

## 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. Even the core can be removed without disturbing the heater mounting arrangement or electrical

connections. 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). Pressure ratings are based on a nominal, 5:1 safety factor and all units are 100% leak tested.

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.

Epoxy coated 14-gauge steel cabinet construction

2" NPT Female connections allow for easy core removal. Optional flanged connections available

Tension wound close fitting aluminum finned tubes

Heresite® coating available

Choose from several types of motors. TEFC or explosion-proof.

UL listed and/or CSA approved. 50 or 60 Hertz motors.

Full-enclosure fan guard featuring narrow spacing

**1-YEAR WARRANTY**

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

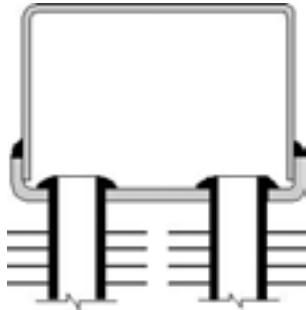
## Model Coding

FR	1	12	EP	240	1	60
<b>MODEL SERIES</b> FR - FROST RESISTANT HP - HIGH PRESSURE	<b>TUBESIDE PASSES</b> 1 - 1 PASS 3 - 3 PASS* 5 - 5 PASS* 7 - 7 PASS**	<b>FAN SIZE</b> 12 - 12" 16 - 16" 20 - 20" 24 - 24" 30 - 30" 36 - 36"	<b>OPTIONS</b> EP - EXPLOSION-PROOF MOTOR GP - GENERAL PURPOSE MOTOR C - HERESITE® CORE & CABINET C1 - HERESITE® CABINET C2 - HERESITE® CORE	<b>VOLTS</b> 115 208 220 230 380 440 460 575	<b>PHASE</b> 1 3	<b>HERTZ</b> 50 60

\* Available for HP Series only  
 \*\* Available for HP24, HP30 & Hp36 inch fan sizes only  
 Contact the factory for pricing and delivery on Heresite® coated units  
 Contact the factory for other available motors

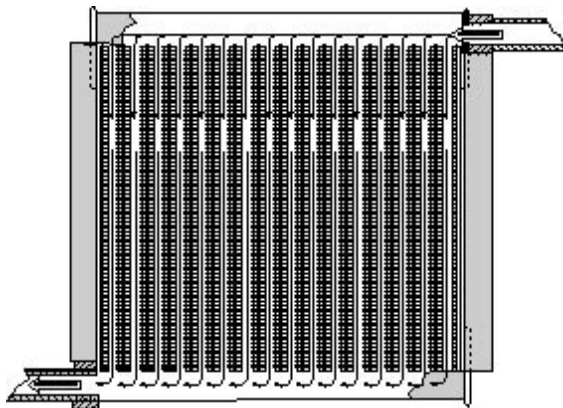
**HP/FR Single-Pass & Multi-Pass**

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 allows the heaters to be frozen several times without serious damage. These features are 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.



