IBC®

INSTALLATION AND OPERATING MANUAL

HPX™

Hydronic Heat Pump

HPX 3 (3 ton model #IHEXXF1-003T)
HPX 5 (5 ton model #IHEXXF1-005T)

WARNING

Risk of Electric shock. If the information in this manual is not followed exactly, a fire or electricution may result causing property damage, personal injury, or loss of life.

Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance.

C ETL LISTED US

Water quality

Warning

Water quality has a significant impact on the lifetime and performance of a boiler's heat exchanger.

Improperly prepared water in a heating circuit may cause damage to the heat exchanger through fouling or corrosion. Repeated or uncontrolled water fills will increase the potential for damage.

High levels of dissolved solids or minerals may precipitate out of the fluid onto the hottest part of the heat exchanger, impairing heat transfer and resulting in overheating and premature failure. The amount of solids that may form on the heat exchanger will depend on the degree of hardness and the total water volume in the system. A high water volume system with a low hardness count may cause as much damage as a system with less volume and higher hardness, so it is recommended to treat water so as to reduce dissolved solids to the minimum 10 ppm, and to no more than 30 ppm. Water chemistry allowable limits are as follows:

- TDS 0.6 to 1.75 grains/ gal (10 to 30 ppm)
- Acidity pH is to be between 6.6 and 8.5
- Chloride is to be less than 125 mg/l
- Iron is to be less than 0.3 mg/l
- Cu less than 0.1 mg/l
- Conductivity is to be less than 400µS/cm at 77°F (25°C)

Important: Ensure that these limits are acceptable for the other water-side components in the system.

Shipped with the heat pump:

- 1 x remote display, P-1900
- 1 x remote display extension cable (33'), P-1904
- 1 x buffer tank temperature sensor (33', ⦰ 3/8"), P-1902
- 4 x rubber feet

Contents

Intentionally left empty

Safety information

2.0 Manual safety markings

Danger

Points out an immediate hazardous situation that must be avoided to prevent serious injury or death.

Warning

Points out a potential hazardous situation that must be avoided to prevent serious injury or death.

Caution

Points out a potential hazardous situation that must be avoided to prevent possible moderate injury and/or property damage.

Note

Points out installation, maintenance and operational notes to enhance efficiency, longevity and proper operation of the hydronic heat pump.

Important safety instructions

Installation, start-up and servicing of IBC hydronic heat pumps must be performed by competent, qualified, licensed and trained technicians.

Failure to read and comply with all instructions and applicable national and local codes may result in hazardous conditions that could result in property damage and injury to occupants, and in extreme cases to death. Keep instructions near the appliance for future reference.

Danger

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance. If you smell gas vapors, do not try to operate any appliance - do not touch any electrical switch or use any phone in the building.

Warning

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

Warning

Do not use this hydronic heat pump if any part has been under water. Immediately call a qualified service technician to inspect the hydronic heat pump and to replace any part of the system that has been under water.

Warning

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, or loss of life. Read and understand the entire manual before attempting installation, start-up, operation, or service. Installation and service must be performed only by an experienced, skilled installer or service agency.

Failure to follow all instructions in the proper order can cause personal injury or death. Read all instructions, including all those contained in component manufacturers' manuals before installing, starting up, operating, maintaining, or servicing the appliance.

Warning

Disconnect power supply before any wiring/service is performed. Failure to do so could result in damage to appliance and/or electric shock.

Caution

The hydronic heat pump must be installed so that electrical components are not exposed to water during operation.

Known contaminants

Known Corrosive Contaminants to Avoid	
Salt air of ocean-front properties	Calcium chloride used for snow clearing
Cements and glues	Sodium chloride or potassium chloride used for water softening
Paint or varnish removers	Chemicals in perming solutions
Adhesives used to fasten building products and other similar products	Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Chlorinated waxes or cleaners	Chlorofluorocarbon chemicals found in spray cans
Chlorine-based swimming pool chemicals	Antistatic dryer sheets in clothes dryers
Hydrochloric acid or muriatic acid used in household cleaning and stain removal	

3.0 Specifications

Hydronic Heat Pump Specifications	HPX 3	HPX 5
Rated Voltage / Frequency / Phase	208/230V 60Hz 1Ph	
Heating Capacity Range *	9.6 - 44.2 MBH	14.4 - 56.6 MBH
Heating Capacity Range *	2.8 - 12.9 kW	4.2 - 16.6 kW
Cooling Capacity Range **	15.5 - 34.5 MBH	21.4 - 47.6 MBH
Cooling Capacity Range **	4.55 - 10.1 kW	6.3 - 14.0 kW
Total Load (@240V)	20.3 A	26.6 A
Noise measured at 1 meter	38 - 52 dB (A)	42 - 53 dB (A)
Weight (empty)	220 lb / 100 kg	320 lb / 145 kg
Compressor Rating Load	19.5 A	25 A
Fan Motor Rating Load	0.8 A	2 x 0.8 A
Minimum Circuit Ampacity	25.2 A	33 A
Max Fuse Size	40 A	50 A
Rated Water Flow	6.6 gpm / 1.5 m^3/h	7.5 gpm / 1.7 m^3/h
Water Pressure Drop (Head Loss)	7 feet / 2.1 m	9 feet / 2.7 m
Maximum Outlet Water Temp. (electronic hi-limit)	140°F/ 60°C	
Design Water Pressure	30 psig / 207 kPa	
Maximum Water Pressure	145 psig / 1,000 kPa	
Minimum Water Pressure	8 psig / 55 kPa	
Minimum Ambient Temperature	-22°F / -30°C	
Maximum Refrigerant Pressure (low side)	305 psig / 2.1 MPa	
Maximum Refrigerant Pressure (high side)	638 psig / 4.4 MPa	
Maximum Allowable Refrigerant Pressure	696 psig / 4.8 MPa	725 psig / 5.0 MPa
Refrigerant Type and Charge	R410a / 2.2 kg	R410a / 2.5 kg
Refrigerant Safety Group Classification	A1	
Moisture Resistance	IPX4	

* for conditions Ambient Temp = 45°F (7°C), Outlet Water Temp = 106°F (41°C)

** for conditions Ambient Temp = 95°F (35°C), Outlet Water Temp = 54°F (12°C)

Table 1 *Specifications*

3.1 Cabinet dimensions

HPX-Series dimensions

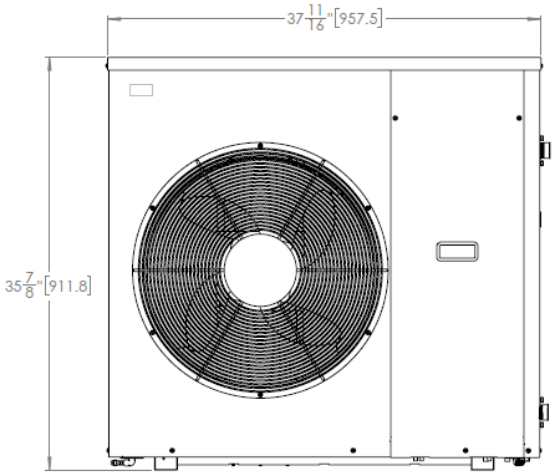

Figure 1 *Front view- HPX 3*

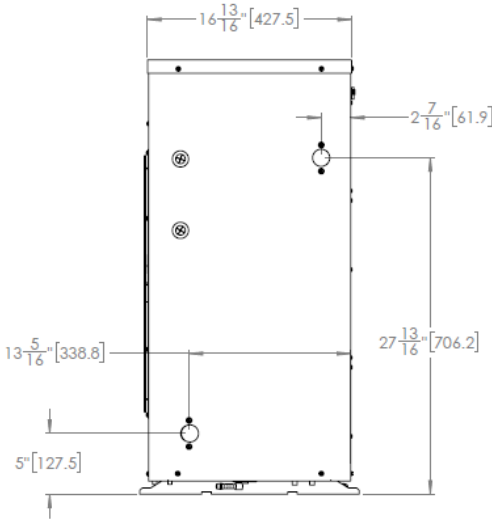

Figure 2 *Side view- HPX 3*

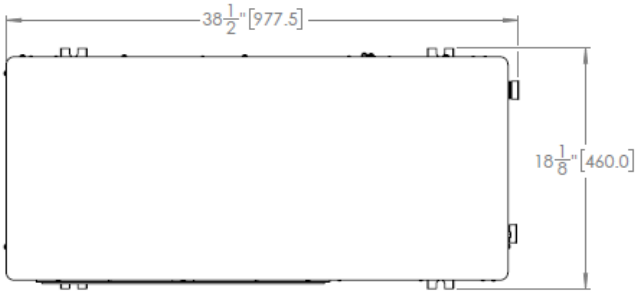

Figure 3 *Top view- HPX 3*

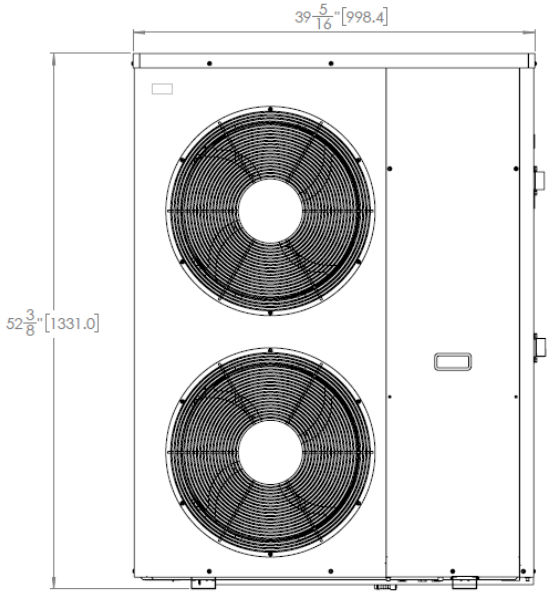

Figure 4 *Front view- HPX 5*

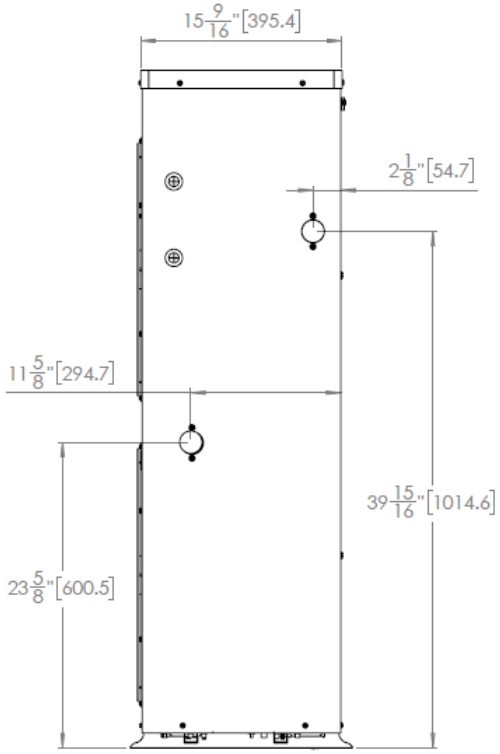

Figure 5 *Side view - HPX 5*

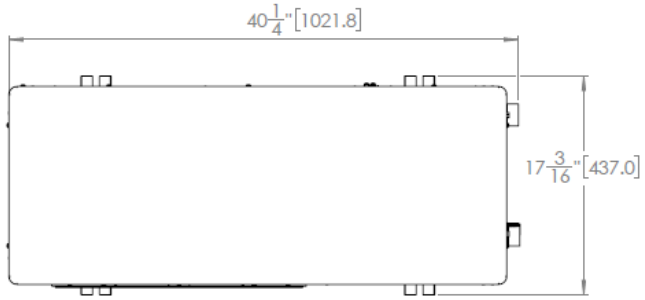

Figure 6 *Top view- HPX 5*

3.2 Connection specifications

Description	HPX 3	HPX 5
Return water inlet	1" NPT-M	1¼" NPT-M
Supply water outlet	1" NPT-M	1¼" NPT-M
Supply power knock-out	Dual 3/4" and 1"	
Control wiring knock-out	1/2"	

