.15
	20	131.7	14.2	90.5	0.27	177.5	19.0	101.3	0.46	215.4	22.8	110.3	0.64
	40	59.8	3.20	73.6	0.02	74.0	3.91	76.8	0.03	137.5	7.26	91.7	0.08
AH-24A-A5 <i>Five pass</i>	10	183.8	39.8	103.0	8.39	220.5	47.2	111.7	11.6	—	—	—	—
	20	158.3	17.2	96.9	1.68	195.7	21.0	105.7	2.45	233.0	24.7	114.5	3.32
	40	93.2	5.04	81.4	0.17	139.6	7.48	92.3	0.35	187.1	9.94	103.5	0.59
AH-24A-A7 <i>Seven pass</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	167.2	18.1	99.0	4.98	204.3	21.9	107.8	7.09	241.3	25.6	116.5	9.48
	40	118.1	6.41	87.3	0.69	163.6	8.80	98.0	1.25	201.6	10.7	107.0	1.80
AH-24B-A1* <i>One pass Tandem</i>	10	286.4	62.1	94.0	0.25	352.4	75.6	101.9	0.36	418.1	88.6	109.9	0.48
	20	173.8	18.8	80.5	0.03	260.1	27.9	90.8	0.06	335.6	35.6	99.8	0.09
	40	69.2	3.69	67.9	0.00	96.7	5.12	71.2	0.00	156.0	8.22	78.2	0.01
AH-24B-A3 <i>Three pass Tandem</i>	10	330.2	71.7	99.3	7.73	394.6	84.7	107.1	10.4	458.8	97.3	114.9	13.5
	20	290.2	31.6	94.5	1.67	355.7	38.3	102.3	2.35	420.8	44.7	110.2	3.12
	40	194.0	10.6	82.9	0.22	269.8	14.6	91.9	0.39	348.2	18.6	101.4	0.61
AH-24B-A5 <i>Five pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	308.7	33.6	96.7	8.14	373.4	40.2	104.5	11.12	437.9	46.6	112.3	14.7
	40	239.5	13.1	88.3	1.41	312.2	16.9	97.1	2.23	378.3	20.2	105.0	3.07
AH-24B-A7 <i>Seven pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	—	—	—	—	—	—	—	—	—	—	—	—
	40	261.0	14.3	90.9	4.35	326.9	17.7	98.9	6.37	392.4	21.0	106.7	8.65

* Single-pass heaters are not recommended for liquid service. In many cases, a smaller multi-pass model would be a more economical choice. For 50 Hz power supply, derate output by 10%. For complete model coding, refer to page 69. Above figures are based on calculations at sea level.

1" Extruded Finned Tubing (9 fins/inch)

50% Ethylene Glycol – 60°F EAT

		ENTERING GLYCOL TEMPERATURE											
		180°F				200°F				220°F			
MODEL	ΔT F°	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
AH-12A-B1* <i>One pass</i>	10	9.1	1.83	66.6	0.00	11.2	2.22	68.0	0.00	13.3	2.61	69.6	0.00
	20	6.6	0.64	64.6	0.00	8.2	0.78	65.6	0.00	9.7	0.93	66.8	0.00
	40	4.4	0.21	62.9	0.00	5.6	0.26	63.7	0.00	6.8	0.31	64.5	0.00
AH-12A-B3 <i>Three pass</i>	10	26.7	5.68	80.4	0.05	42.0	8.88	92.4	0.11	53.1	11.1	101.2	0.17
	20	10.1	1.03	67.3	0.00	12.5	1.25	69.1	0.00	14.6	1.47	70.6	0.00
	40	6.8	0.34	64.8	0.00	8.6	0.42	66.0	0.00	10.5	0.51	67.4	0.00
AH-16A-B1* <i>One pass</i>	10	17.4	3.61	68.4	0.00	21.4	4.37	70.3	0.00	25.4	5.13	72.3	0.00
	20	12.6	1.27	65.9	0.00	15.5	1.56	67.3	0.00	18.6	1.84	68.8	0.00
	40	8.4	0.41	63.8	0.00	10.6	0.51	64.8	0.00	12.9	0.62	65.9	0.00
AH-16A-B3 <i>Three pass</i>	10	57.2	12.3	88.9	0.13	78.6	16.8	99.9	0.23	96.7	20.4	109.2	0.34
	20	19.2	2.01	69.3	0.00	32.9	3.44	76.2	0.01	59.6	6.24	89.9	0.03
	40	13.0	0.66	66.1	0.00	16.4	0.83	67.8	0.00	20.0	1.00	69.5	0.00
AH-16A-B5 <i>Five pass</i>	10	72.5	15.7	96.8	0.91	90.3	19.3	106.0	1.37	108.1	22.8	115.2	1.91
	20	44.1	4.73	82.1	0.09	68.6	7.31	94.7	0.21	86.9	9.16	104.1	0.32
	40	15.8	0.82	67.6	0.00	20.0	1.03	69.6	0.00	24.3	1.24	71.7	0.01
AH-20A-B1* <i>One pass</i>	10	29.2	6.14	69.4	0.00	36.1	7.43	71.5	0.00	80.3	16.8	86.5	0.01
	20	21.0	2.18	66.7	0.00	26.3	2.66	68.2	0.00	31.1	3.15	69.9	0.00
	40	14.0	0.71	64.3	0.00	18.0	0.88	65.4	0.00	21.5	1.06	66.6	0.00
AH-20A-B3 <i>Three pass</i>	10	102.9	22.2	94.3	0.28	130.8	28.0	103.8	0.43	158.6	33.5	113.2	0.62
	20	32.1	3.37	70.4	0.01	79.3	8.45	86.3	0.04	119.2	12.6	99.7	0.09
	40	21.7	1.13	66.9	0.00	27.5	1.42	68.7	0.00	33.4	1.71	70.6	0.00
AH-20A-B5 <i>Five pass</i>	10	118.6	25.7	99.7	1.65	146.0	31.3	109.0	2.43	173.3	36.7	118.3	3.32
	20	83.0	8.98	87.6	0.22	116.5	12.5	98.9	0.41	144.6	15.3	108.4	0.60
	40	26.4	1.39	68.5	0.01	33.4	1.74	70.7	0.01	78.1	4.12	85.7	0.05
AH-24A-B1* <i>One pass</i>	10	43.6	9.14	70.4	0.00	79.4	16.7	79.3	0.01	127.2	26.6	91.8	0.01
	20	31.9	3.29	67.5	0.00	39.4	4.02	69.2	0.00	47.2	4.76	71.1	0.00
	40	21.4	1.08	64.9	0.00	27.1	1.35	66.2	0.00	32.9	1.63	67.5	0.00
AH-24A-B3 <i>Three pass</i>	10	136.2	29.4	93.7	0.35	170.4	36.4	102.3	0.53	204.5	43.1	110.8	0.74
	20	74.3	7.94	78.1	0.03	117.7	12.5	88.9	0.07	162.3	17.1	100.1	0.12
	40	32.7	1.70	67.7	0.00	41.3	2.13	69.7	0.00	50.2	2.56	71.8	0.00
AH-24A-B5 <i>Five pass</i>	10	152.5	33.0	97.8	1.99	186.1	39.8	106.3	2.86	219.7	46.4	114.7	3.86
	20	119.9	13.0	89.6	0.33	154.3	16.5	98.2	0.52	188.7	19.9	106.8	0.75
	40	39.2	2.06	69.3	0.01	73.8	3.90	77.9	0.03	119.7	6.31	89.3	0.08
AH-24A-B7 <i>Seven pass</i>	10	160.2	34.6	99.8	5.90	193.5	41.4	108.1	8.34	226.9	47.9	116.5	11.2
	20	133.1	14.4	92.9	1.07	167.2	17.9	101.4	1.63	201.2	21.3	110.0	2.28
	40	65.9	3.53	76.0	0.07	109.4	5.84	86.8	0.19	153.1	8.11	97.8	0.35
AH-24B-B1* <i>One pass Tandem</i>	10	202.8	43.9	84.7	0.04	277.9	59.5	93.9	0.07	339.4	71.8	101.5	0.10
	20	81.3	8.66	69.7	0.00	117.0	12.4	74.0	0.00	214.9	22.7	86.0	0.01
	40	44.1	2.30	65.1	0.00	65.6	3.42	67.7	0.00	85.3	4.41	70.0	0.00
AH-24B-B3 <i>Three pass Tandem</i>	10	282.8	61.4	94.6	1.81	342.5	73.4	102.0	2.53	402.1	85.2	109.4	3.36
	20	231.7	25.2	88.3	0.33	292.7	31.4	95.8	0.50	353.6	37.5	103.3	0.70
	40	81.9	4.39	69.7	0.01	176.6	9.47	81.4	0.05	249.3	13.3	90.3	0.10
AH-24B-B5 <i>Five pass Tandem</i>	10	298.9	64.9	96.6	8.94	358.1	76.8	104.0	12.3	—	—	—	—
	20	259.7	28.2	91.7	1.82	319.9	34.3	99.2	2.63	379.9	40.3	106.6	3.55
	40	173.1	9.42	81.0	0.23	247.4	13.3	90.1	0.44	309.1	16.5	97.8	0.64
AH-24B-B7 <i>Seven pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	273.0	29.7	93.4	5.33	332.7	35.8	100.8	7.56	392.2	41.7	108.2	10.1
	40	208.3	11.4	85.4	0.86	269.7	14.6	92.9	1.36	330.7	17.6	100.5	1.95

* Single-pass heaters are not recommended for liquid service. In many cases, a smaller multi-pass model would be a more economical choice. For 50 Hz power supply, derate output by 10%. For complete model coding, refer to page 69. Above figures are based on calculations at sea level.