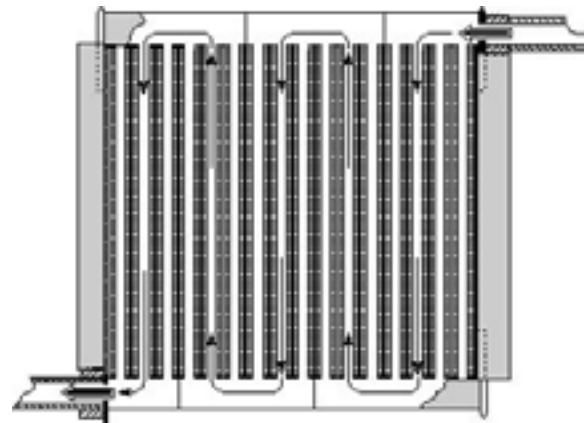
**Single-Pass for FR and HP Series**

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 50Hz 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	110.7	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 50Hz 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 50Hz 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	974.2	924.8	876.3	828.8	782.1	736.3	691.3	647.2	603.8
		COND. (LBS./HR)	1069	1016	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	1062.	1012	962.3	913.6	866.0	819.1	773.2	728.0	683.7
		COND. (LBS./HR)	1177	1122	1069	1016	964.7	914.3	864.9	816.3	768.6	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	1186	1134	1083	1033	983.7	935.6	888.3	841.8	796.2
		COND. (LBS./HR)	1337	1279	1223	1168	1114	1061	1009	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	1275	1222	1169	1118	1068	1019	970.7	923.4	876.9
		COND. (LBS./HR)	1459	1399	1341	1283	1227	1172	1118	1065	1013	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	1350	1296	1243	1191	1140	1090	1041	992.8	945.6
		COND. (LBS./HR)	1563	1502	1442	1382	1325	1268	1212	1158	1104	1051
		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	1412	1357	1303	1251	1199	1149	1099	1050	1002
		COND. (LBS./HR)	1654	1591	1529	1468	1409	1350	1293	1237	1182	1128
		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	1536	1480	1425	1371	1318	1266	1215	1165	1116
		COND. (LBS./HR)	1844	1777	1712	1648	1586	1524	1464	1405	1347	1290
		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	1629	1572	1516	1461	1407	1354	1302	1251	1201
		COND. (LBS./HR)	1997	1927	1859	1793	1727	1664	1601	1539	1479	1420
		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	1714	1656	1598	1543	1488	1434	1381	1330	1279
		COND. (LBS./HR)	2144	2071	2001	1932	1864	1797	1732	1668	1606	1544
		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

CHANGE IN GLYCOL TEMPERATURE		ENTERING GLYCOL TEMPERATURE															
		180°F				200°F				220°F				240°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	OUTPUT MBH	FLOW USGPM
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	114	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 50Hz 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 Imperial?**

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

## HP/FR Heat Exchanger Capacities - Water 60°F EAT

CHANGE IN GLYCOL TEMPERATURE		ENTERING GLYCOL TEMPERATURE															
		180°F				200°F				220°F				240°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	OUTPUT MBH	FLOW USGPM
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	-	-	-	-	248.6	24.2	128.2	4.67	285.2	27.6	138.5	6.08
	20	175.1	17.1	107.7	2.40	211.9	20.6	117.9	3.44	213.4	10.4	118.2	0.91	250.7	12.1	128.67	1.23
	40	138.2	6.74	97.4	0.40	175.8	8.56	107.8	0.63	-	-	-	-	-	-	-	-
HP7-24	10	-	-	-	-	-	-	-	-	253.6	24.6	129.6	13.1	-	-	-	-
	20	180.4	17.6	109.2	6.82	217.1	21.2	119.4	9.72	222.2	10.8	120.7	2.63	259.3	12.6	131.0	3.53
	40	147.5	7.20	100.0	1.22	184.9	9.01	110.3	1.86	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	361.5	35.2	134.1	6.90	413.4	40.1	145.1	8.91
	20	257.1	25.2	112.3	3.62	309.3	30.2	123.2	5.14	316.2	15.4	124.6	1.40	369.2	17.9	135.7	1.87
	40	209.5	10.2	102.4	0.65	263.0	12.8	113.5	1.00	-	-	-	-	-	-	-	-
HP7-30	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	263.1	25.8	113.6	10.2	-	-	-	-	326.2	15.9	126.6	3.98	378.8	18.4	137.7	5.28
	40	220.1	10.8	104.6	1.91	273.3	13.3	115.6	2.86	-	-	-	-	-	-	-	-
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

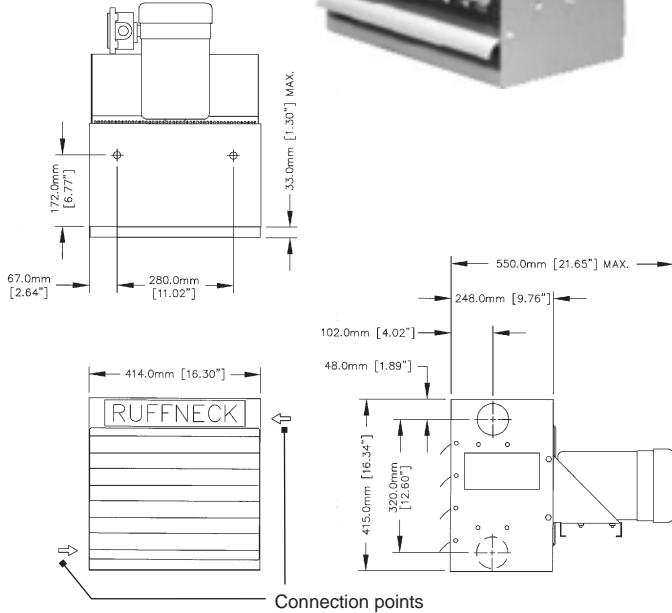
\* - HP and FR single-pass heaters are not recommended for liquid service. In many cases, a smaller HP multi-pass model would be a more economical choice.