Table 2 *Connections*

3.3 Capacities and COPs

HPX 3 Heating Capacity, 30 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	/	/	9,700	10,200	10,700	11,100	12,100	12,800	13,600	14,400	15,600	16,100	17,300	18,500	19,800	21,200	22,600
	106 [41]	/	/	9,200	9,600	10,000	10,300	10,900	12,000	12,700	13,600	15,000	15,500	16,600	17,800	19,000	20,300	21,800
	113 [45]	/	/	8,600	9,000	9,400	9,700	10,200	11,300	12,200	12,900	14,400	14,900	16,000	17,100	18,300	19,600	21,000
	122 [50]	/	/	8,000	8,300	8,600	8,900	9,400	10,700	11,600	12,500	13,600	14,100	15,100	16,100	17,300	18,500	19,800
	131 [55]	/	/	7,600	8,000	8,300	8,500	9,000	10,100	11,300	12,000	13,100	13,600	14,600	15,600	16,700	17,800	19,100
	140 [60]	/	/	7,000	7,200	7,500	7,800	8,200	9,200	10,800	11,400	12,600	13,100	14,000	15,000	16,000	17,100	18,300
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 30 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	/	/	2.85	2.98	3.15	3.25	3.54	3.75	3.98	4.23	4.56	4.73	5.06	5.41	5.79	6.2	6.63
	106 [41]	/	/	2.71	2.82	2.94	3.03	3.19	3.51	3.72	3.99	4.38	4.55	4.87	5.21	5.57	5.96	6.38
	113 [45]	/	/	2.53	2.64	2.75	2.83	2.98	3.32	3.57	3.78	4.22	4.38	4.68	5.01	5.36	5.74	6.14
	122 [50]	/	/	2.34	2.43	2.53	2.61	2.75	3.13	3.41	3.65	3.98	4.13	4.42	4.73	5.06	5.41	5.79
	131 [55]	/	/	2.24	2.34	2.43	2.50	2.64	2.95	3.31	3.52	3.85	3.99	4.27	4.57	4.89	5.23	5.6
	140 [60]	/	/	2.04	2.12	2.21	2.28	2.4	2.71	3.16	3.35	3.69	3.83	4.1	4.39	4.69	5.02	5.37
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 COP, 30 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	/	/	2.94	3.02	3.10	3.12	3.32	3.42	3.52	3.68	3.84	3.94	4.16	4.34	4.54	4.74	4.96
	106 [41]	/	/	2.50	2.54	2.60	2.64	2.70	2.90	3.00	3.20	3.38	3.45	3.65	3.85	4.05	4.25	4.40
	113 [45]	/	/	2.10	2.14	2.18	2.22	2.26	2.46	2.62	2.72	2.94	3.04	3.20	3.34	3.54	3.68	3.84
	122 [50]	/	/	1.84	1.88	1.90	1.92	1.98	2.20	2.36	2.48	2.64	2.72	2.86	3.02	3.18	3.32	3.46
	131 [55]	/	/	1.64	1.66	1.70	1.70	1.74	1.90	2.08	2.18	2.32	2.40	2.52	2.66	2.80	2.92	3.04
	140 [60]	/	/	1.40	1.42	1.46	1.46	1.50	1.66	1.90	1.98	2.14	2.22	2.34	2.46	2.60	2.74	2.86
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 60 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	16,800	18,700	20,700	22,800	24,400	25,900	28,600	30,800	31,700	32,700	33,600	33,800	34,800	35,800	36,800	37,900	38,900
	106 [41]	16,400	18,300	20,200	22,300	24,000	25,400	28,000	30,200	31,200	31,800	32,300	32,500	33,500	34,500	35,500	36,500	37,500
	113 [45]	15,700	17,600	19,500	21,500	23,100	24,600	27,100	29,200	30,200	30,800	31,300	31,500	32,400	33,400	34,400	35,300	36,400
	122 [50]	15,100	16,900	18,800	20,700	22,300	23,700	26,200	28,300	29,200	29,800	30,200	30,400	31,400	32,300	33,300	34,200	35,200
	131 [55]	14,400	16,200	18,100	20,000	21,500	22,900	25,400	27,400	28,300	28,800	29,300	29,500	30,400	31,300	32,200	33,200	34,200
	140 [60]	13,600	15,300	17,100	19,000	20,500	21,800	24,200	26,200	27,000	27,600	28,000	28,200	29,100	30,000	30,900	31,800	32,800
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 60 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	4.92	5.48	6.06	6.67	7.16	7.59	8.37	9.02	9.30	9.58	9.83	9.90	10.19	10.49	10.79	11.10	11.41
	106 [41]	4.81	5.36	5.93	6.54	7.02	7.44	8.21	8.86	9.13	9.32	9.46	9.52	9.81	10.10	10.39	10.69	11.00
	113 [45]	4.61	5.15	5.72	6.31	6.78	7.20	7.94	8.57	8.84	9.02	9.16	9.22	9.50	9.78	10.07	10.36	10.66
	122 [50]	4.42	4.94	5.50	6.08	6.54	6.94	7.68	8.29	8.55	8.72	8.86	8.92	9.19	9.46	9.75	10.03	10.33
	131 [55]	4.23	4.75	5.29	5.87	6.31	6.70	7.43	8.03	8.28	8.44	8.58	8.64	8.90	9.17	9.45	9.73	10.01
	140 [60]	3.99	4.49	5.02	5.58	6.01	6.40	7.10	7.68	7.92	8.08	8.20	8.26	8.52	8.78	9.05	9.32	9.60
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 COP, 60 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	2.60	2.86	3.12	3.40	3.60	3.78	4.10	4.34	4.42	4.50	4.56	4.56	4.66	4.76	4.84	4.96	5.06
	106 [41]	2.46	2.68	2.92	3.14	3.32	3.46	3.74	3.98	4.08	4.12	4.12	4.12	4.20	4.30	4.38	4.48	4.58
	113 [45]	2.20	2.40	2.62	2.84	2.98	3.12	3.38	3.60	3.68	3.74	3.72	3.72	3.80	3.90	3.98	4.06	4.14
	122 [50]	2.02	2.22	2.42	2.64	2.78	2.90	3.16	3.36	3.44	3.48	3.48	3.48	3.56	3.64	3.70	3.78	3.86
	131 [55]	1.80	1.98	2.16	2.36	2.50	2.62	2.84	3.02	3.10	3.14	3.12	3.14	3.20	3.28	3.34	3.42	3.48
	140 [60]	1.60	1.76	1.94	2.12	2.24	2.36	2.56	2.74	2.80	2.84	2.82	2.84	2.90	2.96	3.02	3.10	3.16
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 80 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	23,900	25,700	27,600	29,700	31,900	33,200	35,300	37,600	39,400	41,300	43,880	44,700	47,100	49,600	51,600	53,700	55,700
	106 [41]	20,500	22,000	23,700	25,500	27,400	29,800	32,200	34,300	35,800	37,500	40,366	41,700	43,900	46,200	49,700	52,300	54,200
	113 [45]	19,500	21,000	22,500	24,200	26,000	28,500	30,900	32,900	34,400	36,000	38,553	39,600	41,700	43,900	46,800	49,200	51,000
	122 [50]	18,500	19,900	21,400	23,000	24,700	26,600	28,700	30,500	31,900	33,400	35,831	37,000	38,900	41,000	43,900	46,200	47,900
	131 [55]	17,600	18,900	20,300	21,800	23,500	25,100	27,100	28,800	30,100	31,500	33,773	34,900	36,700	38,600	41,000	43,200	44,800
	140 [60]	16,700	17,900	19,300	20,700	22,300	23,300	24,900	26,500	27,700	28,900	30,975	31,900	33,600	35,300	37,900	39,900	41,300
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3.]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 80 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	6.99	7.52	8.09	8.70	9.35	9.72	10.36	11.03	11.54	12.09	12.86	13.11	13.80	14.53	15.12	15.75	16.32
	106 [41]	6.01	6.46	6.95	7.47	8.03	8.72	9.44	10.04	10.50	10.99	11.83	12.23	12.87	13.55	14.56	15.32	15.88
	113 [45]	5.71	6.14	6.60	7.09	7.63	8.35	9.07	9.65	10.09	10.56	11.30	11.61	12.22	12.86	13.71	14.43	14.95
	122 [50]	5.42	5.83	6.27	6.74	7.25	7.79	8.41	8.94	9.35	9.78	10.50	10.84	11.41	12.01	12.86	13.54	14.03
	131 [55]	5.15	5.54	5.95	6.40	6.88	7.36	7.93	8.44	8.82	9.22	9.90	10.22	10.75	11.32	12.03	12.66	13.12
	140 [60]	4.89	5.26	5.66	6.08	6.54	6.83	7.30	7.77	8.11	8.48	9.08	9.35	9.84	10.36	11.10	11.69	12.11
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3.]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 COP, 80 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	2.22	2.36	2.48	2.64	2.80	2.86	3.00	3.14	3.24	3.34	3.48	3.50	3.62	3.74	3.80	3.88	3.96
	106 [41]	1.88	2.00	2.10	2.24	2.38	2.56	2.70	2.84	2.92	3.02	3.16	3.24	3.34	3.44	3.64	3.74	3.80
	113 [45]	1.76	1.86	1.96	2.06	2.22	2.40	2.54	2.68	2.76	2.86	2.96	3.02	3.12	3.24	3.38	3.50	3.54
	122 [50]	1.62	1.72	1.82	1.92	2.06	2.18	2.32	2.42	2.52	2.60	2.72	2.78	2.88	3.00	3.14	3.24	3.30
	131 [55]	1.50	1.60	1.68	1.78	1.92	2.02	2.14	2.24	2.34	2.42	2.52	2.58	2.66	2.80	2.92	3.00	3.06
	140 [60]	1.40	1.48	1.56	1.66	1.78	1.84	1.94	2.02	2.12	2.20	2.28	2.34	2.40	2.52	2.66	2.74	2.80
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3.]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 90 Hz modulation [240V only] (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	26200	28200	30400	32700	35700	37100	39600	42300	44300	46400	49700	51000	53700	56500	58800	61200	63500
	106 [41]	22600	24200	26100	28000	30700	33300	36100	38500	40300	42200	45700	47600	50100	52700	56600	59600	61800
	113 [45]	21400	23000	24800	26600	29100	31900	34600	37000	38700	40500	43600	45100	47500	50000	53300	56100	58100
	122 [50]	20300	21900	23500	25300	27700	29800	32100	34300	35900	37500	40600	42200	44400	46700	50000	52600	54600
	131 [55]	19300	20800	22300	24000	26300	28100	30300	32400	33800	35400	38200	39800	41800	44000	46800	/	/
	140 [60]	18400	19800	21200	22800	25000	26100	27900	29800	31200	32600	35100	36400	38300	40300	43200	/	/
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 Heating Capacity, 90 Hz modulation [240V only] (kW)																		
Water Outlet (°F [°C])	95 [35]	7.69	8.27	8.90	9.57	10.47	10.87	11.61	12.40	12.99	13.60	14.56	14.95	15.74	16.56	17.24	17.95	18.60
	106 [41]	6.61	7.10	7.64	8.21	8.99	9.75	10.57	11.29	11.82	12.37	13.39	13.94	14.67	15.45	16.60	17.47	18.10
	113 [45]	6.28	6.75	7.26	7.80	8.54	9.35	10.15	10.85	11.35	11.88	12.79	13.23	13.93	14.66	15.62	16.45	17.04
	122 [50]	5.96	6.41	6.89	7.41	8.12	8.72	9.41	10.06	10.52	11.00	11.89	12.36	13.01	13.69	14.66	15.43	15.99
	131 [55]	5.67	6.09	6.55	7.04	7.71	8.24	8.88	9.49	9.92	10.37	11.21	11.65	12.26	12.90	13.71	/	/
	140 [60]	5.38	5.79	6.22	6.69	7.33	7.65	8.18	8.74	9.13	9.54	10.28	10.66	11.22	11.81	12.66	/	/
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 3 COP, 90 Hz modulation [240V only]																		
Water Outlet (°F [°C])	95 [35]	2.16	2.28	2.42	2.56	2.72	2.80	2.92	3.08	3.18	3.28	3.42	3.44	3.50	3.60	3.68	3.76	3.82
	106 [41]	1.84	1.94	2.06	2.18	2.32	2.48	2.64	2.78	2.86	2.94	3.10	3.18	3.22	3.32	3.50	3.62	3.68
	113 [45]	1.70	1.80	1.92	2.02	2.16	2.32	2.48	2.62	2.70	2.78	2.90	2.98	3.02	3.12	3.26	3.38	3.42
	122 [50]	1.58	1.68	1.78	1.88	2.00	2.12	2.26	2.38	2.48	2.54	2.66	2.74	2.78	2.90	3.04	3.14	3.18
	131 [55]	1.46	1.56	1.64	1.74	1.86	1.96	2.08	2.20	2.30	2.36	2.46	2.54	2.58	2.70	2.82	/	/
	140 [60]	1.36	1.44	1.52	1.62	1.74	1.80	1.88	1.98	2.08	2.14	2.24	2.30	2.32	2.44	2.58	/	/
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