5/8" Tension-wound Finned Tubing (10 fins/inch)

Water – 60°F EAT

		ENTERING WATER TEMPERATURE											
		180°F				200°F				220°F			
MODEL	ΔT F°	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
AH-12A-A1* <i>One pass</i>	10	37.6	7.29	89.4	0.01	50.4	9.75	99.5	0.01	64.3	12.4	110.6	0.02
	20	18.9	1.79	74.4	0.00	23.6	2.23	78.0	0.00	37.2	3.55	88.7	0.00
	40	13.2	0.61	69.8	0.00	16.9	0.79	72.7	0.00	20.9	0.97	75.7	0.00
AH-12A-A3 <i>Three pass</i>	10	53.7	10.5	102.3	0.35	64.9	12.6	111.3	0.51	76.1	14.7	120.3	0.69
	20	42.5	4.13	93.3	0.06	55.6	5.39	103.7	0.10	67.0	6.48	112.8	0.14
	40	18.6	0.88	74.2	0.00	31.7	1.52	84.4	0.01	46.0	2.21	95.8	0.02
AH-16A-A1* <i>One pass</i>	10	72.3	14.1	95.5	0.02	94.2	18.3	106.5	0.03	113.0	21.9	115.9	0.04
	20	34.2	3.28	76.4	0.00	58.2	5.62	88.3	0.00	81.7	7.89	100.0	0.01
	40	24.0	1.14	71.4	0.00	30.8	1.46	74.7	0.00	38.0	1.80	78.1	0.00
AH-16A-A3 <i>Three pass</i>	10	91.7	17.9	105.3	0.69	110.1	21.4	114.5	0.98	128.5	25.0	123.8	1.32
	20	78.2	7.63	98.5	0.13	96.9	9.43	107.8	0.20	115.6	11.2	117.2	0.28
	40	44.0	2.13	81.3	0.01	67.0	3.25	92.7	0.03	87.9	4.26	103.2	0.04
AH-16A-A5 <i>Five pass</i>	10	95.6	18.7	107.3	3.37	113.9	22.2	116.5	4.73	132.2	25.7	125.7	6.30
	20	85.1	8.31	102.0	0.70	103.6	10.1	111.2	1.02	122.1	11.9	120.5	1.39
	40	62.2	3.03	90.4	0.10	83.8	4.08	101.2	0.18	102.7	4.98	110.7	0.26
AH-20A-A1* <i>One pass</i>	10	117.1	22.9	96.3	0.03	144.4	28.1	104.9	0.04	171.6	33.4	113.5	0.06
	20	68.1	6.61	72.2	0.00	103.4	10.0	91.9	0.01	134.6	13.1	101.7	0.01
	40	40.3	1.93	72.2	0.00	51.4	2.47	75.6	0.00	63.2	3.02	79.2	0.00
AH-20A-A3 <i>Three pass</i>	10	136.7	26.7	102.5	0.95	163.4	31.9	111.0	1.34	190.2	37.0	119.5	1.79
	20	119.3	11.7	97.0	0.19	146.4	14.3	105.6	0.28	173.5	16.9	114.1	0.39
	40	78.4	3.82	84.1	0.02	109.2	5.31	93.7	0.04	142.0	6.90	104.1	0.07
AH-20A-A5 <i>Five pass</i>	10	141.4	27.7	104.0	4.58	168.0	32.8	112.5	6.37	194.6	37.9	120.9	8.45
	20	127.6	12.5	99.6	0.98	154.4	15.1	108.1	1.41	181.3	17.6	116.6	1.91
	40	100.7	4.92	91.2	0.17	128.2	6.25	99.8	0.26	155.6	7.57	108.4	0.37
AH-24A-A1* <i>One pass</i>	10	165.9	32.4	98.7	0.04	202.9	39.5	107.4	0.07	239.9	46.6	116.2	0.09
	20	113.2	11.0	86.2	0.01	156.3	15.2	96.3	0.01	196.9	19.1	105.9	0.02
	40	59.0	2.82	73.4	0.00	75.2	3.59	77.1	0.00	92.2	4.40	81.0	0.00
AH-24A-A3 <i>Three pass</i>	10	188.8	36.9	104.2	1.42	225.2	43.9	112.8	1.98	261.6	50.8	121.4	2.63
	20	167.3	16.3	99.0	0.30	204.1	19.9	107.7	0.43	240.9	23.4	116.4	0.59
	40	118.7	5.77	87.4	0.04	159.0	7.73	96.9	0.07	201.3	9.77	106.9	0.11
AH-24A-A5 <i>Five pass</i>	10	194.4	38.0	105.5	6.73	230.6	44.9	114.1	9.32	266.7	51.8	122.7	12.3
	20	176.9	17.3	101.3	1.47	213.4	20.8	110.0	2.09	249.9	24.3	118.6	2.82
	40	142.8	6.97	93.2	0.26	180.0	8.76	102.0	0.40	217.2	10.6	110.8	0.57
AH-24A-A7 <i>Seven pass</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	181.5	17.7	102.4	4.13	217.8	21.2	111.0	5.85	254.2	24.7	119.7	7.85
	40	150.6	7.35	95.0	0.77	187.7	9.14	103.8	1.16	224.7	10.91	112.6	1.62
AH-24B-A1* <i>One pass Tandem</i>	10	323.2	63.3	98.5	0.22	387.5	75.7	106.2	0.30	451.7	88.0	114.0	0.40
	20	278.4	27.3	93.0	0.05	343.6	33.6	100.9	0.07	408.7	39.8	108.7	0.09
	40	155.7	7.58	78.3	0.00	239.4	11.7	88.3	0.01	313.4	15.2	97.1	0.02
AH-24B-A3 <i>Three pass Tandem</i>	10	345.6	67.8	101.2	5.92	409.2	80.0	108.9	8.09	472.7	92.2	116.6	10.6
	20	317.3	31.1	97.8	1.35	381.4	37.3	105.5	1.89	445.4	43.4	113.2	2.51
	40	261.4	12.8	91.0	0.26	326.7	16.0	98.8	0.39	391.8	19.1	106.7	0.54
AH-24B-A5 <i>Five pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	326.7	32.0	98.9	6.26	390.5	38.2	106.6	8.72	454.2	44.3	114.3	11.5
	40	277.8	13.6	93.0	1.26	342.7	16.8	100.8	1.83	407.3	19.9	108.6	2.50
AH-24B-A7 <i>Seven pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	—	—	—	—	—	—	—	—	—	—	—	—
	40	285.5	14.0	93.9	3.48	350.2	17.1	101.7	5.03	414.6	20.2	109.5	6.88

* Single-pass heaters are not recommended for liquid service. In many cases, a smaller multi-pass model would be a more economical choice. For 50 Hz power supply, derate output by 10%. For complete model coding, refer to page 69. Above figures are based on calculations at sea level.

1" Extruded Finned Tubing (9 fins/inch)

Water – 60°F EAT

		ENTERING WATER TEMPERATURE											
		180°F				200°F				220°F			
MODEL	ΔT F°	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI	OUTPUT MBH	FLOW USGPM	FAT °F	PD PSI
AH-12A-B1* <i>One pass</i>	10	13.8	2.55	70.2	0.00	31.5	6.03	84.1	0.00	44.3	8.48	94.1	0.00
	20	10.2	0.93	67.4	0.00	12.8	1.17	69.3	0.00	15.6	1.43	71.4	0.00
	40	6.8	0.30	64.8	0.00	8.8	0.39	66.2	0.00	10.9	0.49	67.7	0.00
AH-12A-B3 <i>Three pass</i>	10	44.5	8.64	94.6	0.09	55.2	10.7	103.0	0.14	65.9	12.7	111.5	0.20
	20	28.3	2.72	81.7	0.01	42.4	4.09	92.8	0.02	53.3	5.13	101.4	0.03
	40	10.3	0.47	67.5	0.00	13.2	0.61	69.7	0.00	18.1	0.84	73.4	0.00
AH-16A-B1* <i>One pass</i>	10	46.8	9.06	83.5	0.00	67.2	13.0	93.9	0.00	89.2	17.2	105.3	0.01
	20	19.3	1.82	69.4	0.00	24.3	2.28	71.8	0.00	29.4	2.70	74.3	0.00
	40	13.0	0.60	66.1	0.00	16.8	0.77	68.0	0.00	20.8	0.96	69.9	0.00
AH-16A-B3 <i>Three pass</i>	10	78.3	15.3	99.8	0.17	95.7	18.6	108.8	0.25	113.2	22.0	117.9	0.35
	20	60.5	5.88	90.6	0.03	78.2	7.59	99.7	0.04	96.0	9.29	108.8	0.07
	40	19.5	0.92	69.5	0.00	32.5	1.55	76.0	0.00	57.3	2.75	88.7	0.01
AH-16A-B5 <i>Five pass</i>	10	84.5	16.5	103.0	0.91	101.8	19.8	112.0	1.31	119.1	23.1	121.0	1.78
	20	70.9	69.1	96.0	0.17	88.5	8.60	105.0	0.25	106.1	10.3	114.1	0.36
	40	40.4	1.95	80.2	0.01	60.6	2.93	90.5	0.03	81.9	3.96	101.5	0.06
AH-20A-B1* <i>One pass</i>	10	87.6	17.1	89.1	0.01	120.9	23.5	100.4	0.01	148.6	28.8	109.8	0.02
	20	32.3	3.07	70.4	0.00	41.0	3.89	73.3	0.00	88.4	8.52	89.2	0.00
	40	21.7	1.01	66.9	0.00	28.0	1.31	68.9	0.00	34.7	1.62	71.1	0.00
AH-20A-B3 <i>Three pass</i>	10	126.0	24.6	102.2	0.30	153.0	29.8	111.4	0.44	179.9	35.0	120.6	0.60
	20	101.6	9.92	93.9	0.05	129.0	12.6	103.2	0.08	156.4	15.2	112.5	0.12
	40	31.7	1.52	70.3	0.00	74.8	3.62	84.7	0.01	106.7	5.16	95.4	0.01
AH-20A-B5 <i>Five pass</i>	10	134.1	26.2	105.0	1.54	160.8	31.4	114.1	2.20	187.5	36.5	123.2	2.97
	20	115.3	11.3	98.6	0.30	142.5	13.9	107.8	0.44	169.6	16.5	117.0	0.62
	40	75.4	3.67	85.0	0.03	108.1	5.26	96.0	0.07	135.8	6.59	105.4	0.10
AH-24A-B1* <i>One pass</i>	10	126.2	24.5	91.2	0.01	160.0	31.1	99.6	0.01	193.9	37.5	108.1	0.02
	20	47.5	4.50	71.4	0.00	90.1	8.65	81.9	0.00	132.5	12.7	92.5	0.00
	40	32.5	1.51	67.6	0.00	41.8	1.95	69.9	0.00	51.8	2.41	72.2	0.00
AH-24A-B3 <i>Three pass</i>	10	160.2	31.3	99.8	0.35	193.3	37.6	108.1	0.51	226.5	43.9	116.4	0.69
	20	133.5	13.0	93.0	0.06	167.1	16.2	101.4	0.10	200.8	19.5	109.9	0.14
	40	68.2	3.28	76.6	0.00	109.6	5.29	86.9	0.01	153.3	7.40	97.8	0.02
AH-24A-B5 <i>Five pass</i>	10	168.5	32.9	101.9	1.77	201.4	39.2	110.1	2.50	234.3	45.5	118.4	3.35
	20	147.8	14.4	96.6	0.35	181.1	17.6	105.0	0.52	214.4	20.8	113.3	0.72
	40	108.8	5.29	86.8	0.05	142.7	6.92	95.2	0.09	176.7	8.55	103.7	0.13
AH-24A-B7 <i>Seven pass</i>	10	172.4	33.7	102.9	5.01	205.2	40.0	111.1	7.02	238.0	46.2	119.4	9.37
	20	154.6	15.1	98.3	1.04	187.7	18.3	106.7	1.51	220.8	21.4	115.0	20.7
	40	120.3	5.86	89.7	0.17	154.1	7.48	98.1	0.27	187.8	9.10	106.6	0.39
AH-24B-B1* <i>One pass Tandem</i>	10	272.2	53.3	93.3	0.05	331.8	64.8	100.7	0.07	391.3	76.2	108.1	0.10
	20	203.2	19.8	84.7	0.01	275.0	26.8	93.6	0.01	335.5	32.6	101.1	0.02
	40	80.9	3.89	69.6	0.00	112.1	5.39	73.4	0.00	204.3	9.88	84.7	0.00
AH-24B-B3 <i>Three pass Tandem</i>	10	306.5	60.0	97.6	1.51	365.1	71.3	104.8	2.10	423.7	82.5	112.1	2.79
	20	273.1	26.7	93.4	0.32	332.4	32.5	100.7	0.46	391.6	38.1	108.1	0.63
	40	209.4	10.2	85.5	0.05	269.8	13.2	92.9	0.08	330.2	16.1	100.4	0.12
AH-24B-B5 <i>Five pass Tandem</i>	10	314.7	61.7	98.6	7.13	373.1	72.9	105.8	9.86	431.5	84.0	113.1	13.0
	20	287.5	28.2	95.2	1.56	346.3	33.8	102.5	2.23	405.2	39.5	109.8	3.00
	40	234.1	11.5	88.6	0.28	294.0	14.4	95.9	0.34	353.9	17.2	103.4	0.61
AH-24B-B7 <i>Seven pass Tandem</i>	10	—	—	—	—	—	—	—	—	—	—	—	—
	20	294.2	28.8	96.0	4.39	352.9	34.5	103.3	6.21	411.5	40.1	110.6	8.31
	40	245.8	12.0	90.0	0.82	305.5	14.9	97.4	1.23	365.0	17.8	104.8	1.72