**Note:** For 50Hz 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](http://www.ccithermal.com)

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



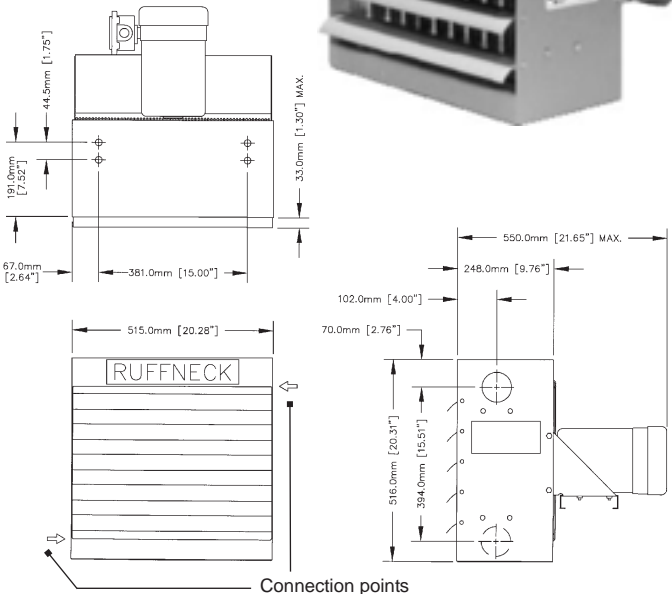
**General**

Air Delivery*	997 CFM
Air Velocity*	1147 FPM
Air Throw*	40 ft. @ 15 PSI stream
Propeller Fan	3 Wing Aluminum, 12" Dia. x 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**

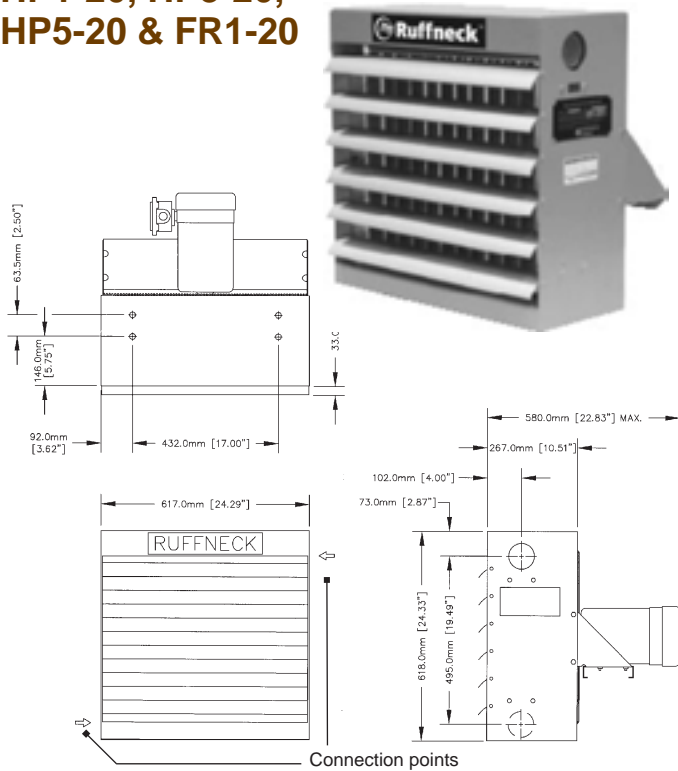
Air Delivery*	1588 CFM
Air Velocity*	1069 FPM
Air Throw*	60 ft. @ 15 PSI Stream
Propeller Fan	3 Wing Aluminum, 16" Dia. x 5/8" Bore
Motor Requirements	1/4 HP, 1725 RPM, Frame 56
	Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy
	1/4" probe will 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 Connections	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