Table 3 *HPX 3 Capacity and COP tables*

HPX 5 Heating Capacity, 30 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	/	/	13,600	15,000	16,300	17,000	18,400	19,600	20,000	20,400	21,200	21,600	22,500	23,400	24,600	25,800	27,100
	106 [41]	/	/	13,100	14,400	15,700	16,400	17,700	18,900	19,200	19,700	20,400	20,800	21,700	22,600	23,700	24,900	26,100
	113 [45]	/	/	12,500	13,800	15,000	15,700	16,900	18,000	18,400	18,800	19,500	19,900	20,700	21,500	22,600	23,700	24,900
	122 [50]	/	/	11,900	13,100	14,200	14,900	16,100	17,100	17,500	17,800	18,500	18,900	19,700	20,400	21,500	22,600	23,700
	131 [55]	/	/	11,200	12,300	13,400	14,000	15,100	16,100	16,400	16,800	17,400	17,800	18,500	19,200	20,200	21,200	22,200
	140 [60]	/	/	10,400	11,400	12,400	13,000	14,100	15,000	15,300	15,600	16,200	16,500	17,200	17,900	18,800	19,700	20,700
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 30 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	/	/	3.99	4.39	4.77	4.99	5.40	5.74	5.86	5.98	6.21	6.34	6.60	6.86	7.20	7.56	7.94
	106 [41]	/	/	3.84	4.22	4.59	4.81	5.20	5.53	5.64	5.76	5.98	6.11	6.35	6.61	6.94	7.29	7.65
	113 [45]	/	/	3.67	4.03	4.39	4.60	4.96	5.28	5.39	5.50	5.71	5.83	6.07	6.31	6.63	6.96	7.31
	122 [50]	/	/	3.49	3.83	4.17	4.36	4.72	5.02	5.12	5.22	5.42	5.54	5.76	5.99	6.29	6.61	6.94
	131 [55]	/	/	3.28	3.60	3.92	4.10	4.43	4.72	4.81	4.91	5.10	5.21	5.42	5.64	5.92	6.21	6.52
	140 [60]	/	/	3.05	3.35	3.64	3.81	4.12	4.39	4.47	4.57	4.74	4.85	5.04	5.24	5.50	5.78	6.07
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 COP, 30 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	/	/	2.72	2.94	3.12	3.24	3.42	3.60	3.62	3.66	3.74	3.82	3.92	4.04	4.12	4.20	4.28
	106 [41]	/	/	2.40	2.58	2.76	2.86	3.02	3.18	3.20	3.24	3.32	3.36	3.46	3.58	3.64	3.72	3.78
	113 [45]	/	/	2.10	2.26	2.42	2.50	2.66	2.78	2.80	2.84	2.90	2.96	3.04	3.12	3.20	3.26	3.32
	122 [50]	/	/	1.74	1.88	2.00	2.06	2.20	2.30	2.32	2.34	2.40	2.44	2.50	2.58	2.64	2.68	2.74
	131 [55]	/	/	1.44	1.54	1.64	1.70	1.80	1.90	1.92	1.94	1.98	2.00	2.06	2.12	2.18	2.22	2.26
	140 [60]	/	/	1.16	1.26	1.34	1.38	1.46	1.54	1.54	1.56	1.60	1.62	1.68	1.72	1.76	1.80	1.82
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 60 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	23,900	26,100	28,500	31,000	33,100	34,900	38,100	40,900	41,700	42,600	43,700	43,900	45,100	46,400	47,600	48,900	50,200
	106 [41]	22,900	25,100	27,500	29,900	32,000	33,700	36,900	39,500	40,800	41,600	42,200	42,500	43,700	44,900	46,100	47,400	48,700
	113 [45]	22,000	24,200	26,500	28,900	30,900	32,600	35,700	38,300	39,400	40,300	40,900	41,200	42,300	43,500	44,700	45,900	47,100
	122 [50]	21,000	23,000	25,200	27,600	29,500	31,200	34,200	36,700	37,800	38,600	39,200	39,400	40,600	41,700	42,900	44,100	45,200
	131 [55]	20,000	22,000	24,200	26,500	28,400	30,000	32,900	35,300	36,400	37,200	37,800	38,000	39,100	40,200	41,300	42,500	43,600
	140 [60]	19,100	21,200	23,300	25,500	27,300	28,900	31,700	34,100	35,200	35,900	36,500	36,700	37,800	38,800	39,900	41,000	42,200
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 60 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	6.99	7.65	8.35	9.09	9.70	10.23	11.18	11.98	12.23	12.48	12.80	12.88	13.23	13.59	13.96	14.34	14.72
	106 [41]	6.72	7.37	8.05	8.77	9.37	9.88	10.81	11.59	11.95	12.20	12.38	12.46	12.81	13.16	13.52	13.89	14.26
	113 [45]	6.46	7.09	7.76	8.47	9.05	9.55	10.46	11.22	11.56	11.80	11.98	12.06	12.40	12.74	13.09	13.45	13.81
	122 [50]	6.14	6.75	7.40	8.09	8.65	9.14	10.02	10.76	11.09	11.32	11.49	11.56	11.89	12.22	12.56	12.91	13.26
	131 [55]	5.86	6.46	7.10	7.77	8.31	8.79	9.64	10.36	10.68	10.90	11.07	11.14	11.46	11.78	12.11	12.45	12.79
	140 [60]	5.61	6.20	6.82	7.48	8.01	8.47	9.30	10.00	10.31	10.52	10.69	10.76	11.07	11.38	11.70	12.03	12.37
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 COP, 60 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	2.78	3.02	3.26	3.50	3.68	3.84	4.14	4.38	4.42	4.46	4.50	4.56	4.60	4.68	4.76	4.84	4.94
	106 [41]	2.58	2.78	2.98	3.20	3.36	3.54	3.76	3.96	4.06	4.08	4.10	4.14	4.18	4.26	4.34	4.42	4.50
	113 [45]	2.30	2.48	2.68	2.86	3.02	3.18	3.38	3.58	3.66	3.68	3.70	3.72	3.76	3.84	3.92	3.98	4.06
	122 [50]	2.00	2.18	2.34	2.50	2.66	2.80	2.98	3.16	3.22	3.24	3.26	3.28	3.32	3.38	3.46	3.50	3.58
	131 [55]	1.76	1.92	2.06	2.22	2.34	2.48	2.64	2.80	2.86	2.88	2.90	2.92	2.96	3.00	3.06	3.12	3.18
	140 [60]	1.64	1.78	1.94	2.08	2.20	2.34	2.48	2.64	2.68	2.70	2.72	2.74	2.78	2.82	2.88	2.94	3.00
		-22 [-30]	-13 [-25]	-4 [-20]	5 [-15]	10 [-12]	17 [-8.3]	23 [-5]	32 [0]	36 [2]	41 [5]	47 [8.3]	50 [10]	59 [15]	68 [20]	77 [25]	86 [30]	95 [35]
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 80 Hz modulation (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	27,400	29,400	31,700	34,100	36,600	37,700	40,100	42,700	44,700	46,800	49,600	50,300	52,900	55,700	58,200	60,700	62,900
	106 [41]	26,300	28,300	30,500	32,800	35,200	36,500	38,900	41,400	43,400	45,400	48,300	49,000	51,600	54,300	56,400	59,300	61,500
	113 [45]	25,100	27,000	29,000	31,200	33,500	35,300	37,900	40,300	42,200	44,200	46,900	47,500	50,000	52,600	55,100	58,000	60,200
	122 [50]	23,900	25,700	27,600	29,700	31,900	34,000	36,500	38,900	40,700	42,700	45,400	46,200	48,700	51,200	53,900	56,800	58,800
	131 [55]	22,900	24,600	26,400	28,400	30,600	32,700	35,300	37,600	39,300	41,200	44,000	45,000	47,400	49,900	52,100	54,800	56,800
	140 [60]	21,500	23,100	24,800	26,700	28,700	31,200	33,900	36,000	37,700	39,500	42,300	43,400	45,700	48,100	50,400	53,100	55,000
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 80 Hz modulation (kW)																		
Water Outlet (°F [°C])	95 [35]	8.03	8.63	9.28	9.98	10.73	11.05	11.76	12.51	13.10	13.73	14.54	14.73	15.50	16.32	17.06	17.78	18.42
	106 [41]	7.72	8.30	8.93	9.60	10.32	10.70	11.41	12.14	12.72	13.32	14.14	14.37	15.12	15.92	16.52	17.39	18.02
	113 [45]	7.35	7.90	8.49	9.13	9.82	10.36	11.11	11.81	12.37	12.96	13.74	13.93	14.66	15.43	16.16	17.01	17.63
	122 [50]	6.99	7.52	8.09	8.70	9.35	9.96	10.71	11.39	11.93	12.50	13.29	13.55	14.26	15.01	15.80	16.64	17.24
	131 [55]	6.70	7.21	7.75	8.33	8.96	9.60	10.35	11.01	11.52	12.07	12.89	13.20	13.90	14.63	15.26	16.07	16.65
	140 [60]	6.29	6.76	7.27	7.82	8.41	9.16	9.93	10.56	11.06	11.57	12.39	12.73	13.40	14.11	14.78	15.56	16.12
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

HPX 5 COP, 80 Hz modulation																		
Water Outlet (°F [°C])	95 [35]	2.32	2.46	2.60	2.76	2.92	2.96	3.10	3.24	3.34	3.46	3.56	3.58	3.70	3.82	3.90	4.00	4.06
	106 [41]	2.20	2.34	2.48	2.62	2.78	2.84	2.98	3.12	3.22	3.32	3.44	3.46	3.56	3.68	3.74	3.86	3.92
	113 [45]	2.04	2.16	2.30	2.44	2.58	2.70	2.84	2.98	3.08	3.18	3.30	3.30	3.40	3.54	3.62	3.74	3.80
	122 [50]	1.90	2.00	2.12	2.26	2.42	2.54	2.68	2.82	2.94	3.02	3.14	3.16	3.26	3.40	3.50	3.62	3.68
	131 [55]	1.78	1.88	2.00	2.10	2.28	2.40	2.54	2.66	2.78	2.88	3.02	3.04	3.14	3.28	3.36	3.46	3.52
	140 [60]	1.62	1.72	1.82	1.94	2.08	2.24	2.40	2.50	2.64	2.72	2.86	2.88	2.98	3.14	3.22	3.32	3.38
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 90 Hz modulation [240V only] (Btu/h)																		
Water Outlet (°F [°C])	95 [35]	30,100	32,400	34,800	37,500	41,000	42,200	44,900	48,000	50,300	53,000	59,200	60,300	63,000	66,300	69,300	72,200	74,800
	106 [41]	29,000	31,200	33,500	36,000	39,400	40,900	43,600	46,600	48,800	51,400	57,600	58,800	61,400	64,600	67,100	70,600	73,200
	113 [45]	27,600	29,700	31,900	34,300	37,500	39,600	42,400	45,300	47,500	50,000	56,000	57,000	59,500	62,600	65,600	69,100	71,600
	122 [50]	26,200	28,200	30,400	32,700	35,700	38,100	40,900	43,700	45,800	48,200	54,200	55,500	57,900	60,900	64,200	67,600	70,000
	131 [55]	25,100	27,100	29,100	31,300	34,300	36,700	39,500	42,200	44,300	46,500	52,500	54,000	56,400	59,400	62,000	/	/
	140 [60]	23,600	25,400	27,300	29,300	32,100	35,000	37,900	40,500	42,400	44,600	50,500	52,100	54,400	57,300	60,000	/	/
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

HPX 5 Heating Capacity, 90 Hz modulation [240V only] (kW)																		
Water Outlet (°F [°C])	95 [35]	8.83	9.49	10.21	10.98	12.02	12.38	13.17	14.07	14.74	15.52	17.36	17.67	18.45	19.42	20.31	21.15	21.92
	106 [41]	8.49	9.13	9.82	10.56	11.56	11.99	12.78	13.66	14.31	15.05	16.89	17.24	18.00	18.94	19.66	20.69	21.44
	113 [45]	8.08	8.69	9.34	10.05	11.00	11.60	12.44	13.29	13.92	14.65	16.40	16.71	17.44	18.36	19.23	20.25	20.98
	122 [50]	7.69	8.27	8.90	9.57	10.47	11.15	12.00	12.82	13.42	14.12	15.88	16.26	16.97	17.86	18.81	19.80	20.52
	131 [55]	7.37	7.93	8.52	9.17	10.04	10.75	11.59	12.38	12.97	13.64	15.40	15.84	16.54	17.41	18.16	/	/
	140 [60]	6.92	7.44	8.00	8.60	9.42	10.26	11.12	11.88	12.44	13.08	14.80	15.28	15.95	16.79	17.59	/	/
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

HPX 5 COP, 90 Hz modulation [240V only]																		
Water Outlet (°F [°C])	95 [35]	2.26	2.38	2.52	2.68	2.84	2.88	3.02	3.18	3.28	3.40	3.72	3.76	3.86	3.98	4.08	4.16	4.24
	106 [41]	2.14	2.28	2.40	2.54	2.70	2.76	2.90	3.06	3.14	3.26	3.58	3.64	3.72	3.84	3.90	4.04	4.10
	113 [45]	2.00	2.10	2.24	2.36	2.52	2.62	2.76	2.92	3.02	3.12	3.44	3.48	3.56	3.68	3.78	3.90	3.98
	122 [50]	1.86	1.96	2.06	2.20	2.36	2.48	2.62	2.76	2.86	2.98	3.28	3.34	3.40	3.56	3.66	3.78	3.84
	131 [55]	1.74	1.84	1.94	2.04	2.22	2.34	2.48	2.60	2.72	2.82	3.12	3.20	3.28	3.42	3.50	/	/
	140 [60]	1.58	1.68	1.78	1.88	2.02	2.18	2.34	2.46	2.58	2.68	2.94	3.04	3.12	3.28	3.36	/	/
		-22 [-30]	**-13 [-25]**	**-4 [-20]**	**5 [-15]**	**10 [-12]**	**17 [-8.3]**	**23 [-5]**	**32 [0]**	**36 [2]**	**41 [5]**	**47 [8.3.]**	**50 [10]**	**59 [15]**	**68 [20]**	**77 [25]**	**86 [30]**	**95 [35]**
		Outdoor Air Temperature (°F [°C])																