* Single-pass heaters are not recommended for liquid service. In many cases, a smaller multi-pass model would be a more economical choice. For 50 Hz power supply, derate output by 10%. For complete model coding, refer to page 69. Above figures are based on calculations at sea level.

The EFX Explosion-Proof Exhaust Fan is designed for hazardous and general purpose industrial applications. The EFX is constructed with epoxy-coated steel panels and spark resistant aluminum fan blades for ventilation of combustible materials, vapors and hazardous fumes. The EFX is fully assembled for easy installation, has explosion-proof motors that are CSA approved and/or UL listed with fan guards conforming to OSHA specifications.



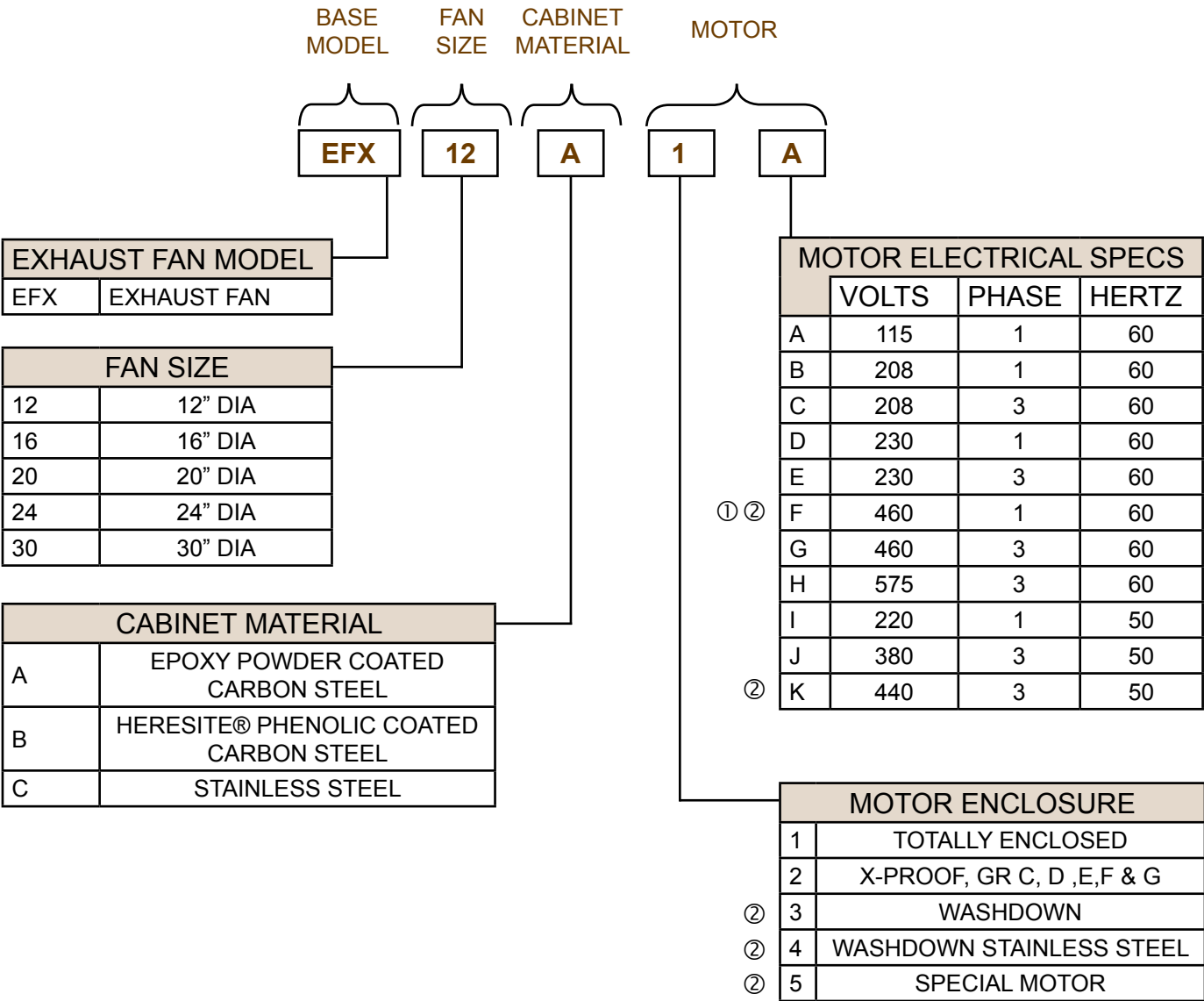
General Specifications

Hazardous Location Classifications	Class I, Div. 1 & 2, Groups C, D. Class II, Div. 1 & 2, Groups E, F, G. Temperature Code: T3B 165°C (329°F).
Approvals	Motors are CSA approved and/or UL listed.
Fan	Aluminum blade. Steel spider and hub with 5/8 in. (15.875mm) bore. Optional Heresite® coating for corrosive atmospheres.
Fan Guard	Split design with close wire spacing, meets OSHA requirements.
Motors	CSA approved and/or UL listed permanently lubricated ball bearing type with rigid base. Explosion-proof or totally enclosed construction. All standard voltages for 60 and 50 hertz are available.
Frame Material	16ga. (0.060 in. or 1.52mm) epoxy-coated steel. Optional stainless steel or Heresite® coating for corrosive atmospheres.
Mounting	Four 3/8 in. (9.5mm) diameter holes. Must be mounted to a rigid structure.

Model		EFX12	EFX16	EFX20	EFX24	EFX30
Fan Diameter		12 in. (305mm)	16 in. (406mm)	20 in. (508mm)	24 in. (610mm)	30 in. (762mm)
Motor*		1/2 HP, 60Hz (0.373kW)	1/2 HP, 60Hz (0.373kW)	1/2 HP, 60Hz (0.373kW)	1/2 HP, 60Hz (0.373kW)	3/4 HP, 60Hz (0.560kW)
Air Flow Rating @70°F (21°C)		850 CFM (1444 m ³ /hr.)	1825 CFM (3101 m ³ /hr.)	3760 CFM (6388 m ³ /hr.)	4180 CFM (7102 m ³ /hr.)	4759 CFM (8086 m ³ /hr.)
Motor Speed		1725 RPM	1725 RPM	1725 RPM	1725 RPM	1140 RPM
Net Weight		51.0 lbs. (23.1 kg)	55.0 lbs. (24.9 kg)	59.0 lbs. (26.7 kg)	61.0 lbs. (27.7 kg)	67.0 lbs. (30.4 kg)
Shipping Weight		56.0 lbs. (25.4 kg)	61.0 lbs. (27.7 kg)	67.0 lbs. (30.3 kg)	96.0 lbs. (43.5 kg)	114.0 lbs. (51.7 kg)
Dimensions	Width	16.1 in. (410mm)	20.2 in. (513mm)	24.2 in. (615mm)	28.1 in. (715mm)	34.0 in. (863mm)
	Height	18.2 in. (462mm)	23.1 in. (588mm)	27.1 in. (688mm)	31.0 in. (788mm)	37.1 in. (942mm)
	Depth	15.4 in. (392mm)	14.9 in. (378mm)	16.1 in. (410mm)	15.5 in. (394mm)	15.6 in. (397mm)

*Note: 50Hz units also available.

EFX Explosion-Proof Exhaust Fan
Model Coding



① Only available for Class I Group D, Class II Group F & G.
② Consult factory for motor availability.