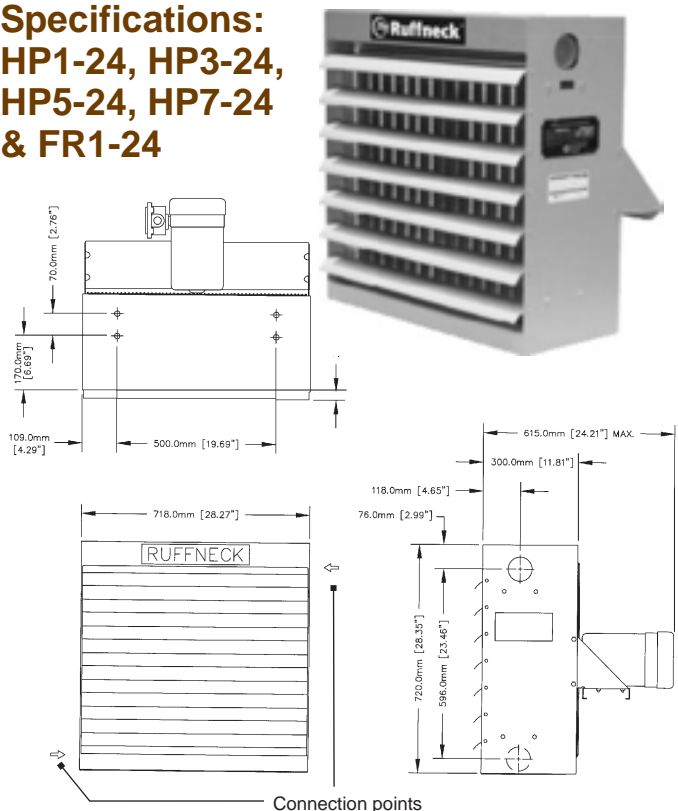
### General

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 Connections	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

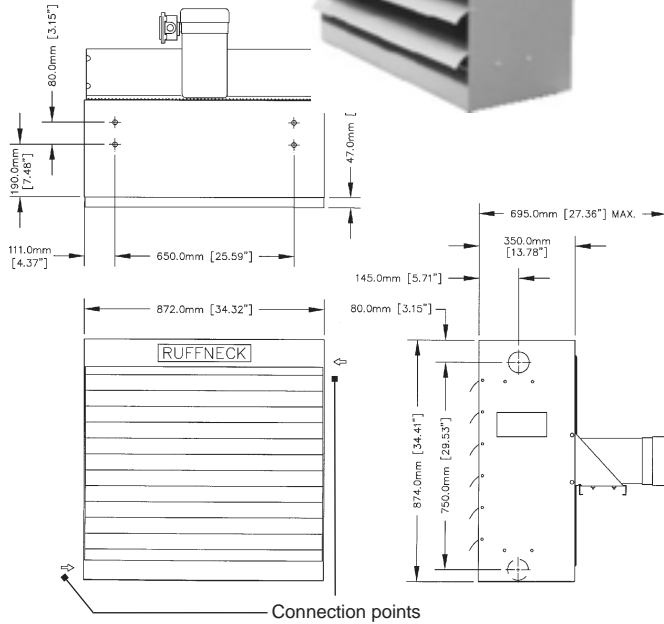
Air Delivery*	3405 CFM
Air Velocity*	981 FPM
Air Throw*	70 ft. @ 15 PSI stream
Propeller Fan	3 Wing Aluminum, 24" Dia. x 5/8" Bore
Motor Requirements	1/2 HP, 1725 RPM, Frame 56
	Rigid Base (Specify enclosure type, voltage, cycle and phase.)
Fan Guard	Welded, Wire, Powder Coated Epoxy
	7/16" probe will 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 Connections	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**



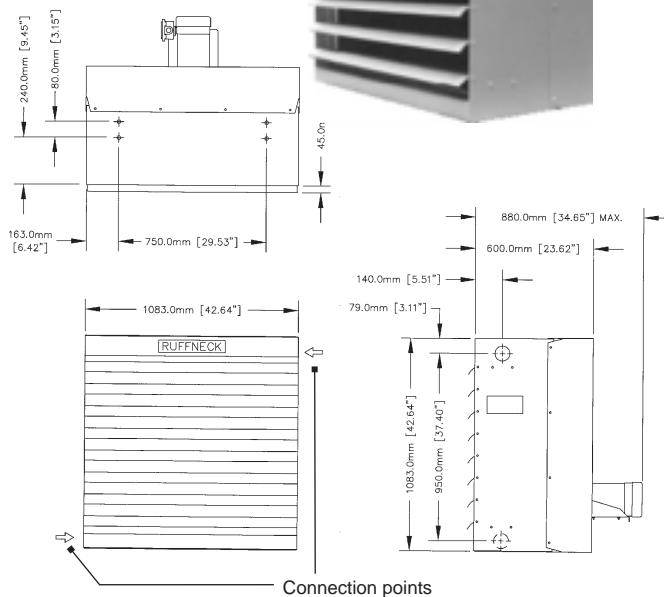
**General**

Air Delivery*	4569 CFM
Air Velocity*	814 FPM
Air Throw*	70 ft. @ 15 PSI stream
Propeller Fan	3 Wing Aluminum, 30" Dia. x 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 Connections	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,  
& FR1-36**



**General**

Air Delivery*	7830 CFM
Air Velocity*	852 FPM
Air Throw*	65 ft. @ 15 PSI Stream
Propeller Fan	6 Wing Aluminum, 36" Dia. x 1" Bore
Motor Requirements	1 1/2 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 Connections	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