Table 4 *HPX 5 Capacity and COP tables*

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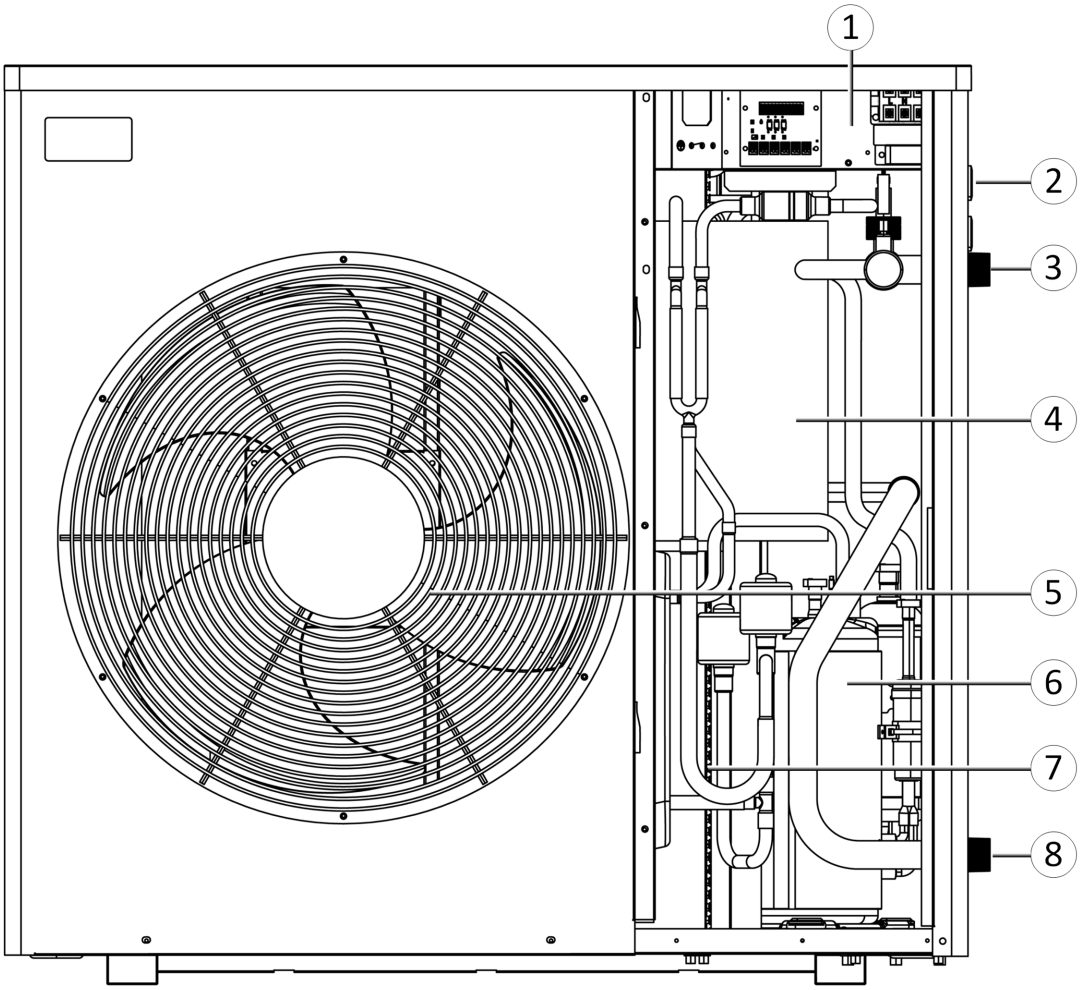
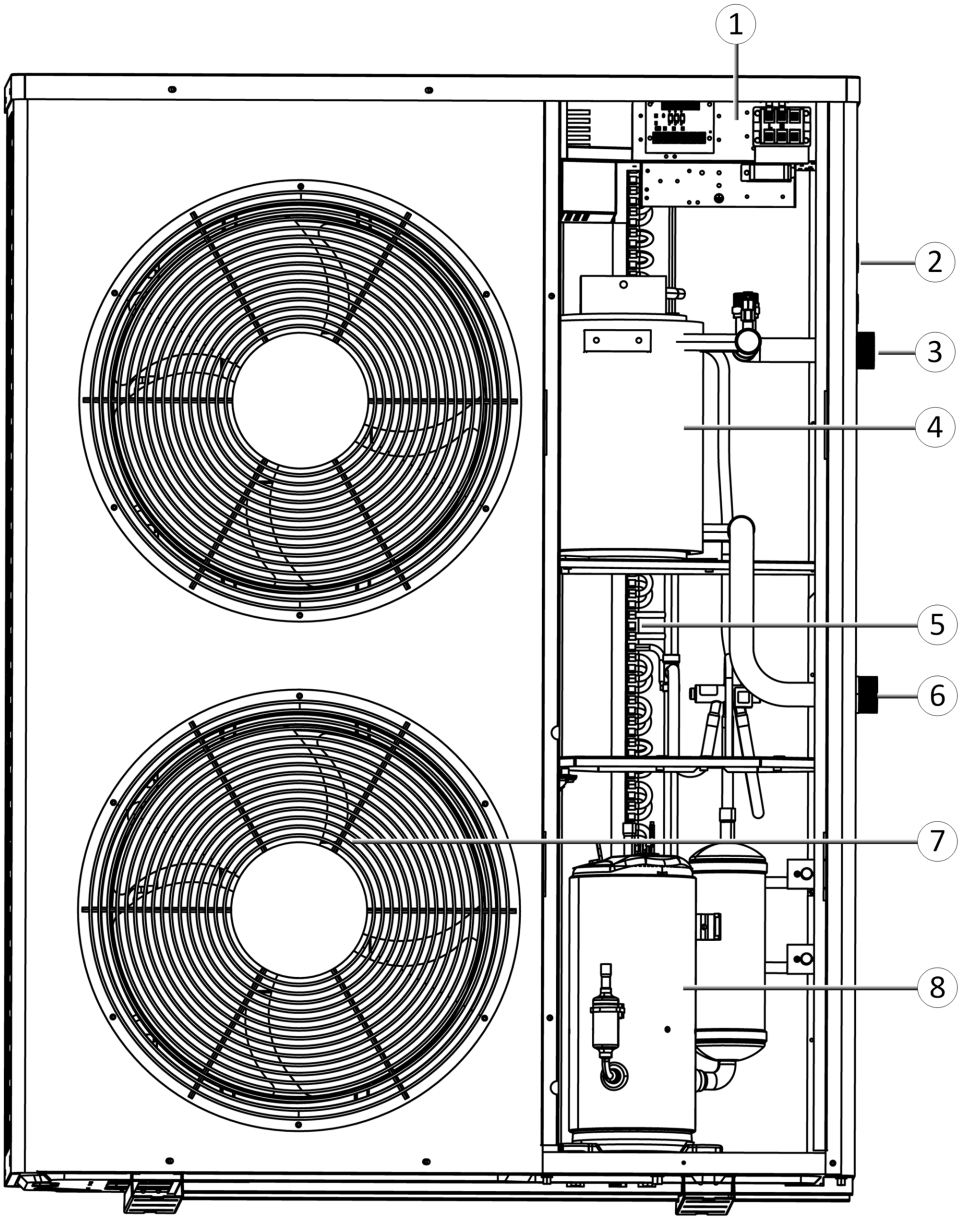
4.0 Introduction



1	Wiring connection area
2	Electrical connection rubber grommet (2)
3	Supply water connection
4	Heat Exchanger
5	Fan
6	Compressor
7	Outdoor finned coil
8	Return water connection

Figure 7 *Interior view of HPX 3*



1	Wiring connection area	5	Outdoor finned coil
2	Electrical connection rubber grommet (2)	6	Return water connection
3	Supply water connection	7	Fan (1 of 2)
4	Heat Exchanger	8	Compressor

Figure 8 *Interior view of HPX 5*

4.1 Standard features and benefits

- Highly efficient heating and cooling
- Enhanced Vapor Injection (EVI) design increases efficiency, lowers ambient temperature operating range, and increases maximum supply water temperature
- Renewable energy source
- Modulating
- Quiet operation
- Easy set-up for Set-Point or Outdoor Reset heating
- Flow-proving and high limit safeties built in

4.2 Warranty

For residential applications, IBC offers a 2-year parts and a 5-year compressor limited warranty against defects in materials or workmanship.

For commercial applications, IBC offers a 2-year parts and a 2-year compressor limited warranty against defects in materials or workmanship.

To view the full warranty statement for the HPX-series, go to ibcboiler.com.

5.0 Before installation

Before installing the hydronic heat pump, it is important to review and observe the following checklist of precautions:

Precautions	Check
Care must be taken to properly size the hydronic heat pump for its intended use. Prolonged full output run time, over-sizing or under-sizing, and incorrect flow rates can lead to increased maintenance costs, equipment stress and premature failure.	☐
Exposure to corrosive chemical fumes such as chlorinated and/or fluorinated hydrocarbons can reduce the life of a hydronic heat pump. Cleaners, bleaches, air fresheners, refrigerants, aerosol propellants, dry-cleaning fluids, de-greasers, paint-removers and airborne chlorides such as those released with the use of laundry detergents are to be avoided.	☐
Exposure to salt air can reduce the life of a hydronic heat pump. Ocean-front installations are to be avoided.	☐
Locate the hydronic heat pump's base at least 12" [30 cm] above the highest anticipated snow line. An after-market permanent platform or wall mounting bracket may be used.	☐
Locate the hydronic heat pump where water from the defrost cycle will drain freely and will not cause a slip hazard under freezing conditions.	☐
Do not install where operation noise may cause a disturbance.	☐
At a new construction site, or during renovations, protect the hydronic heat pump from dust and other construction related contaminants. Do not seal case openings directly when operating- allow for air circulation and ventilation in the immediate area.	☐
Ensure that the pressure relief valve is installed. It is recommended to pipe relief discharge into glycol fill tank. Make sure the relief valve outlet is piped with unobstructed piping (minimum ¾" diameter) to a safe discharge location.	☐

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6.0 Installation

Refer to the Specifications section for dimensional drawings and connection specifications. Use these drawings to find a suitable location for the appliance.

6.1 Code requirements

The appliances are tested and certified under CSA STD.C22.2 No.60335-1 and 60335-2-40. Below are the code requirements for every installation.

Canada and USA
Conform to local codes, or in the absence of these, with the latest editions of UL STD.60335-1 and 60335-2-40 / CSA STD. C22.2 No. 60335-1 and 60335-2-40.

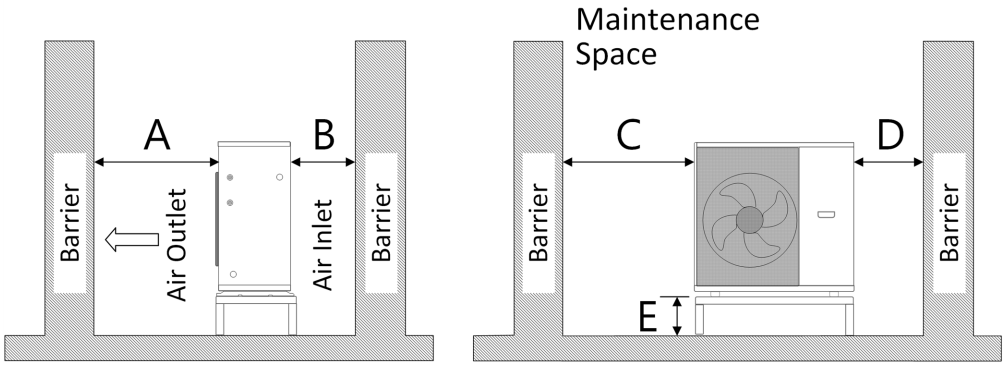
Table 5 *Code requirements by country*

Warning

This appliance shall be installed in accordance with national wiring regulations.

6.2 Determining location of the appliance

The hydronic heat pumps are designed and approved for outdoor installation. .



A = 4 ft 11" / 1.5 m minimum
B = 1 ft 8" / 0.5 m minimum
C = 3 ft 3½" / 1.0 m minimum
D = 1 ft 8" / 0.5 m minimum
E = 1 ft / 0.3 m minimum above snow level

Table 6 *Clearance distances for hydronic heat pump mounting sites*

6.2.1 Installation clearances

Warning

Exposed water piping and associated components (relief valves, circulators, etc., should not be in contact with combustible materials. Check local codes for required clearances and / or provide adequate insulation.

- Many jurisdictions set maximums for allowable dB during operations: the IBC HPX 5 produces only 53 dB at full operation, as measured 3'3½" (1m) from the unit. Some jurisdictions impose a stricter dB level at night: users can easily program a quiet operation schedule.
- The unit must be mounted above the anticipated snow level. Do not mount at ground level where grass trimmings can block the fan vents.
- IBC recommends mounting the unit on a cement pad with rubber or neoprene blocks to absorb vibration noise, or a similarly durable, level and permanent mounting surface.
- The selected location should be protected from roof drip-line: this is particularly important in areas of high snow-fall. A canopy structure may be needed.
- The location must be protected from strong winds. If the site is subject to strong winds consider building a windbreak around the unit.
- The selected location must be in an area accessible for maintenance.
- Penetrations through outside walls should be sloped downward to the outside at 1.5% to encourage water to drain away from the interior.
- Where heating load exceeds cooling load, it is recommended to locate the unit on the south side of the building to take advantage of winter solar warming.

6.3 Important Design Considerations

Determine the water temperatures needed before selecting heat pump. Not only outdoor temperature but also target water temperature significantly impacts COP and available heat output. For example, in this HPX 5 heat COP chart (at 60 Hz) we see that the efficiency for operation with 106°F supply water temperature at -4°F outdoors is as high as the efficiency with 140°F water at 95°F outdoors:

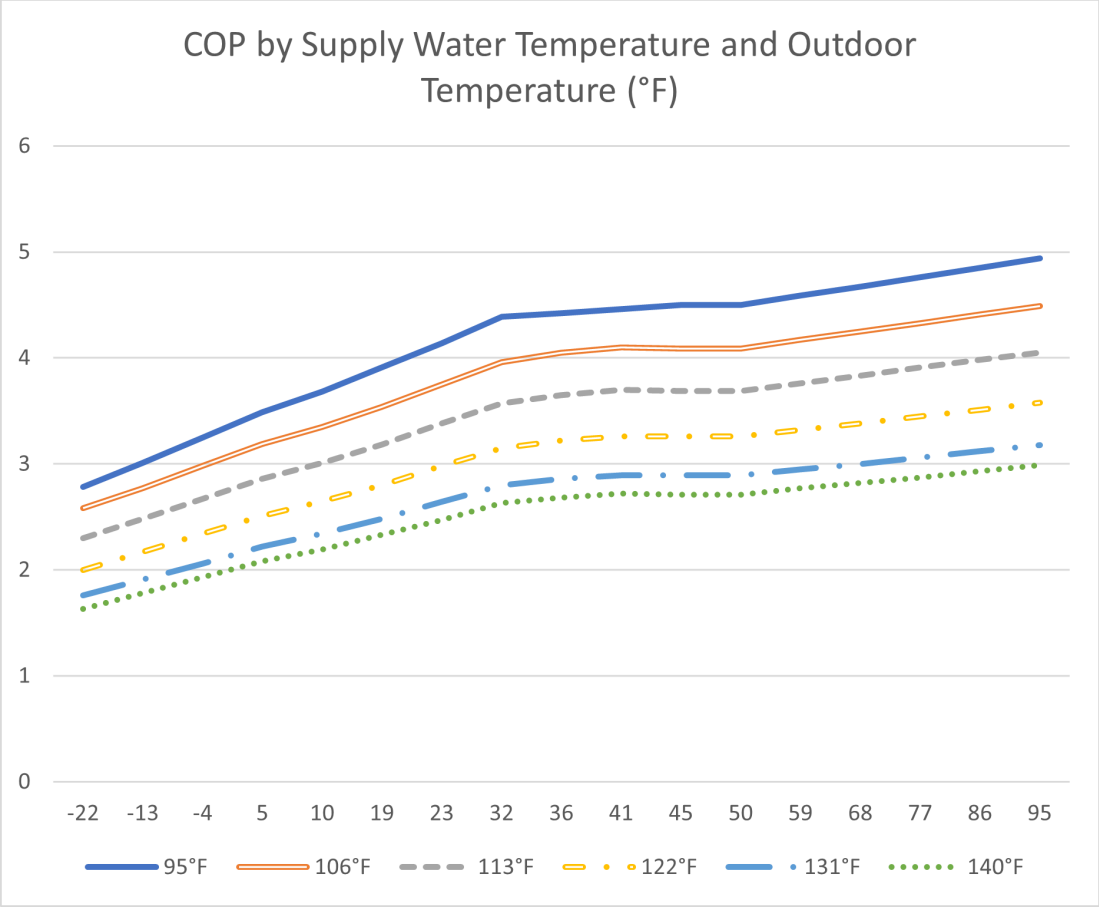


Table 7 *COPs of HPX 5by Supply Water Temperatures and Outdoor Temperatures (at 60Hz)*

See charts in Specification section for capacity and COP details on both models across their modulation ranges. It is always best practice for any heat pump to design for a supply temperature maximum of 120°F. If the existing heat distribution system operates at higher temperature, consider these options:

- Reduce the heat loss of the building. Upgrading windows and attic insulation will reduce the required size and temperatures of the equipment.
- Add to the existing heat emitters: the greater the thermal mass of the emitters, the lower the water temperature needs to be. Tighter radiant tube spacing also has the effect of boosting heat emission.
- Install supplemental heating source to boost the system water temperature as required. Example: Electric boiler or gas boiler.