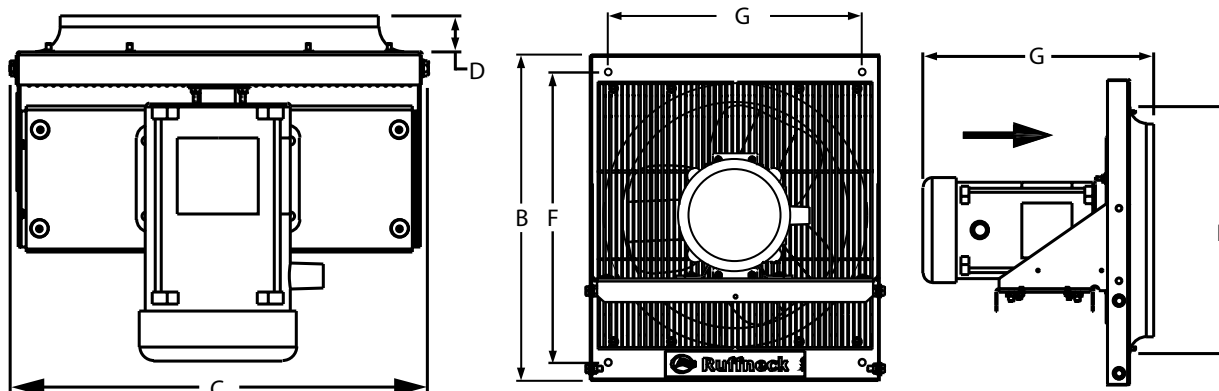
Performance Data for 60 Hertz Motor

60 Hertz EFX Explosion-Proof Exhaust Fan						
Class I, Div. 1 & 2, Groups C,D, Class II, Div. 1 & 2, Groups E,F,G						
Model	Fan Size	Voltage	Phase	CFM	Approximate Shipping Weight	
					lbs	kg
EFX-12A-2A	12	115	1	850	56	26
EFX-12A-2B	12	208	1	850	56	26
EFX-12A-2C	12	208	3	850	56	26
EFX-12A-2D	12	240	1	850	56	26
EFX-12A-2E	12	230	3	850	56	26
EFX-12A-2G	12	460	3	850	56	26
EFX-12A-2H	12	575	3	850	56	26
EFX-16A-2A	16	115	1	1825	61	29
EFX-16A-2B	16	208	1	1825	61	29
EFX-16A-2C	16	208	3	1825	61	29
EFX-16A-2D	16	230	1	1825	61	29
EFX-16A-2E	16	230	3	1825	61	29
EFX-16A-2G	16	460	3	1825	61	29
EFX-16A-2H	16	575	3	1825	61	29
EFX-20A-2A	20	115	1	3760	67	31
EFX-20A-2B	20	208	1	3760	67	31
EFX-20A-2C	20	208	3	3760	67	31
EFX-20A-2D	20	230	1	3760	67	31
EFX-20A-2E	20	230	3	3760	67	31
EFX-20A-2G	20	460	3	3760	67	31
EFX-20A-2H	20	575	3	3760	67	31
EFX-24A-2A	24	115	1	4180	96	44
EFX-24A-2B	24	208	1	4180	96	44
EFX-24A-2C	24	208	3	4180	96	44
EFX-24A-2D	24	230	1	4180	96	44
EFX-24A-2E	24	230	3	4180	96	44
EFX-24A-2G	24	460	3	4180	96	44
EFX-24A-2H	24	575	3	4180	96	44
EFX-30A-2A	30	115	1	4759	114	52
EFX-30A-2B	30	208	1	4759	114	52
EFX-30A-2C	30	208	3	4759	114	52
EFX-30A-2D	30	230	1	4759	114	52
EFX-30A-2E	30	230	3	4759	114	52
EFX-30A-2G	30	460	3	4759	114	52
EFX-30A-2H	30	575	3	4759	114	52

Performance Data for 50 Hertz Motor

50 Hertz EFX Explosion-Proof Exhaust Fan						
Class I, Div. 1 & 2, Groups C,D, Class II, Div. 1 & 2, Groups E,F,G						
Model	Fan Size	Voltage	Phase	CFM	Approximate Shipping Weight	
					lbs	kg
EFX-12A-2I	12	220	1	702	56	26
EFX-12A-2J	12	380	3	702	56	26
EFX-12A-2K	12	440	3	702	56	26
EFX-16A-2I	16	220	1	1507	61	29
EFX-16A-2J	16	380	3	1507	61	29
EFX-16A-2K	16	440	3	1507	61	29
EFX-20A-2I	20	220	1	3106	67	31
EFX-20A-2J	20	380	3	3106	67	31
EFX-20A-2K	20	440	3	3106	67	31
EFX-24A-2I	24	220	1	3453	96	44
EFX-24A-2J	24	380	3	3453	96	44
EFX-24A-2K	24	440	3	3453	96	44
EFX-30A-2I	30	220	1	3931	114	52
EFX-30A-2J	30	380	3	3931	114	52
EFX-30A-2K	30	440	3	3931	114	52

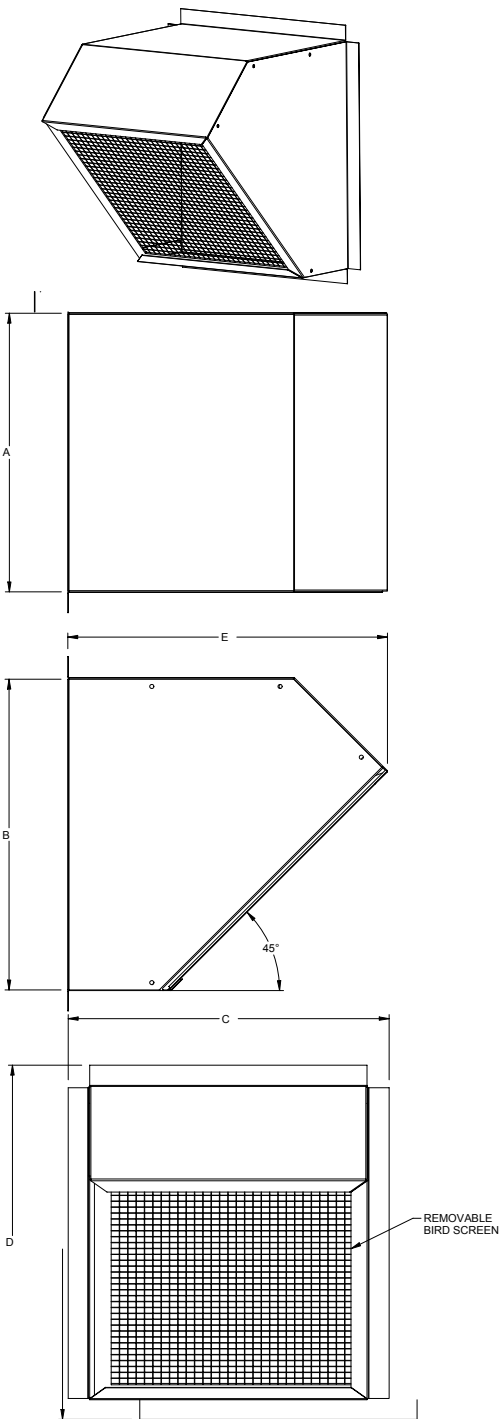
EFX Explosion-Proof Exhaust Fan Physical Dimensions



DIMENSION	EFX-12	EFX-16	EFX-20	EFX-24	EFX-30
A	mm 392.1	mm 377.8	mm 409.6	mm 393.7	mm 396.9
	in 15.4	in 14.9	in 16.1	in 15.5	in 15.6
B	mm 461.9	mm 588	mm 687.9	mm 787.9	mm 942.3
	in 18.2	in 23.2	in 27.1	in 31	in 37.1
C	mm 410	mm 512.5	mm 614.5	mm 714.5	mm 862.5
	in 16.1	in 20.2	in 24.2	in 28.1	in 34
D	mm 79.4	mm 57.2	mm 91.7	mm 76.2	mm 88.9
	in 3.1	in 2.2	in 3.6	in 3	in 3.5
E	mm 373.3	mm 475.6	mm 577.3	mm 677.3	mm 835.3
	in 14.7	in 18.7	in 22.7	in 24.7	in 32.9
F	mm 411.1	mm 537.2	mm 637.1	mm 737.1	mm 891.5
	in 16.2	in 21.2	in 25.1	in 29	in 35.1
G	mm 359.2	mm 461.7	mm 563.7	mm 663.7	mm 811.7
	in 14.1	in 18.2	in 22.2	in 26.1	in 32

EFX Accessories

Stormhood



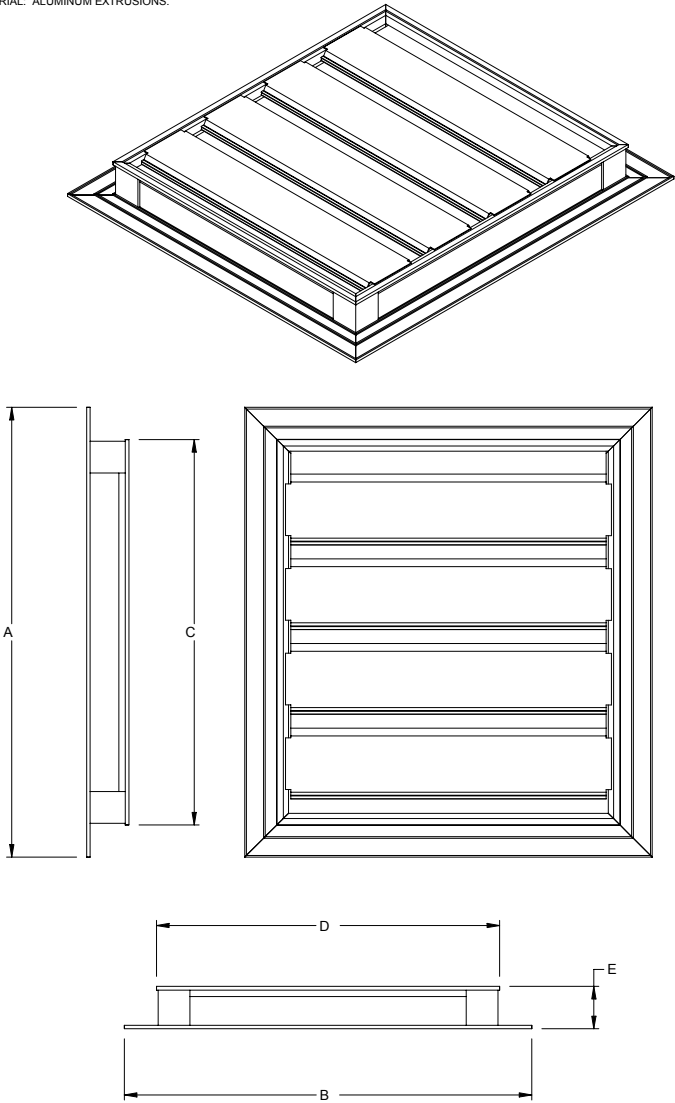
NOTES:
1) MATERIAL: 20 Ga GALVANIZED METAL