6.4 Hydronic heat pump circulator selection

It is up to the installer to select a circulator that can overcome the head resistance shown in the appropriate table below:

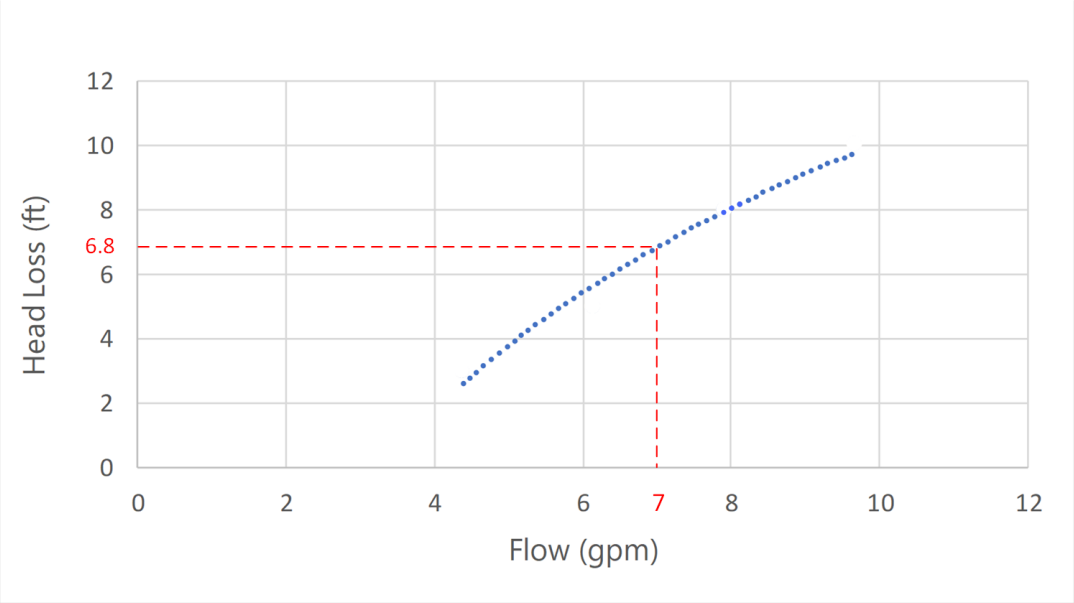


Table 8 *HPX 3 heat exchanger head loss (requires correction if glycol is used)*

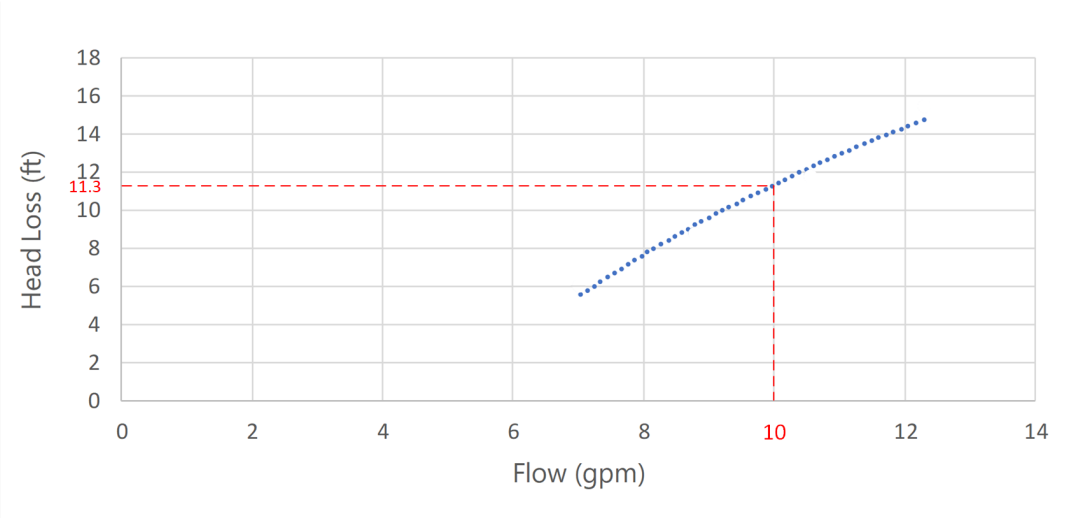


Table 9 *HPX 5 heat exchanger head loss (requires correction if glycol is used)*

Ensure that the selected circulator delivers a minimum the following minimum flow:

Heat Pump Flow Requirement	HPX 3	HPX 5
Rated Water Flow*	6.6 gpm / 1.5 m^3/h	7.5 gpm / 1.7 m^3/h
Water Pressure Drop (Head Loss)	7 feet / 2.1 m	9 feet / 2.7 m
Minimum Heat Pump Flow Rate (Variable Speed Pump)	3.1 USgpm / 0.7 m^3/h	4.0 USgpm / 0.9 m^3/h
Maximum Heat Pump Flow Rate (Fixed Speed Pump)	10.1 USgpm / 2.3 m^3/h	12.0 USgpm / 2.7 m^3/h
Recommended Heat Pump Flow Rate	7.0 USgpm / 1.6 m^3/h	10.0 USgpm / 2.3 m^3/h

* "Rated" indicates the flow rate at which the heat pump's heating output, pressure drop and noise was measured

Propylene glycol adjustment factors (typical): consult manufacturer for final calculations					
Glycol percentage by weight	25%	30%	40%	45%	50%
Freeze protection to ambient	-10.5° C	-13° C	-20° C	-25° C	-27.5° C
Target water flow	1.107	1.133	1.188	1.215	1.242
Water pressure drop	1.275	1.332	1.484	1.541	1.610

For example, to select a HPX 5 circulator if using 30% glycol:

- 10 gpm is the HPX 5's recommended water flow and 1.133 is the 30% flow adjustment; multiply 10 gpm x 1.133 = 11.33 gpm.
- Consult the head loss chart above to find for 11.33 gpm a head loss of 13.2 ft.
- Multiply the head loss by the Water pressure drop adjustment factor; 13.2' x 1.332 = 17.6 ft
- Select a circulator capable of 17.6 ft at 11.33 gpm.

Do not reduce pipe sizes from the HPX's supplied connectors; in some cases, it will be preferable to increase pipe size.

Some circulators have a minimum water temperature rating above the low temperature potential of the hydronic heat pump. If cooling mode is to be used, purchase a volute insulation block from the circulator manufacturer.

6.5 Water Piping

IBC recommends using unions on the inlet and outlet water connections. Unions simplify many service procedures, for example cleaning of an inlet water strainer. See *System piping on page 30*below for other piping recommendations.

Warning

Water quality has a significant impact on the lifetime and performance of a hydronic heat pump's heat exchanger.

Improperly prepared water in a heating circuit may cause damage to the heat exchanger through fouling or corrosion. Repeated or uncontrolled water fills will increase the potential for damage.

High levels of dissolved solids or minerals may precipitate out of the fluid onto the hottest part of the heat exchanger, impairing heat transfer and resulting in overheating and premature failure. The amount of solids that may form on the heat exchanger will depend on the degree of hardness and the total water volume in the system. A high water volume system with a low hardness count may cause as much damage as a system with less volume and higher hardness, so it is recommended to treat water so as to reduce dissolved solids to the minimum 10 ppm, and to no more than 30 ppm. Other water chemistry allowable limits are as follows:

- TDS 0.6 - 1.75 grains/ gal (10-30 ppm)
- Acidity pH is to be between 6.6 and 8.5
- Chloride is to be less than 125 mg/l
- Iron is to be less than 0.3 mg/l
- Cu less than 0.1 mg/l
- Conductivity is to be less than 400µS/cm at 77°F (25°C)

Important: Ensure that these limits are acceptable for the other water-side components in the system.

Propylene glycol usage

Warning

Do not use automotive-type ethylene or other types of automotive glycol antifreeze, or undiluted antifreeze of any kind. This may result in severe heat exchanger damage. Installers must ensure that glycol solutions are formulated to inhibit corrosion in hydronic heating systems of mixed materials. Improper mixtures and chemical additives may cause damage to ferrous and non-ferrous components as well as non-metallic, wetted components, normally found in hydronic systems. Ethylene glycol is toxic, and may be prohibited for use by codes applicable to your installation location. For environmental and toxicity reasons, IBC recommends only using non-toxic propylene glycol.

Propylene glycol solution is commonly used in a closed loop where freeze protection is required. Its specific heat is lower than that of water, resulting in lower thermal performance at a given flow and pressure. Generally, a 50:50 solution of propylene glycol and water requires an increased system circulation rate (gpm up 10%), and system head (up 20%) to provide performance

equivalent to straight water. For the HPX Series hydronic heat pumps propylene glycol concentrations between 25% and 50% are permitted.

These hydronic heat pumps are designed for use within a closed loop, forced circulation, low pressure system. A pressure relief valve must be field-supplied. Relief valve discharge piping must terminate between 6" (15 cm) and 12" (30 cm) above the floor or per local code.

Warning

During operation, the relief valve may discharge large amounts of steam and/or hot water. To reduce the potential for bodily injury and property damage, install a discharge line that:

- Is connected from the valve outlet with no intervening valve, and directed downward to a safe point of discharge.
- Allows complete drainage of both the valve and the discharge line.
- Is independently supported and securely anchored, so as to avoid applied stress on the valve.
- Is as short and straight as possible.
- Terminates freely to atmosphere where any discharge will be clearly visible and is at no risk of freezing.
- Terminates with a plain end which is not threaded.
- Is constructed of a material suitable for exposure to temperatures of 375° F or greater.
- Is, over its entire length, of a pipe size equal to or greater than that of the valve outlet (¾" NPT).

Do not cap, plug or obstruct the discharge pipe outlet.

6.6 Relief Valve

Ensure that the pressure relief valve is installed indoors; third parties sell combination relief valve / vacuum breakers for easy mounting on top of a buffer tank

Make sure the relief valve outlet is piped with unobstructed piping (minimum 3/4" diameter) to a safe discharge location.

6.7 General piping best practices

Primary/secondary piping, or the use of a hydraulic separator, and the use of a properly sized buffer tank is recommended for maximum flexibility in multi-load applications. See *Buffer tank sizing on page 36* and *Quick calculation for buffer tank sizing on page 36*.

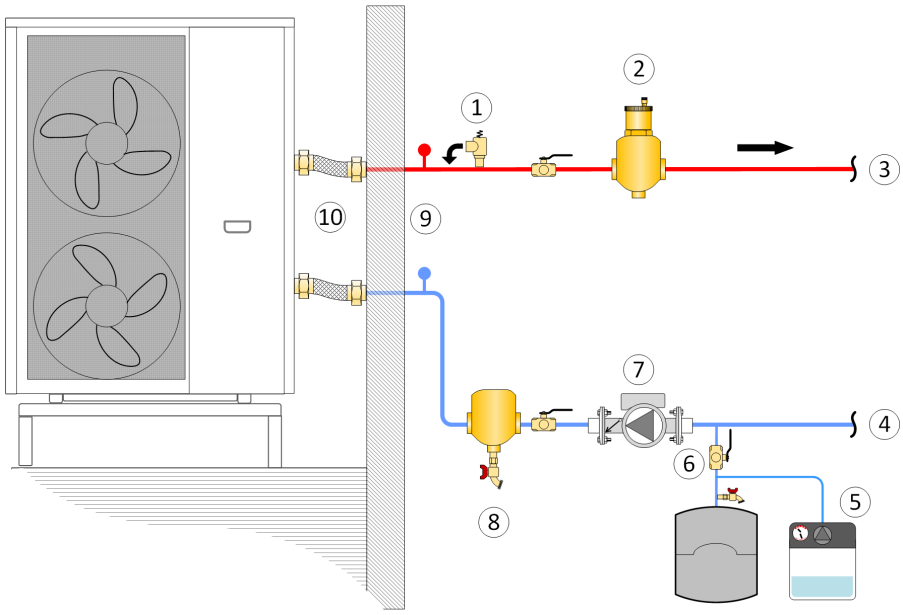
6.7.1 System piping

> **Note**
>
> The piping drawings in this manual are simple schematic guides to a successful installation. For further information and details, consult our concept drawings – which provide details on specific applications (available in IBC's Technical Portal). There are many necessary components not shown, and details such as thermal traps are left out so the drawings have greater clarity. Our hydronic heat pumps must be installed by licensed and experienced heating professionals familiar with the applicable local and national codes. System design is to be completed by an experienced hydronic designer or engineer. You should carefully read and follow the installation instructions along with the application drawing that fits your system.

System piping is connected to the hydronic heat pump using 1" (HPX 3) or 1¼" (HPX 5) NPT-Male threaded fittings. To simplify servicing, we recommend using unions at the hydronic heat pump's supply and return water connections.

Fluid fill is most often accomplished by using a regulator and fill valve set at 12 psig or more, with the appropriate backflow prevention device as required by local code. This is acceptable in areas where municipal water or well water has been treated and filtered to remove excessive minerals and sediment, and water chemistry is known to be suitable for closed loop hydronic systems. Follow the applicable codes and good piping practice.

6.7.2 Essential components



1	Pressure relief valve: located indoors, discharges into glycol fill tank
2	Microbubble air eliminators are best installed where the fluid is at the highest temperature and lowest pressure
3	To buffer tank
4	From buffer tank
5	Glycol fill tank
6	Expansion tank connection (point of no pressure change); there should be minimal pressure drop to circulator inlet
7	Heat Pump (*i.e.* primary) circulator
8	Dirt separator recommended. Isolation valve upstream allows low-point drainage of outdoor unit if needed during a power failure.
9	Pressure / Temperature test ports (e.g. 'Pete's Plugs) for observation of pressure and temperature differences across the unit.
10	Flexible hoses (field-supplied) aid in aligning water connections to indoor piping, and in the prevention of vibration transmission from outdoor unit. Alternatively, use swing joints. Exterior piping must be insulated.

Figure 9 *Hydronic Heat Pump essential components*

Warning

Close the fill valve after any addition of water to the system, to reduce risk of water escaping.

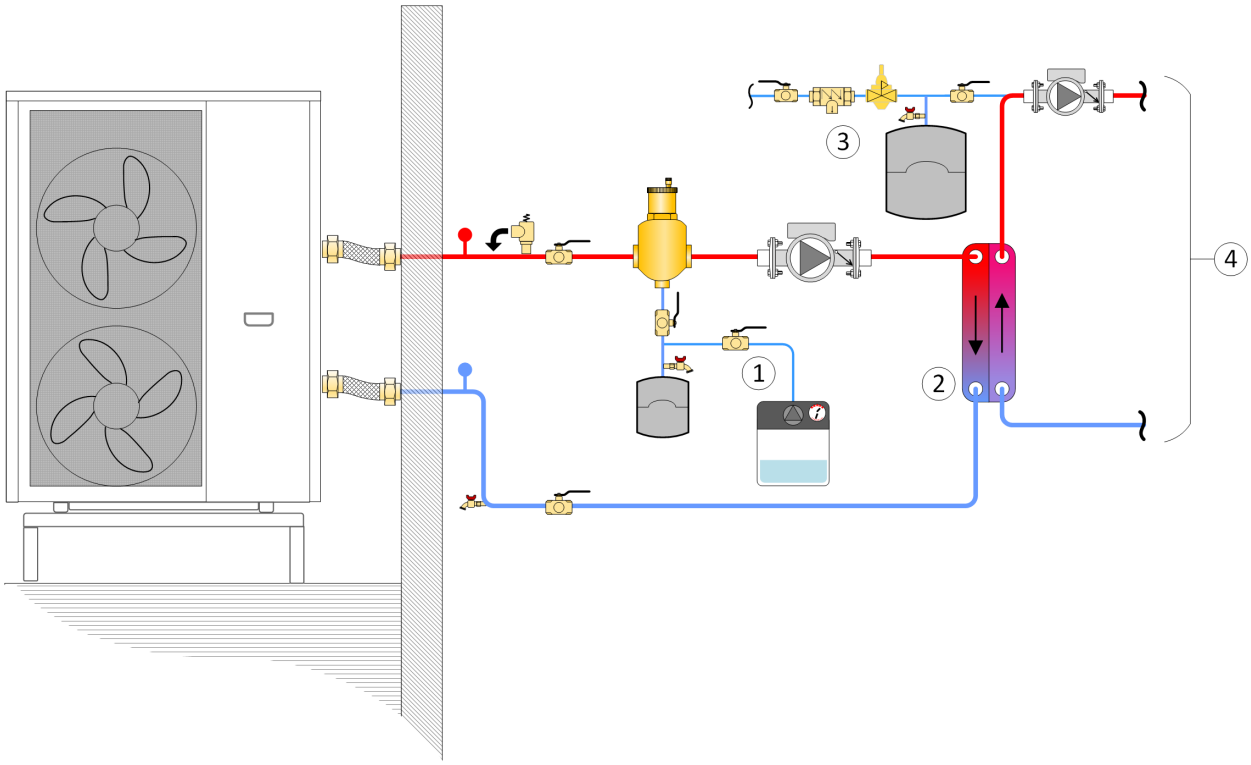
Caution

Contact local water purveyors about the suitability of the supply for use in hydronic heating systems. If unsure about water quality, bring water or hydronic fluid of known quality to the site. Alternatively, request testing and assessment (and treatment, if required) from a local water treatment expert.

In areas where water quality is in question, or when chemical treatment or glycol is required, other options should be considered. Today there are a number of feed and pressurization devices on the market that may be a better choice than a raw water fill from the mains. When regular maintenance requires relief valve blow-off, the discharge may be directed back into the pressurization appliance for recycling of fluid and chemicals back into the system. In buildings that may be unoccupied for long periods of time, pressurization appliances are useful to prevent flood damage should leakage occur from any component in the system. An additional benefit is that backflow prevention devices are not required when using these devices.

Where cooling mode is to be used, all piping must be thoroughly insulated to prevent damage from uncontrolled condensaton.

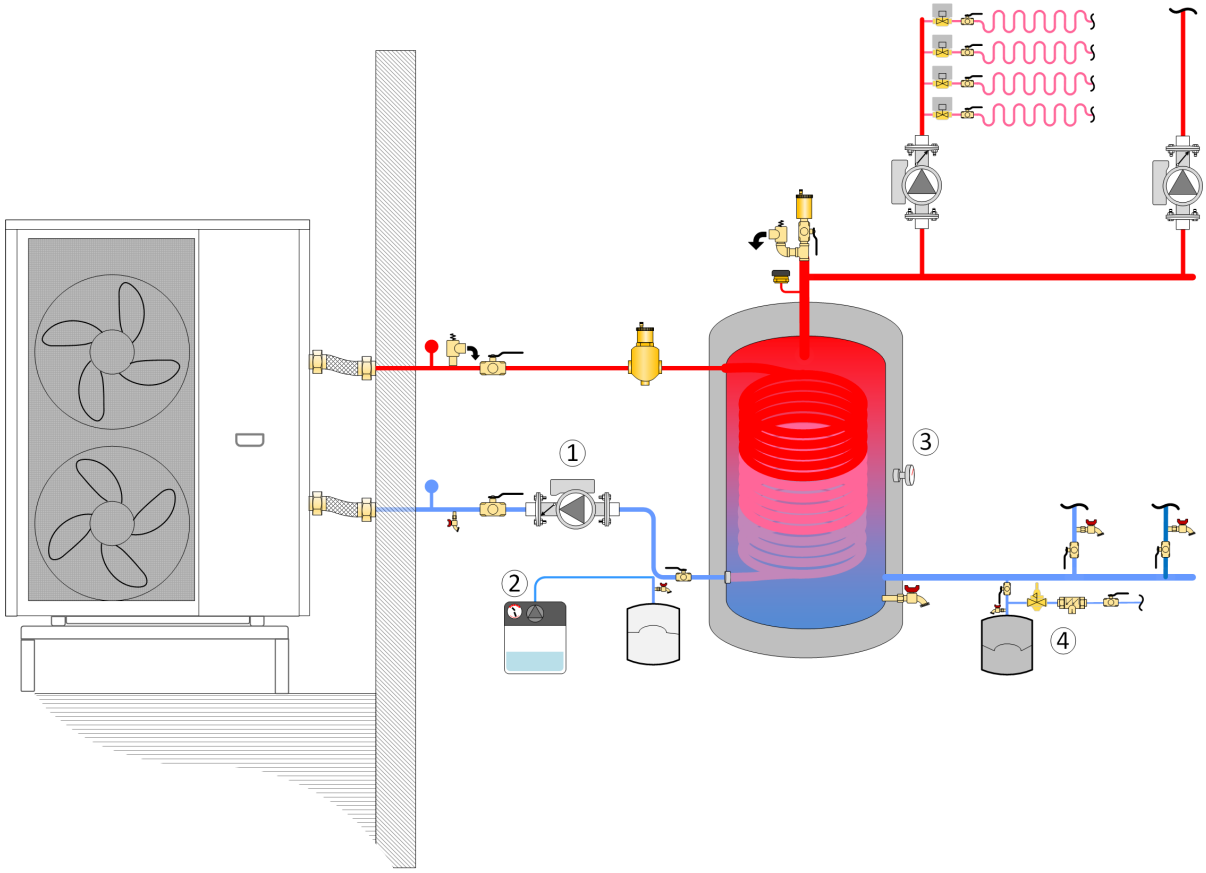
6.7.3 Glycol isolation with external heat exchanger



1	Glycol fill tank
2	Heat Exchanger. Note: the external heat exchanger separates the outside glycol fluid from the inside distribution fluid. **The heat exchanger must be sized generously so as to keep the distribution supply temperature within 5°F (3°C) of the glycol supply.**
3	Fill valve and expansion tank to maintain system pressure
4	To / from buffer tank

Figure 10 *Hydronic Heat Pump component options - heat exchanger for isolating glycol*

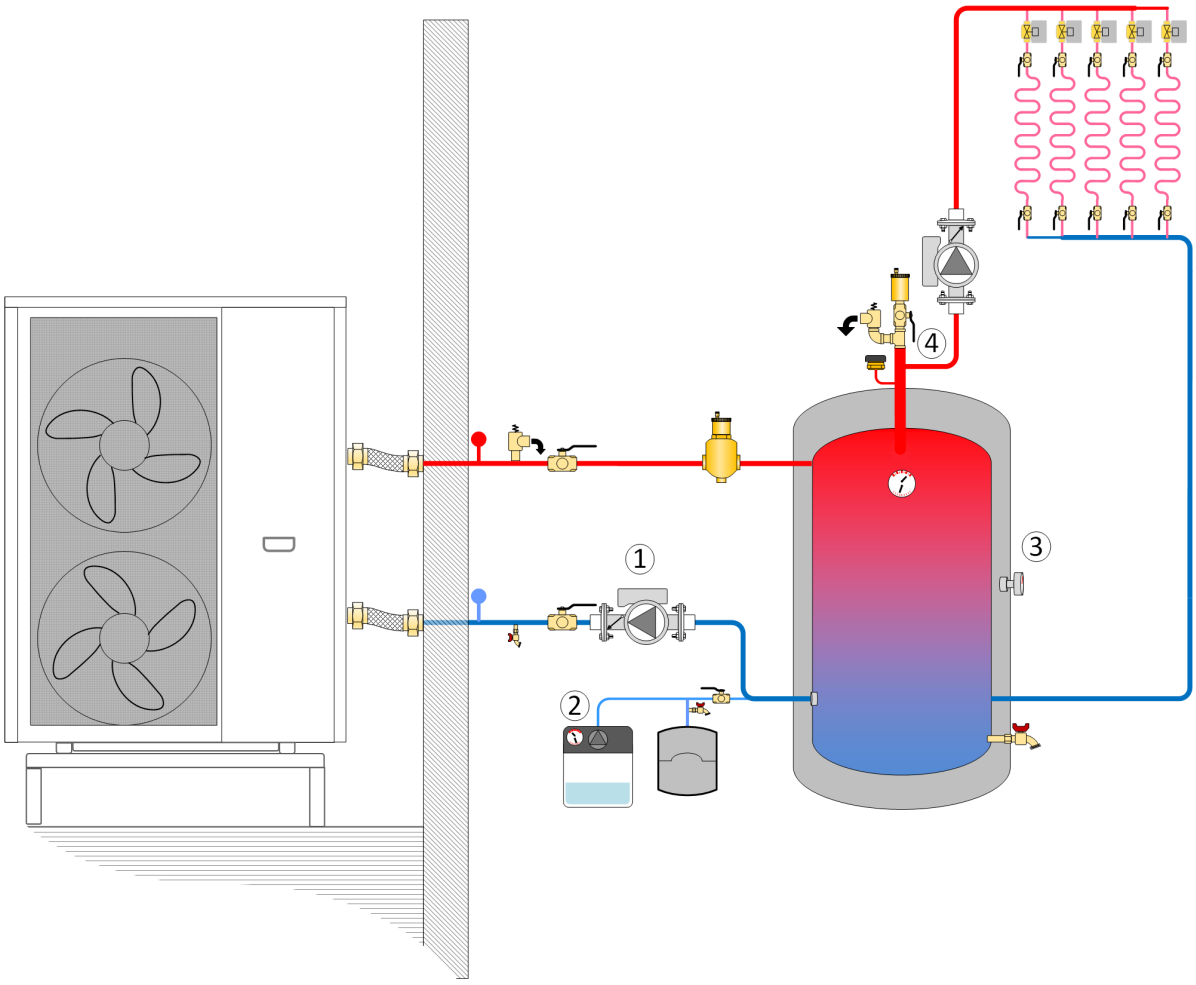
6.7.4 Glycol isolation with indirect / buffer tank



1	Hydronic Heat Pump circulator with integral check valve
2	Glycol fill tank.
3	Extended-coil buffer tank for glycol isolation. Note extra surface area of specialty heat pump indirect tank for efficient heat transfer: domestic model of indirect tank would likely cause short-cycling. Buffer tank needs vacuum breaker for cooling mode.
4	Fill valve and expansion tank to maintain system pressure

Figure 11 *Glycol isolation using extended coil indirect buffer tank*

6.7.5 Buffer tank piping



1	Hydronic Heat Pump circulator with integral check valve
2	Glycol fill tank: 25%-50% propylene glycol throughout system. Alternatively, a flat plate heat exchanger or heat pump indirect tank can isolate glycol from distribution water (see previous figures).
3	Buffer tank.
4	Buffer tank hydraulically separates HPX from load piping; load pump(s) sized for head loss of building side of tank only. Buffer tank needs vacuum breaker for cooling mode.