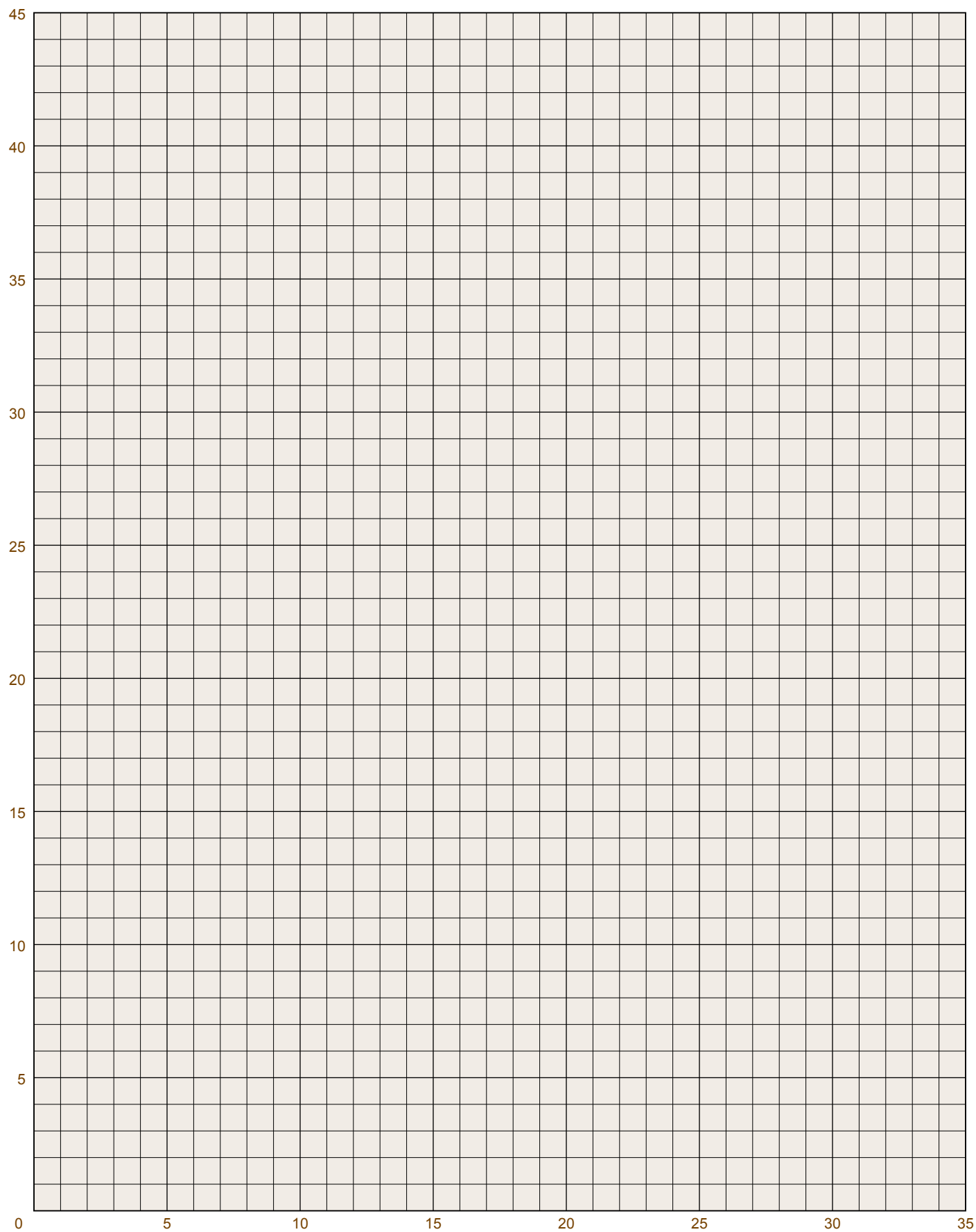
MODEL SIZE	OPENING				C		D				CCI PART NUMBER
	A	B									
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	
12	422.3	16 5/8	473.1	18 5/8	485.8	19 1/8	536.6	21 1/8	486.1	19 1/8	10210
16	523.9	20 5/8	600.1	23 5/8	587.4	23 1/8	663.6	26 1/8	616.5	24 1/4	10211
20	625.5	24 5/8	698.5	27 1/2	689	27 1/8	762	30	717.7	28 1/4	10211
24	727.1	28 5/8	800.1	31 1/2	790.6	31 1/8	863.6	34	822	32 3/8	10212
30	876.3	34 1/2	952.5	37 1/2	939.8	37	1016	40	978.7	38 1/2	10213

Backdraft Damper

MODEL SIZE	A		B		C		D		E	CCI PART NUMBER
	mm	Inches	mm	Inches	mm	Inches	mm	Inches		
12	514.4	20 1/4	489.0	19 1/4	463.6	18 1/4	409.6	16 1/8	50.8 (2)	10205
16	666.8	26 1/4	590.6	23 1/4	573.6	22 9/16	511.2	20 1/8		10206
20	765.2	30 1/8	692.2	27 1/4	689.0	27 1/8	616.0	24 1/4		10207
24	866.8	34 1/8	793.8	31 1/4	787.4	31	717.6	28 1/4		10208
30	1019.2	40 1/8	939.8	37	943.0	37 1/8	863.6	34		10209

NOTES:
1) MATERIAL: ALUMINUM EXTRUSIONS.







Defender®

Explosion-Proof Thermostats

Defender Explosion-Proof Thermostats

Ruffneck™ Defender® explosion-proof, heavy-duty thermostats are the smallest, lightest, and most durable thermostats available. They are designed to control heating only, cooling only, or ventilation systems in demanding industrial applications. These include oil refineries, petrochemical plants, pulp and paper mills, coal mines, grain elevators, hazardous waste storage facilities, and other hazardous locations where specific explosive gases or dusts are present.

For hazardous-location temperature controls, rely on Defender® Thermostats for the most dependable, trouble-free service available. The Defender® Thermostat's unique and highly engineered design offers outstanding features and benefits.

More Features ... More Benefits:

- all-aluminum exterior
- no breakable external plastic parts
- no exposed copper or brass
- corrosion resistant, suitable for H₂S environments
- compact & lightweight
- more competitively priced
- CFC & mercury free
- environmentally safe, no leveling required
- 3-year warranty: longest trouble-free warranty in the industry
- precision die-cast components
- greater consistency, better quality
- bimetal sensing element
- fast-acting, reliable, unaffected by altitude
- no delicate coils or bellows
- rugged reliability
- 480 VAC maximum
- wider range of applications

Specifications

Temperature range: 36°F to 82°F (2°C to 28°C)

Temperature differential: 2.5 F° (1.5 C°)

Net weight: 2.1 lbs. (0.95 kg)

Switching: Snap acting

Conduit opening: ¾" - 14 NPT

Electrical Rating

22 Amps Res., 480 VAC Max.;

½ HP @ 125 VAC, 1 HP @ 250 VAC

Class I, Divisions 1 & 2, Groups C & D;

Class II, Division 1, Groups E, F, & G;

Class II, Division 2, Groups F & G; Class III;

Class I, Zones 1 & 2, Groups IIA & IIB

Approvals

UL Listed & CSA Certified

Patents

Pat. 08/583,929 USA

Pat. Pending 2,151,641 CAN

Des. Pat. 376,109 USA; Rd. 1996, 78975 CDN

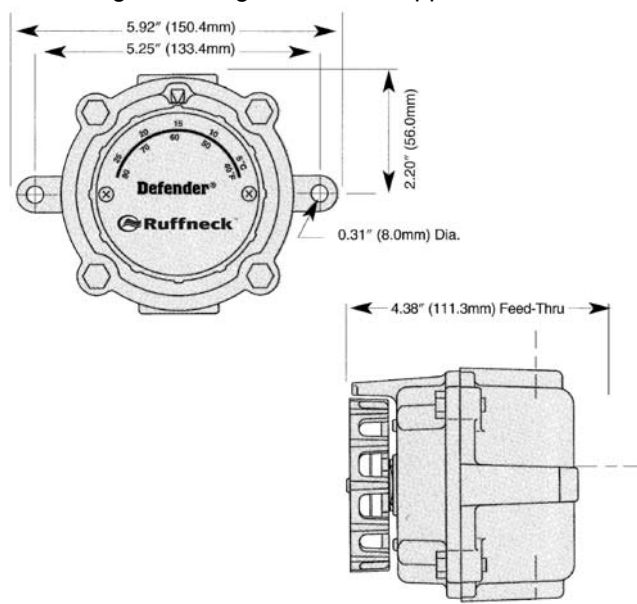
Available in two models ...

XT-311 (Feed-Through, Single Pole, Single Throw)

For heating-only applications.

XT-312 (Feed-Through, Single Pole, Double Throw)

For heating or cooling / ventilation applications.



ET5-S Standard Ruffneck™ Thermostat



Heavy Duty Line Voltage Thermostat

- Temp. range: 5° to 25°C / 40° to 80°F
- 22 Amps, 277 VAC
- ¾ HP @ 125 VAC
- 1½ HP @ 250/277 VAC
- Single pole
- Single Throw*
- Approximate Shipping Weight: 0.6 lbs. (0.28 kg)

TF115 NEMA 4X Corrosion Resistant Thermostat



- Temp. range: 4° to 30°C / 40° to 90°F
- 25 Amps Res., 480 VAC Max.
- Full load = 16 Amps @ 120 VAC
12 Amps @ 240 VAC
- Lock Rotor = 80 Amps @ 120 VAC
60 Amps @ 240 VAC
- single pole, double throw (heating or cooling applications)
- Approximate Shipping Weight: 0.69 lbs. (0.31 kg)

XTB Explosion-Proof Thermostat



- Temp. range: -18° to 40°C / 0° to 100°F
- Class I, Division 1 & 2 Groups C & D
Class II, Division 1 & 2 Groups E, F & G
Class III, Division 1 & 2
- Remote sensing bulb with 57 in. capillary length
- 15 Amps Res., 600 VAC Max. – 25 Amps Res., 277 Max.
- XTB04481 (Single Pole, Single Throw)*
- XTB04483 (Double Pole, Single Throw)*
- Approximate Shipping Weight: 3.8 lbs. (1.7 kg)

XTWA Explosion-Proof Thermostat



- Temp. range: -18° to 40°C / 0° to 100°F
- Class I, Division 1 & 2 Groups A, B, C & D
Class II, Division 1 & 2 Groups E, F & G
Class III, Division 1 & 2
- Sensing bulb in Finned Thermowell for Air Sensing
- 15 Amps Res., 600 VAC Max. – 25 Amps Res., 277 Max.
- XTWA04481 (Single Pole, Single Throw)*
- XTWA04483 (Double Pole, Single Throw)*
- Approximate Shipping Weight: 4.0 lbs. (1.8 kg)

XTD8-S Explosion-Proof Thermostat



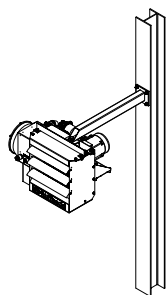
- Temp. range: 5° to 25°C / 40° to 80°F
- Class I, Division 1 & 2 Groups C & D
Class II, Division 1 & 2 Groups E, F & G
Class III, Division 1 & 2
- Feed-thru model (includes explosion-proof plug)
- ¾" - 14 NPT conduit opening (½" conduit adapter included)
- single pole, double throw (heating or cooling applications)
- 22 Amps, 277 VAC Max.
- ¾ HP @ 125 VAC
- 1½ HP @ 250/277 VAC
- Approximate Shipping Weight: 5.3 lbs. (2.4 kg)

NOTE: All 3 phase motors on AH, HP and FR heaters require a motor starter (supplied by others).

*Heating applications only

BMK**Basic Mounting Kit (BMK)***

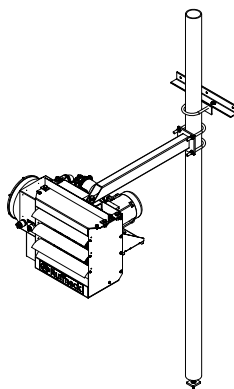
The BMK is suitable for applications where the support arm can be bolted or welded directly to structural steel or concrete.



Model	Approximate Shipping Weight	
	Lbs.	kg
FX4/FX5 (12" fan)	16.5	7
FX4/FX5 (16" fan)	18.2	8
FX4/FX5 (20" fan)	19.3	9
HP / FR 12 / 16	16.5	7
HP / FR 20 / 24	18.2	8
AH-12A	16.5	7
AH-16A	18.2	8
AH-20A	19.3	9
AH-24A	20.3	9

PMK**Pipe Mounting Kit (PMK)***

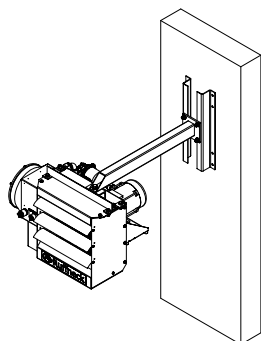
Particularly useful in buildings with insufficient structural strength to use other types of mounts. Requires 3" pipe (3½" O.D.) (not supplied).



Model	Approximate Shipping Weight	
	Lbs.	kg
FX4/FX5 (12" fan)	23.7	11
FX4/FX5 (16" fan)	25.4	12
FX4/FX5 (20" fan)	26.5	12
HP / FR 12 / 16	23.7	11
HP / FR 20 / 24	25.4	12
AH-12A	23.7	11
AH-16A	25.4	12
AH-20A	26.5	12
AH-24A	27.5	12

WMK**Wall Mounting Kit (WMK)***

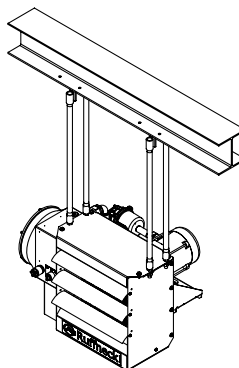
Ideal for use in buildings that have substantial walls. The Z sections provide additional support where necessary.



Model	Approximate Shipping Weight	
	Lbs.	kg
FX4/FX5 (12" fan)	24.3	11
FX4/FX5 (16" fan)	25.4	12
FX4/FX5 (20" fan)	26.5	12
HP / FR 12 / 16	24.3	11
HP / FR 20 / 24	25.4	12
AH-12A	24.3	11
AH-16A	25.4	12
AH-20A	26.5	12
AH-24A	27.5	12

HMK**Hanging Mounting Kit (HMK)**

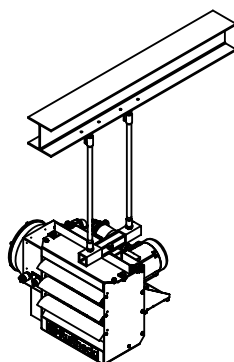
Simple and economical if an adequate overhead structure exists. Requires ½" pipe, cut and threaded (not supplied).



Model	Approximate Shipping Weight	
	Lbs.	kg
All FX4/FX5	4.5	2
All HP / FR	4.5	2
All AH	4.5	2

SHMK**Swivel Hanging Mounting Kit (SHMK)***

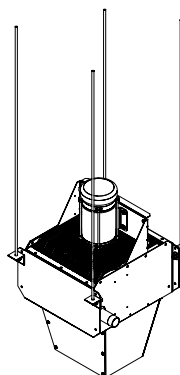
Swivels 360°. Requires ½" pipe, cut and threaded (not supplied).



Model	Approximate Shipping Weight	
	Lbs.	kg
FX4/FX5 (12" fan)	18.2	8
FX4/FX5 (16" fan)	19.4	9
FX4/FX5 (20" fan)	20.4	9
HP / FR 12 / 16	18.3	8
HP / FR 20 / 24	20.1	9
AH-12A	18.2	8
AH-16A	19.4	9
AH-20A	20.4	9
AH-24A	21.4	10

VHMK**Vertical Hanging Mounting Kit (VHMK)**

Simple and economical when mounting to an appropriate overhead structure. (Requires 3/8" THD Rod)



Model	Approximate Shipping Weight	
	Lbs.	kg
All AV	4.5	2

NOTE: Mounting kits are made of steel with wet applied enamel paint. If the heater is installed on a structure that is to be transported, provide additional support for the heater during transit. The suspended weight should not exceed 300 lbs. (136 kg).

How To Order: When ordering mounting kits, specify the type of kit required and the basic model of the heater to be mounted.

* Not suitable for models – HP 30, FR 30, HP 36, FR 36, or Tandem AH Series (24B fan configuration).

Thermal Performance Analysis Service

Thermal Performance Analysis Service

You are encouraged to take advantage of our computerized service available for calculating heating capabilities for Ruffneck™ heat-exchanger unit heaters. This service accurately computes complete performance parameters and output capacities for all Ruffneck™ models under a wide range of operating conditions.

The software used is powerful and flexible, and offers metric or imperial unit measures to rate unit heaters based on flow rate or fluid temperature drop. The program is also designed to rate standard unit heaters; to rate heat-exchangers only for non-standard air flows in duct applications; or to quickly rate units for the following pre-programmed fluid types:

- Steam
- Ethylene Glycol / Water
- Water
- Triethylene Glycol / Water
- Dowtherm G
- Dowtherm A
- Dowtherm E
- Therminol FR-1
- Therminol 66
- Humbletherm 500
- Mobiltherm 600
- Sun 21 Thermal Oil
- SAE 20 Lube Oil
- SAE 30 Lube Oil

This program can also rate units for other fluids by manually inputting fluid properties.

CCI Thermal can provide long or short printouts of all calculations. All this can be performed quickly and easily by simply providing the following information:

- type of fluid used
- inlet fluid temperature
- outlet fluid temperature or available flow rate
- altitude above seal level
- entering air temperature

This service is particularly helpful for large complex projects requiring multiple heaters. We are able to perform dozens of calculations in search of the most economic system. Along with the thermal performance analysis, our staff can assist you with common heat loss calculations for your building.

 **CCI Thermal Technologies INC.**

Thermal Performance Analysis Report

Reference Data	
Job Description:	Test Data
Internet Browser used:	Microsoft Internet Explorer
Date: 2000 / 10 / 11	
Heater Data	
Advanced Series Model No.	AH-16A-B5
Number of Passes	5 Passes
Tube OD	1 in
Tube ID	0.834 in
Fin Spacing	9 fins / inch
Number of Rows	2 Rows
Input Data	
Fluid Name	50 % Ethylene Glycol by Weight
Operating Pressure	15 psig
Inlet Fluid Temperature	200 °F
Outlet Fluid Temperature	180 °F
Air Inlet Temperature	60 °F
Altitude	1500 ft ASL
Electric Motor Power	60 Hz
Any "Cautions" to note? None	

Fluid Properties @ Average Temperature	
Average Temperature	190 °F
Reynolds Number	10,999
Tubeside Conditions	
Fluid Flow Rate	3,820.82 lb/hr
Tubeside Flow Rate	7.12 USGPM@60°F
Tubeside Pressure Drop	0.19 psi
Airside Conditions	
Air Flow Rate	1,777 ACFM
Air Flow Rate (Standard Conditions)	1,713 SCFM
Air Velocity	759.14 FPM
Final Air Temperature	95.35 °F
Heater Performance Data	
Heat Dissipated (Total)	66,877 BTU/hr

Version: 1.01B4
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 **CCI Thermal Technologies INC.**

Thermal Performance Analysis Report

Reference Data	
Job Description:	Test Data
Internet Browser used:	Microsoft Internet Explorer
Date: 2000 / 10 / 11	
Heater Data	
Advanced Series Model No.	2A-A1
Tubeside Conditions	
Inlet Steam Temperature	337.88 °F
Outlet Steam Temperature	337.88 °F
Condensate Flow Rate	157.06 lb/hr
Tubeside Pressure Drop	0 psi
Airside Conditions	
Air Flow Rate	1,111 ACFM
Air Flow Rate (Standard Conditions)	1,131 SCFM
Air Mass Flow	5,086 lb/hr
Air Velocity	831.94 FPM
Final Air Temperature	172.77 °F
Heater Performance Data	
Heat Dissipated (Total)	140,765 BTU/hr

Version: 1.01B4
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These reports are samples only.