Figure 12 *Hydronic Heat Pump with buffer tank*

6.7.6 Buffer tank sizing

When using a heat pump it is important at the planning stage to consider whether a buffer tank will be needed to prevent short-cycling by looking at the minimum output during warm-weather conditions. Repeated short-cycling can lead to premature compressor failure and other component damage. Good practice is to design for a minimum cycle time of ten minutes. To calculate the buffer tank size required:

$$V = \frac{t(Q_{heat\ source} - q_{load})}{500(\triangle T)}$$

where:

- V= minimum volume of buffer tank (US gallons)
- t = desired minimum cycle time (minutes); IBC recommends 8
- Q = heat source output rate, i.e. minimum warm-weather output (Btu/h)
- q = lowest rate of heat extraction from tank: may be zero (Btu/h)
- ΔT = tank differential (°F); IBC recommends 10 and advises this should not exceed 20°F

6.7.7 Quick calculation for buffer tank sizing

The buffer tank volume in gallons can be quickly calculated by taking the minimum output *during mild summer weather* in MBtu/h and multiplying by two. (This presumes the tank temperature can vary by 10°F.)

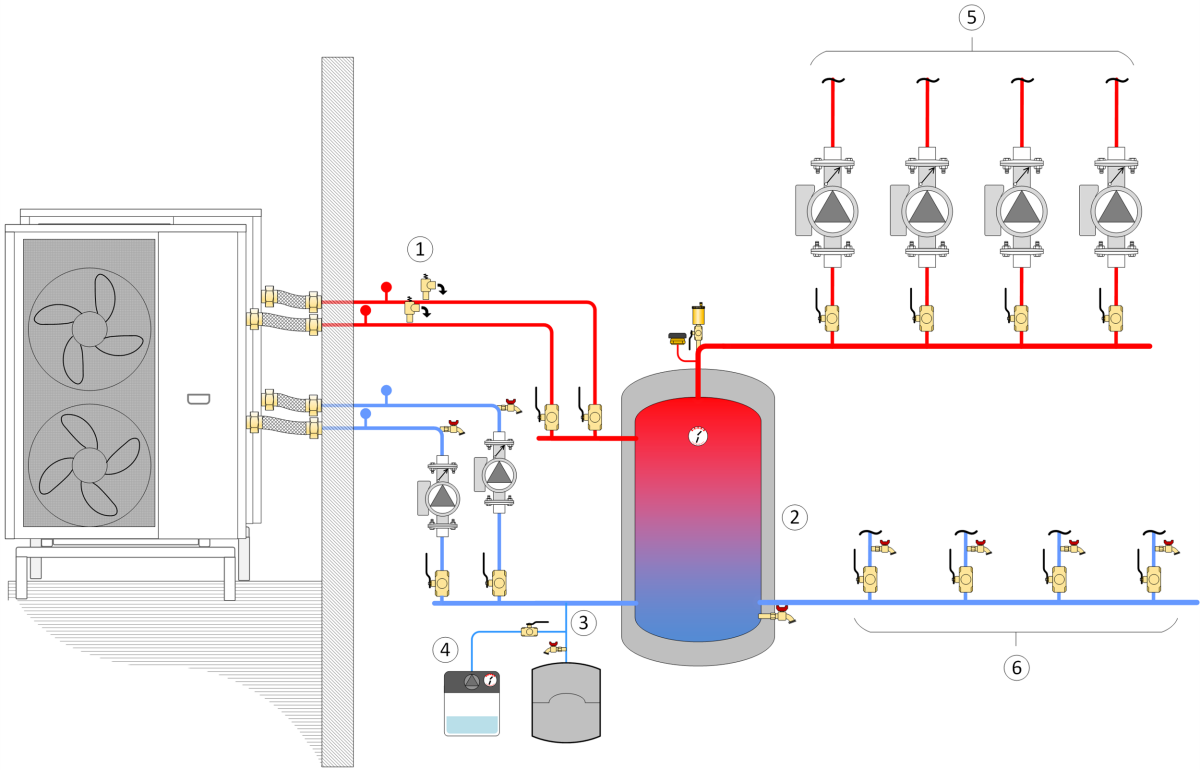
$$V = Q_{heat\ source} \times 2$$

where:

- V= minimum volume of buffer tank (US gallons)
- Q = minimum heat source output rate (Btu/h)

Example: if the Heat Pump's minimum output is 20MBH (read from the lowest modulation (30 Hz) chart), 20 X 2 = 40; thus the buffer tank's minimum size is 40 gallons. By this rough calculation IBC recommends a minimum buffer tank volume of 40 gallons for the HPX 3 and a minimum of 50 gallons for the HPX 5.

6.7.8 Multiple hydronic heat pumps piping

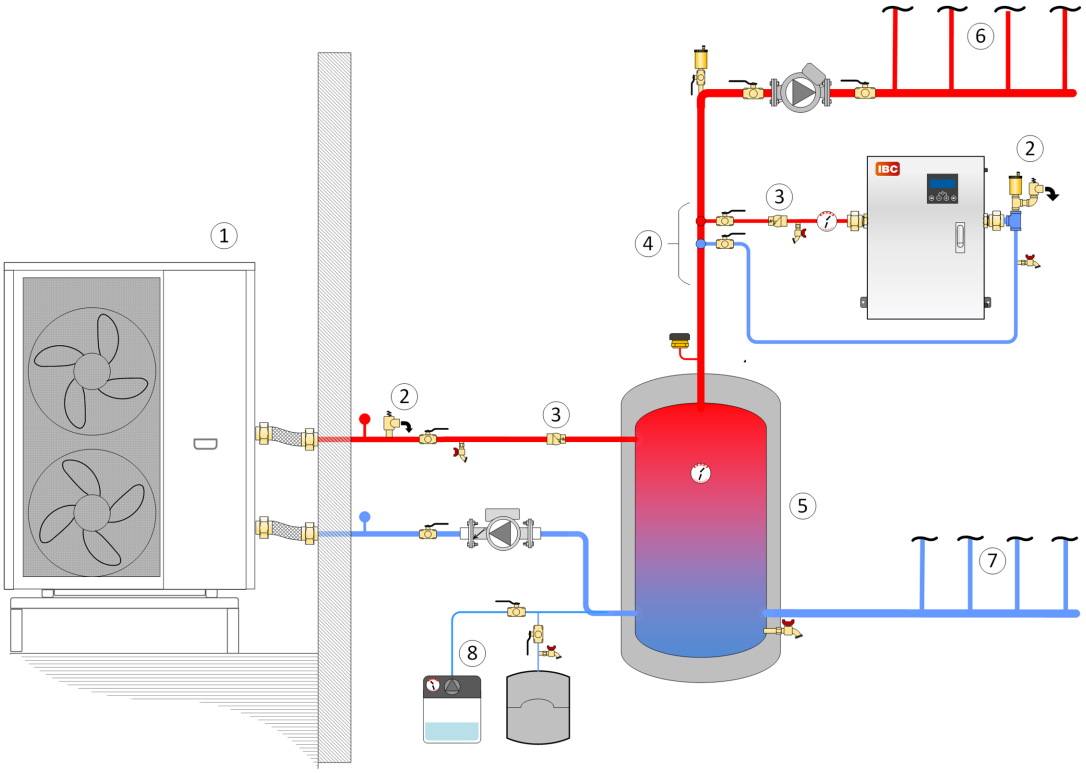


1	Pressure relief valve
2	Buffer tank; use short fat headers. Buffer tank needs vacuum breaker for cooling mode.
3	Recommended expansion tank connection point
4	Glycol fill tank (shown), or fill station with isolation closed
5	Supply piping to loads
6	Returns from loads

Figure 13 *Multiple hydronic heat pumps piping concept with buffer tank*

Note that multiple heat pumps should be staged using an external control such as the IBC Sky-35.

6.7.9 Multiple heat sources with buffer tank



1	Hydronic heat pump; system fluid circulates outdoors so typically requires glycol treatment.
2	High Efficiency Hydronic Gas Boiler or Electric boiler staged (by IBC Sky-35 controller) to supplement heat pump below system balance point.
3	Check Valves
4	Closely-spaced tees: max. four pipe diameters apart, min. eight pipe diameters straight piping upstream and four downstream
5	Buffer tank. Buffer tank needs vacuum breaker for cooling mode.
6	Supply to Heating System
7	Return from Heating System
8	Glycol fill tank

Figure 14 *Hydronic heat pump and backup boiler piping concept with buffer tank*

6.8 Using concrete slab as buffer

When an application is using a minimally-zoned concrete slab, that slab's thermal mass may be able to act as a thermal buffer. To determine whether the slab can protect your equipment from short-cycling, use this variation of the buffer tank formula:

$$A = \frac{t(Q_{heat\ source} - q_{load})}{147(\triangle T)d}$$

- A = minimum area of **smallest** concrete slab zone (ft^2)
- t = desired duration of heat source's on cycle; IBC recommends 8 (minutes)
- Q = heat source output rate, i.e. minimum output during warm weather (Btu/h)
- q = guaranteed rate of heat extraction from slab: may be zero (Btu/h)
- d = depth of slab (inches)
- ΔT = slab differential; IBC recommends 2 (°F)
- 147 = constant based on heat capacity of concrete and units used: (29.4 Btu/ft^3/°F) (60 min/hr) (0.0833 ft/in)

Large-zoned radiant floor systems (warehouses for example) may be able to do without a buffer tank by virtue of the thermal mass of the slab. The contractor must ensure the heat pump can meet the smallest load of the heating season without short-cycling: it is essential in this case that the **smallest** slab zone is large enough to absorb the heat pump output in warm weather. For this design IBC recommends, presuming 12-inch tubing centers and a four-inch slab, a minimum equivalent area of 135 square feet for the HPX 3 and **minimum** 169 square feet for the HPX 5.

6.9 Electrical connections

All electrical wiring to the hydronic heat pump (including grounding) must conform to local electrical codes and/or to the National Electrical Code, ANS/NFPA No. 70 – latest edition, or to the Canadian Electrical Code, C22.1 - Part 1.

6.9.1 Power management, quality and electrical protection

Note

The IBC hydronic heat pump (like any modern appliance that contains electronic equipment) must have a "clean" power supply, and is susceptible to power surges and spikes, lightning strikes and other forms of severe electrical "noise". Power conditioning equipment (surge protectors) may be required in areas where power quality is suspect.

In temporary or manual operation, for example in new construction heating, use a construction thermostat or jumper with an in-line switch to control calls to the hydronic heat pump. **Do not** turn off the heat by removing power to the unit.

6.9.2 240VAC line-voltage hook-up

Line-voltage wiring is done within the field-wiring box (see *Wiring diagrams on page 1*), located at the upper section of the service area. Connect the hydronic heat pump to the grid power using a separate, fused circuit and on/off contactor within sight of the unit. Use appropriately-sized wire in sheath or conduit properly anchored to the hydronic heat pump case for mains supply and pump circuits.