Additionally, this program is available for your use, free of charge, from our web site at www.ccithermal.com.

PROPERTIES OF STEAM

GAUGE PRESSURE (PSIG)	TEMPERATURE (°F)	LATENT HEAT (BTU/lb.)	DENSITY (lb./ft. ³)
2	219	965	0.0434
10	239	952	0.0612
20	259	939	0.0855
40	287	919	0.1351
60	307	904	0.1818
80	324	891	0.2127
100	338	880	0.2564
150	366	857	0.3634
200	387	838	0.4686
250	406	820	0.5720
450	460	764	1.0000

ABBREVIATIONS USED

1. BTU = British Thermal Unit
2. MBH = BTU/hr. × 1000
3. EAT = Entering Air Temperature
4. FAT = Final Air Temperature
5. USGPM = U.S. Gallons Per Minute
6. PD = Pressure Drop, p.s.i.
7. PSIG = Pounds Per Sq. In. Gauge Pressure
8. ΔT = Liquid Temperature Differential
9. CFM = Cubic Feet Per Minute
10. FPM = Feet Per Minute
11. COND. = Condensate Flow

USEFUL FORMULAS

1. Condensate, lb./hr. = $\frac{\text{actual BTU / hr}}{\text{Latent Heat of Steam at PSIG}}$
2. Specific heat of air from 0°F to 150°F
= 0.24 BTU / lb.°F
3. Weight of one cubic foot of air at 70°F = 0.75 lb.
4. BTU/hr. = CFM × Air Temp. Rise (F°) × 1.08
(Note: 1.08 = 0.24 × 0.75 × 60)
5. Water temperature drop (F°) = $\frac{\text{actual BTU / hr}}{500 \times \text{USGPM}}$
6. CFM at FAT = CFM at 70°F × $\frac{460 + \text{FAT}}{530}$
7. CFM at 70°F = CFM at FAT × $\frac{530}{460 + \text{FAT}}$
8. Air temperature rise (F°) = $\frac{\text{actual BTU / hr}}{1.08 \times \text{CFM}}$
9. Final air temperature (°F) = EAT + Temp. Rise
10. 1 Boiler Horsepower = 33,479 BTU/hr. at 70 p.s.i.
11. 1 Boiler Horsepower = 30 lbs./hr. of feed water
at 100°F converted to steam at 70 p.s.i.
12. 1 U.S. Gallon of water = 8.34 pounds of water
13. 1 Imperial Gallon of water = 10 pounds of water
14. 1 p.s.i. pressure drop = 27.6 inches of water
15. 1 kW = 3,414 BTU/hr.
16. 1 U.S. Gallon = 0.83267 Imperial Gallons
17. 1 U.S. Gallon = 3.785 litres
18. °C = 5/9 (°F – 32)

EQUIVALENT RESISTANCE OF VALVES AND FITTINGS

Feet of Pipe

PIPE SIZE	GLOBE VALVE OPEN	GATE VALVE OPEN	CLOSE RETURN BEND	TEE 90° FLOW	TEE 0° FLOW	ELBOW 90° STANDARD	ELBOW 45° STANDARD	REDUCER D/d = 2
1"	27	1.1	6	6	1.7	2.6	1.3	1.0
1¼"	37	1.3	8	8	2.3	3.5	1.6	1.3
1½"	44	1.6	10	9	2.7	4.5	2.0	1.5
2"	55	2.2	13	12	3.5	5.3	2.5	1.9
2½"	65	2.7	15	14	4.2	6.3	3.0	2.2
3"	80	3.3	18	17	5.0	8.0	3.7	2.8

HEAT LOSS OF STEAM LINES

Heat loss of uncovered steam lines in a 15 MPH wind:

$$\text{BTU / hr.} = \text{td} \times \text{C} \times \text{S}$$

WHERE: td = temperature difference between steam and ambient air

C = 5.32 for 200 F° td
5.92 for 250 F° td
6.52 for 300 F° td
7.29 for 350 F° td
8.06 for 400 F° td

S = surface area of pipe in square feet

EXAMPLE: Calculate heat loss for one foot of 2" pipe at 316°F (70 PSI) steam temperature inside, with an ambient air temperature of -34°F outside.

td = 350 F° (-34°F to 316°F)

C = 7.29

$$\text{S} = \frac{2.375" \text{ O.D.} \times \pi \times 12"}{144 \text{ sq.in. / sq.ft.}} = 0.6218$$

$$\text{Heat Loss} = 350 \times 7.29 \times 0.6218 = 1587 \text{ BTU / hr.}$$

BABCOCK FORMULA FOR STEAM FLOW

$$\text{PRESSURE DROP (PSI)} = \frac{0.0001307W^2L}{p \cdot d^5} \left(1 + \frac{3.6}{d}\right)$$

WHERE: W = Steam Flow Rate, lb. per min.

L = Length of Pipe, ft.

p = 0.0434 for 2 PSIG Steam
0.0612 for 10 PSIG Steam
0.0855 for 20 PSIG Steam
0.1351 for 40 PSIG Steam
0.1818 for 60 PSIG Steam
0.2127 for 80 PSIG Steam
0.2564 for 100 PSIG Steam

d = Inside dia. of Pipe, in.

EXAMPLE: Calculate pressure drop for 100 ft. of 2" sch. 40 pipe used to deliver all the steam of a 100 h.p. boiler (3000 lb./hr.) at 80 PSI.

where: W = 50, L = 100, p = 0.2127, d = 2.067

$$\text{Pressure Drop (PSI)} = \frac{0.0001307 \times 50^2 \times 100}{0.2127 \times 2.067^5} \left(1 + \frac{3.6}{2.067}\right)$$

$$\text{Pressure Drop} = 11.16 \text{ PSI}$$

ENGINEER'S SPECIFICATIONS

Supply and install Ruffneck™ Heat-Exchanger Unit Heaters as shown on the following plans.

For FR-1 and HP-1 Series in fluid applications, including standard features listed below.

----- DESCRIPTION -----			----- PERFORMANCE -----		----- MOTOR -----			
Item	Quantity	Model	MBH @ PSI @ EAT	FAT	Type	Volts	Phase	Hertz

FR Series units shall be suitable for use on steam pressures to 100 PSI and shall be warranted against frost damage for a period of one year.

For HP-1, HP-3, HP-5, HP-7 Series in fluid applications, including standard features listed below.

For use on _____ (type of liquid)

----- DESCRIPTION -----			----- PERFORMANCE -----		----- MOTOR -----			
Item	Quantity	Model	MBH @ PSI @ EAT	FAT	Type	Volts	Phase	Hertz

HP series units shall be suitable for use on pressures up to _____ PSI (400 PSI available on select models) and shall be warranted for a period of one year.

Standard features for all models

Cabinet

Cabinet shall be an all-welded design of 14 GA steel (12 GA on model 36) and shall be 5-stage phosphate treated and finished with a powder coated green-grey epoxy. Louvre blades shall be adjustable heavy duty type. Motor mount shall be of heavy-duty formed steel construction.

Heat Exchanger

Shall be a heavy-duty welded steel construction using 5/8" dia. x .065" average wall thickness carbon steel tubing with tension wound close fitting .014" thickness x 7/16" high aluminum fins. Inlet and outlet connections are to be 2" NPT female extra heavy-duty steel type. Completed heat exchangers shall have heat resistant aluminum paint applied. The entire assembly shall be warranted for a period of one year against damage due to over-torquing.

Fan

Shall be an accurately balanced 3-wing design employing aluminum propeller blades, riveted to a steel hub, driven directly by the motor (size 36 models shall use a balance 6-wing, painted, all-steel, belt driven fan).

Fan Guard

The fan shall be shielded with a heavy-duty epoxy coated guard. To provide easy maintenance and cleaning of the fan and motor, the fan guard shall be of a two-piece construction. Gaps in guard not to exceed 1/4". (Size 36 models shall be welded design of perforated sheet steel, powder coated to match the heater).

Motor

Shall be UL listed and/or CSA approved permanently lubricated ball bearing type with rigid base (Type, voltage, phase, hertz, etc. as required).

The following information is to be used only as a general reference. For detailed information concerning hazardous location definitions and installation requirements, refer to either the 1999 National Electrical Code (NEC), Chapter 5 Articles 500 through 516, available from the National Fire Protection Association, or the 1998 Canadian Electrical Code (CEC), Part 1 Section 18, available from the Canadian Standards Association.

Hazardous Locations: Areas where fire or explosion hazards exist due to the possible presence of flammable gases or vapors, flammable liquids, combustible dusts, or ignitable fibers or flyings.

NEC and CE Classification System

Class I Locations A location where there is a danger of explosion due to the presence of a flammable gas or vapor.

Class II Locations A location where there is a danger of explosion due to the presence of a flammable dust.

Class III Locations A location where there is a danger of explosion due to the presence of flammable fibers or flyings.

Division 1 Locations A location where the hazard is expected to be present during normal operating conditions.

Division 2 Locations A location where the hazards would only exist as a result of an accident or other abnormal event, such as an accidental rupture of a vessel or container or failure of a ventilating system.

Class I Groups

Group A Atmospheres containing acetylene.

Group B Atmospheres containing hydrogen (H₂), fuel and combustible process gases containing more than 30% hydrogen by volume, or gases or vapors of equivalent hazard such as butadiene, ethylene oxide, propylene oxide, and acrolein.

Group C Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Group D Atmospheres containing acetone, alcohol, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methanol, methane, natural gas, propane, or gases or vapors of equivalent hazard.

Class II Groups

Group E Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present similar hazards in the use of electrical equipment.

Group F Atmospheres containing combustible carbonaceous dusts including coal, coke, carbon black, and charcoal dust having more than 8% total entrapped volatiles; or dusts that have been sensitized by other materials so that they present an explosion hazard.

Group G Atmospheres containing combustible dusts not included in Group E or F, including flour, starch, grain, wood, plastic, and chemicals.

Hazardous Locations Definitions

CENELEC (and IEC) Zone Classification System

Introduced to North America in 1996, the European CENELEC (and IEC) system of classification of hazardous locations is also permitted to apply to installations in the U.S. and Canada as an alternative in Class I Locations, and is now part of the NEC (Article 505) and CE Code (Section 18).

- Class I, Zone 0** A location in which explosive gas atmospheres are present continuously or for long periods of time.
- Class I, Zone 1** A location in which explosive gas atmospheres are likely to exist in normal operation or may exist frequently because of repairs, maintenance operations, and leakage or where equipment breakdowns could release gases or vapors and also cause simultaneous failure of electrical equipment in a mode to cause the electrical equipment to become a source of ignition.
- Class I, Zone 2** A location in which explosive gas atmospheres are not likely to occur in normal operation and, if they do occur, will exist for a short time only; or where volatile flammable liquids, flammable gas, or flammable vapors are handled, processed, or used, but are normally confined within closed containers or systems from which they can escape only as a result of accidental rupture or breakdown of the containers or system, or as a result of abnormal operation of the equipment with which the liquids or gases are handled, processed, or used; or where ignitable concentrations of flammable gases or vapors are normally prevented by adequate ventilation, but which may occur as a result of failure or abnormal operation of the ventilation system.

Class I Groups

- Group I** Atmospheres containing explosive gas in underground coal mines. Electrical apparatus that is intended for use in underground mines.
- Group IIC** Atmospheres containing acetylene, hydrogen (H_2), or gases of equivalent hazard.
- Group IIB** Atmospheres containing acetaldehyde, ethylene, or gases or vapors of equivalent hazard.
- Group IIA** Atmospheres containing acetone, ammonia, ethyl alcohol, gasoline, methane, propane, or gases or vapors of equivalent hazard.

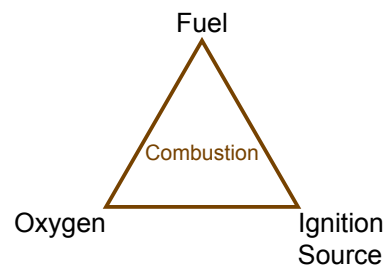
Note: There is potential for confusion between the NEC/CE and IEC gas classification systems since the Group letters are reversed and even combined. Care should also be taken to avoid confusing Group II and Class II, since both use Roman numerals. An unintended result of specifying the IEC gas groups, which combine the traditional Groups A and B into Group IIC, is that equipment approved for hydrogen (H_2) would also have to be approved for acetylene. Since very little equipment is designed for acetylene, the wording as originally adopted severely limits the availability of equipment for hydrogen applications. As a result, NEC Section 505-7(d) now allows for equipment to be listed for a specific gas or vapor, specific mixtures of gases or vapors, or any specific combination of gases or vapors. One common example is equipment marked for "IIB + H_2 ". At present, the NEC or CE Code does not recognize any CENELEC or IEC dust classifications.

Combustion Principles

Three basic conditions must be satisfied for a fire or explosion to occur. First, a flammable liquid, vapor or combustible dust must be present in sufficient quantity. Second, the flammable liquid, vapor or combustible dust must be mixed with air or oxygen in the proportions required to produce an explosive mixture. Finally, a source of energy must be applied to the explosive mixture.

In applying these principles, the quantity of the flammable liquid or vapor that may be liberated and its physical characteristics must be recognized. Vapors from flammable liquids also have a natural tendency to disperse into the atmosphere, and rapidly become diluted to concentrations below the lower explosion limit, particularly when there is natural or mechanical ventilation. In order to have an explosive gas atmosphere, the concentration of the gas or vapor must be above the Lower Explosive Ignition Limit (LEL) but below the Upper Explosive Limit (UEL). The possibility that the gas concentration may be above the upper explosion limit does not afford any degree of safety, as the concentration must first pass through the explosive range to reach the upper explosion limit.

Combustion Triangle



Equipment Marking Requirements

Electrical equipment permitted for use in hazardous locations must be marked to show the Class, Division (or Zone under NEC Article 505 and CEC Section 18), Group, and maximum surface operating temperature or temperature code referenced to a 40°C (104°F) ambient temperature (some exceptions apply). Note that the maximum external temperature of the equipment shall not exceed the minimum ignition temperature of the atmosphere that the equipment is located in.

Electrical equipment approved for operation at ambient temperatures exceeding 40°C shall be marked with the maximum ambient temperature for which the equipment is approved, and the operating temperature or temperature range at that ambient temperature.

Equipment not marked to indicate a division, or marked "Division 1" or "Div. 1", is suitable for both Division 1 and 2 locations. Equipment marked "Division 2" or "Div. 2" is suitable for Division 2 locations only. Equipment that is listed for a Zone 0 location shall be permitted in a Zone 1 or Zone 2 location of the same gas or vapor. Equipment that is listed for a Zone 1 location shall be permitted in a Zone 2 location of the same gas or vapor.

Maximum Surface Temperature Codes

Maximum Surface Temperature °C (°F)	Identification Number	
	NEC/CEC T-Code	IEC T-Code
450°C (842°F)	T1	T1
300°C (572°F)	T2	T2
280°C (536°F)	T2A	
260°C (500°F)	T2B	
230°C (446°F)	T2C	
215°C (419°F)	T2D	
200°C (392°F)	T3	T3
180°C (356°F)	T3A	
165°C (329°F)	T3B	
160°C (320°F)	T3C	
135°C (275°F)	T4	T4
120°C (248°F)	T4A	
100°C (212°F)	T5	T5
85°C (185°F)	T6	T6

TERMS AND CONDITIONS OF SALE

PRICING: Although we must reserve the right to change prices without notice, our policy is to give a minimum of 30 days advance notice of price change to published lists. Unless otherwise stated, prices include the Company's standard packaging for domestic shipment only.

MINIMUM BILLING: The Company does not have a minimum billing policy. However, no discounts apply for orders with a list price of less than \$100.00.

SALES TAX: Sales or similar taxes are not included in published price lists.

ACCEPTANCE: Where deemed necessary the Company reserves the right to accept or reject any order from any customer.

TERMS: Standard terms of sale are NET 30 days, on approved credit. Interest of 2% per month (24% per annum) may be charged on overdue accounts. Shipments to non-credit approved customers shall be C.O.D. or C.W.O. as appropriate.

DELIVERY: All orders are accepted subject to delays in shipment which may be caused by fires, labour disputes, accidents, floods, embargos, shortage of cars, fuel, material or labour, or any other contingencies or acts of God beyond the control of the Company.

CANCELLATIONS: Requests for cancellation of orders will be honored subject to acceptance of cancellation charges. Such charges will be determined by the Company at the time of request for cancellation.

CLAIMS: At the time of shipment, the Company receives the carrier's receipt of shipment in good order after which it is the responsibility of the purchaser to promptly place all claims on the carrier for goods lost or damaged in transit. Any other claims, if made to the Company, must be made within 30 days after receipt of shipment.

RETURN OF MATERIAL: Products may not be returned without written authorization from the sales office or factory, and then only in accordance with the Company's terms and conditions. Normally, returns of standard catalog products will be subject to a minimum 25% restocking charge. Specialty or custom manufactured products will not be considered for restocking. Any repairs or reconditioning necessary to put material in a resalable condition will be charged extra. All returned products must be in first class condition and in their original container. Materials are to be shipped prepaid to the location address as authorized.

WARRANTY

CCI Thermal warrants to the purchaser of each new product that any part thereof which proves to be defective in material or workmanship under normal use within 18 months of the date of shipment, or 12 months (FX5, FX4 & FE1 for 36 months only) from the date of start operation (whichever occurs first) will be repaired or replaced without charge. Any such defect should be brought to the attention of the Company's office from which the product was purchased, which is authorized to furnish repair or replacement within the terms of this warranty.

The company will not be responsible for any expenses incurred in installation, removal from service, transportation cost, or for damages of any type whatsoever, including incidental or consequential damages. Some states or provinces do not allow exclusion or limitation of incidental or consequential damages so the preceding exclusion or limitation may not be applicable to you.

Since we cannot anticipate or control the conditions under which our products may be used, we accept no responsibility for the safety and suitability of our products when used alone or in combination with other products. Tests for safety and suitability of the products should be done by the user.

This warranty will not apply if, in the judgement of the company, damage or failure has resulted from accident, alteration, misuse, abuse or operation on an incorrect power supply. The foregoing is in lieu of other warranties expressed or implied. CCI Thermal neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the said product.

Since the paint finish may be damaged in use, no warranty applies to such Paint finish except for manufacturing defects which become apparent within 30 days from the date of installation.

CORROSION

Heaters are not guaranteed against damage caused by corrosion.

LIABILITY

Technical data contained in the catalog is subject to change without notice. The Company will endeavor to supply the equipment as illustrated but reserves the right to make dimensional and other design changes as required.



CCI Thermal
Technologies Inc.

A Leader in Advanced Heating Solutions

MISSION STATEMENT

To be recognized as a world-wide industry leader in our core competencies;

To build and maintain a loyal customer base through dedicated customer service;

To provide our customers with broad based industry knowledge, expertise and products;

To promote continuous improvement in all existing product lines and develop and market a wide range of quality products through a commitment to research and development;

To maintain strict quality control standards in all manufactured products;

To support a human resource program that provides ongoing training and development of all employees;

To create an internal work environment that supports teamwork, safety and quality control.



Cata-DyneTM

Explosion-Proof Gas Catalytic Heaters



RuffneckTM

Heaters for the Harshest Environments



CaloritechTM

Engineered Electric Heat



NorsemanTM

Electric Explosion-Proof Heaters



DriQuikTM

Curing Solutions

For more information on CCI Thermal Technologies Inc. and our products,
please visit us at:

www.ccithermal.com



RuffneckTM



Ruffneck™

Heaters for the Harshest Environments

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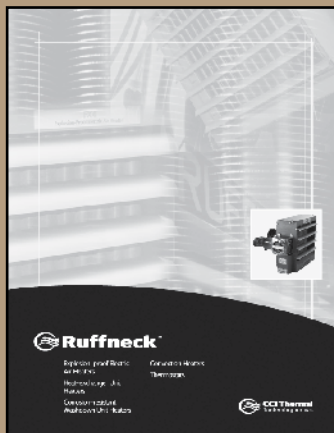
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