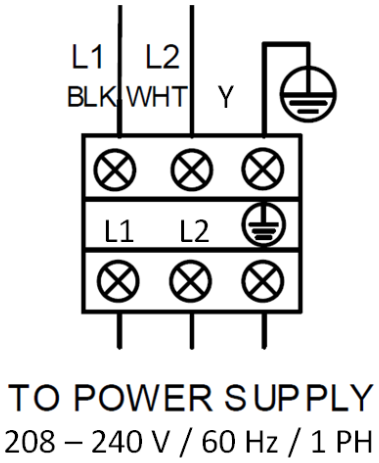
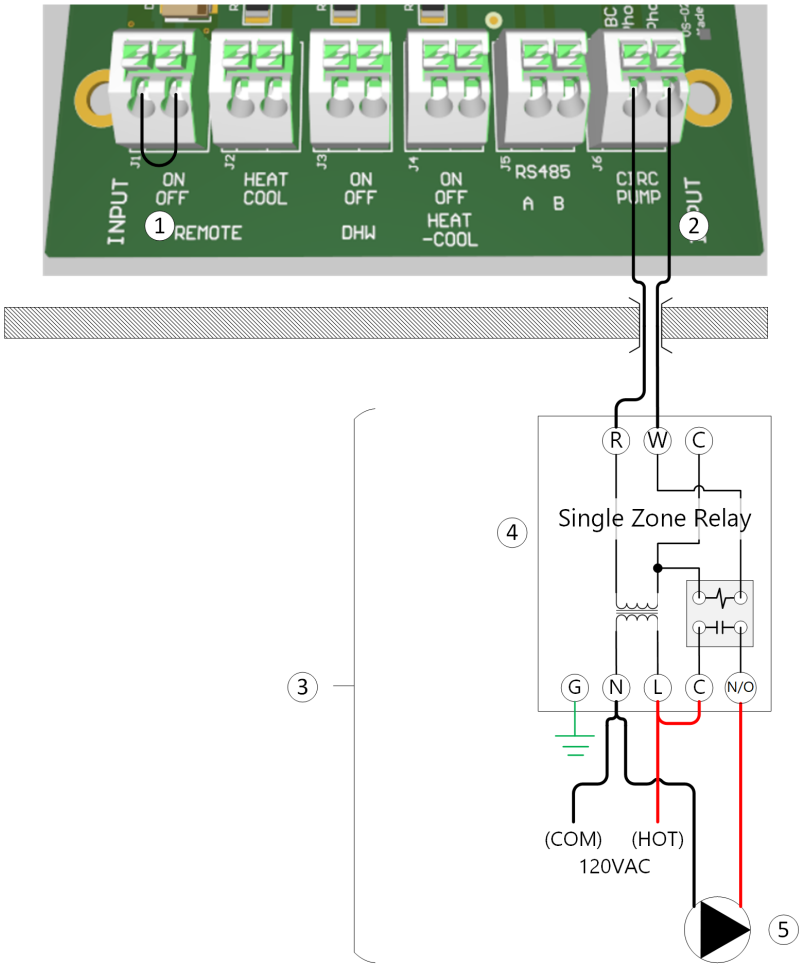


Figure 15 *Line voltage terminals*

6.9.3 Hydronic heat pump circulator

The hydronic heat pump circulator must be field-installed and wired. Bring low-voltage wires to the outside unit J6 terminals "CIRC PUMP" to switch a 24V relay circuit indoors, or use a pump control module as shown below:



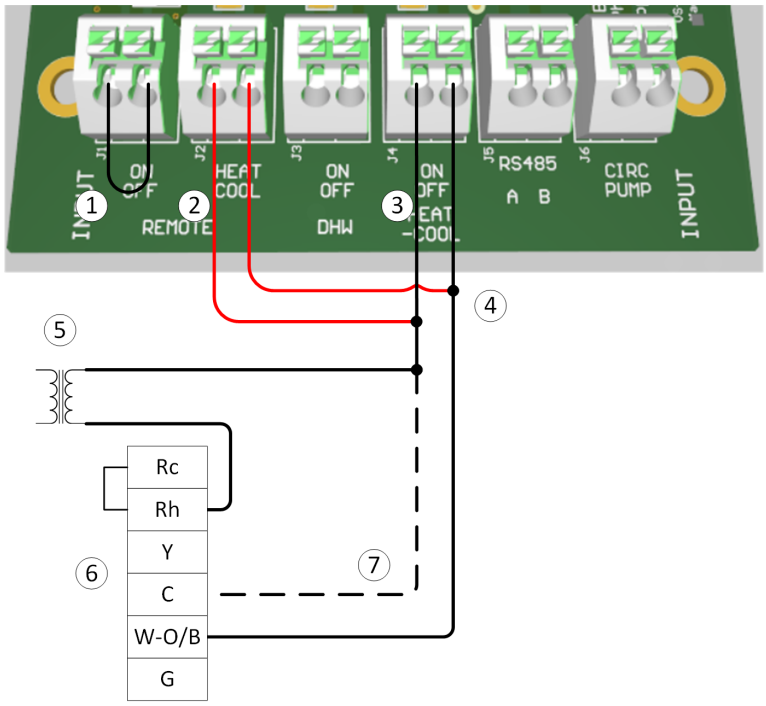
1	Jumper at J1 (interlock) (Outdoor wiring)
2	J6 terminal, switch for "CIRC PUMP" (Outdoor wiring)
3	Indoor wiring
4	Single zone relay (connections may vary by model)
5	HPX hydronic heat pump circulator (field-supplied)

Figure 16 *HPX Series circulator relay field wiring*

IBC recommends the application of the either the IBC Sky-35 module for load circulator control or, alternatively, using a pressure-activated load circulator for which control is unnecessary. See also *Control wiring overview on page 44*. The HPX Series does not control load circulators.

6.9.4 Thermostat wiring

To wire a thermostat for heating-only operation, wire the J2 (Heat Cool) and J4 (On Off Heat Cool) terminals in parallel as shown.



1	Jumper between J1 terminals (interlock)
2	J2 terminals: 24V from t-stat sets HPX to heating mode
3	J4 terminals: 24V from t-stat calls for operation
4	Pigtail between J2 and J4 terminals for heating-only applications
5	24V Transformer
6	Thermostat
7	Option for powered thermostats.

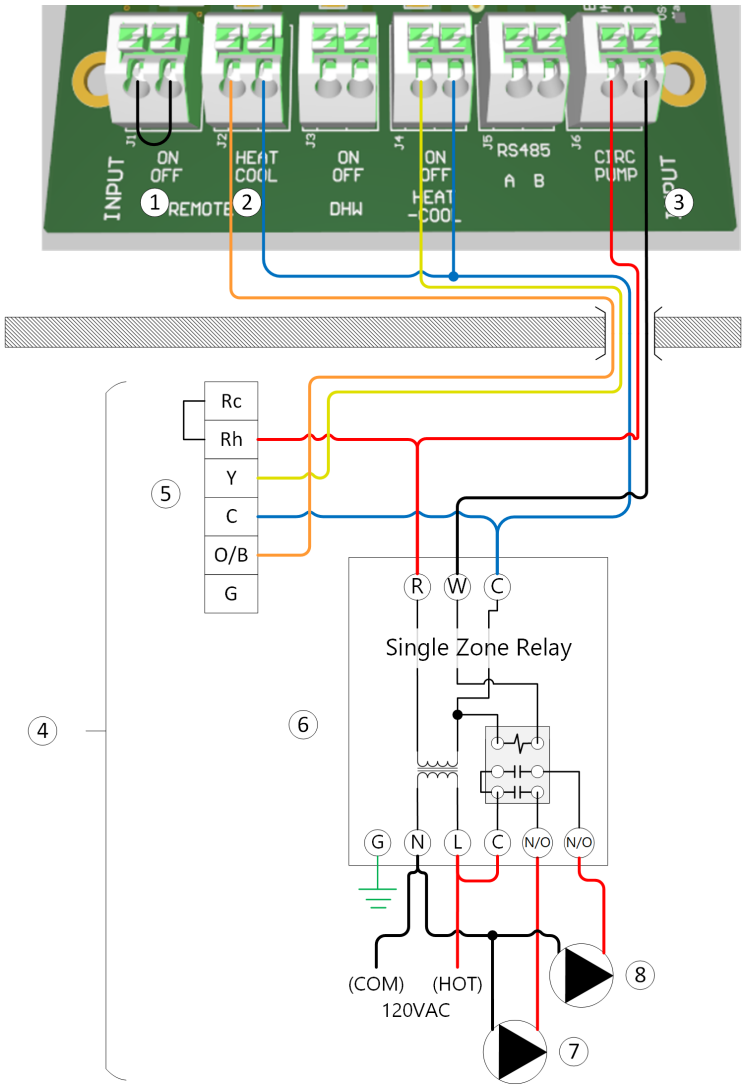
Figure 17 *HPX Series thermostat field wiring*

For a load with multiple zones (e.g. thermostats controlling zone valves), use a zone control module, or wire the end-switches of each zone valve in parallel and send a 24V signal through them to the J4 terminals on the HPX controller.

Ensure that there are no disturbing influences on the call-for-heat lines, for example from being run alongside line-voltage wires. Most power-stealing thermostats can be connected directly to the HPX Series terminals.

6.9.5 Control wiring overview

Combining the t-stat and pump wiring above, adding cooling and system pump control.



1	Jumper between J1 terminals (interlock)	5	Heat pump thermostat set to B type (reversing valve energized for heating)
2	24V to J2 terminals sets heating mode	6	Zone relay module
3	Switch on HPX for pump operation	7	Heat pump circulator (field-supplied)
4	Indoor wiring	8	Heat exchanger or load circulator (field-supplied)

Figure 18 *HPX Series Overview of control wiring*

6.9.6 Other wiring

Other optional low voltage connections to the control board include:

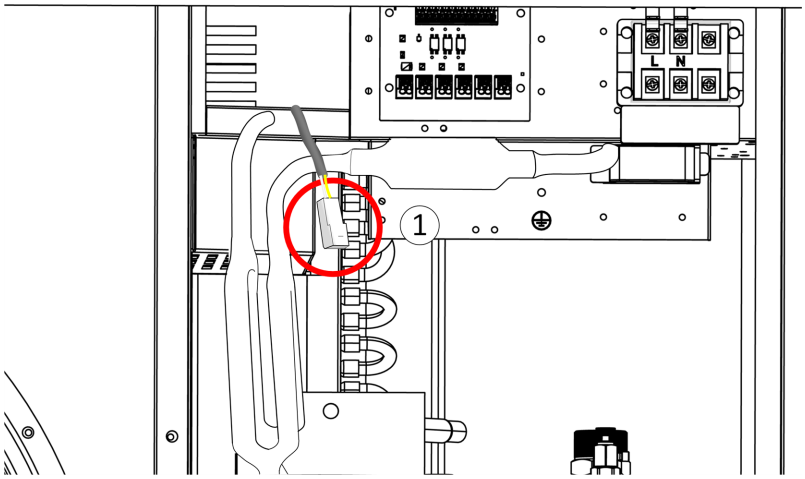
- An auxiliary Interlock at J1 terminals - for external safety devices as may be required by some jurisdictions, such as an external low-water cutoff. Shown in Figure above, as "Remote On/Off."

6.9.7 Buffer tank sensor wiring

IBC recommends the use of a buffer tank to separate the HPX Series operation cycles from the load operation cycles.

See separate manual IBC Sky-35 Controller for more information.

For stand-alone operation, attach the supplied 10KΩ tank sensor to the two-wire quick-connector near the field-wiring board.



1 Buffer tank 10KΩ sensor quick connector

Figure 19 *HPX Series buffer tank sensor field wiring connection*

IBC strongly recommends the use of a properly sized buffer tank with each system. Where a buffer tank is not used, IBC recommends the application of the either the IBC Sky-35 module for load control.

Intentionally left empty

7.0 About the hydronic heat pump controller

7.1 Operation with the IBC Sky-35 Controller (purchased separately)

All HPX Heat Pump setup and configuration can be done through IBC's Sky-35 controller. Using the Sky-35 controller gives you the advantage that control wiring to the HPX will consist of only two wires, i.e. a R485 communication cable. It also eliminates the need to run any wiring from the HPX outdoors to its circulator indoors, as this can also be Sky-35-controlled. For details, see separate document, the *IBC Sky-35 Controller Manual*.

7.2 Operation with the provided controller

The remainder of this chapter explains the use of the provided controller.

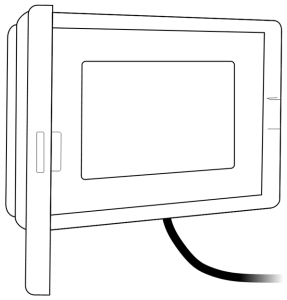


Figure 20 *HPX Controller*

7.3 Waking up the controller

Note that sometimes due to a programming change the controller will be in sleep mode and the display will be all grey. In this state, operation is limited to safety routines. To wake the controller up from sleep mode, touch the power button in the lower left corner.

7.4 Setting a target temperature

A target water temperature is set from the touchscreen controller main menu:

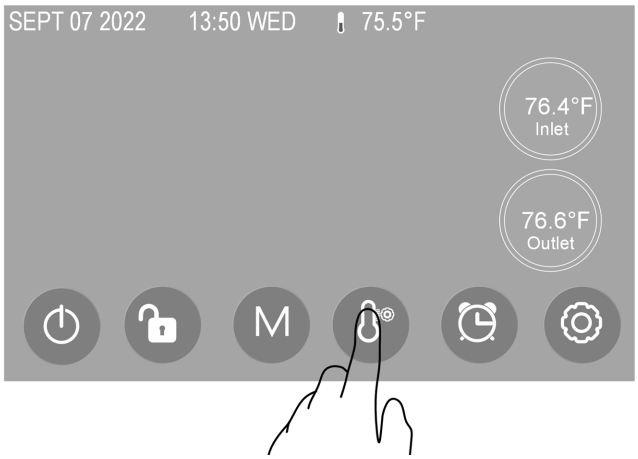


Figure 21 *Temperature setting button*

The Set Temp menu will appear. If you wish to change the units see *Adjusting Temperature Units in the Parameters Menu on page 55* If you wish to set a Reset line (or see a Reset menu and wish to set a simple Setpoint) see *Enabling Reset heating on page 51*.

7.5 Operating with a thermostat or wet contact

The HPX can also be operated with a thermostat or wet contact. This requires using the provided touchscreen interface to put the HPX into Remote Mode. Plug the touchscreen directly into the wiring bundle or, to use touchscreen indoors, use the provided 33ft. (10m) extension cable.

When the touchscreen controller is in sleeping mode the screen is blank. Tap the screen to wake it up. To enter the Settings menu, tap the Cog icon on the lower right.

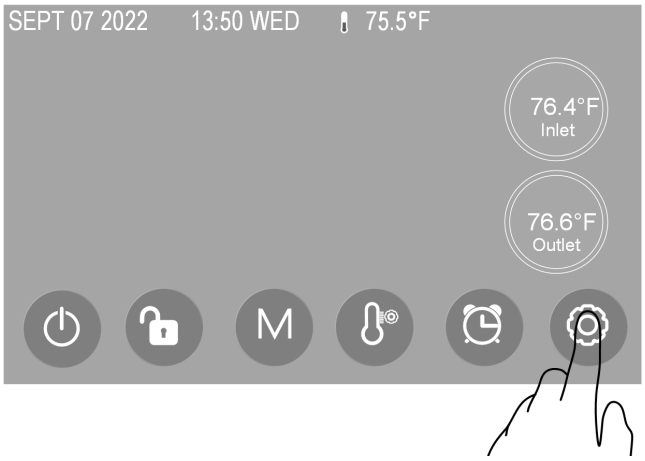


Figure 22 *Settings button*

In the Settings Menu there are five tiles. Select the upper right tile, **Factory**.

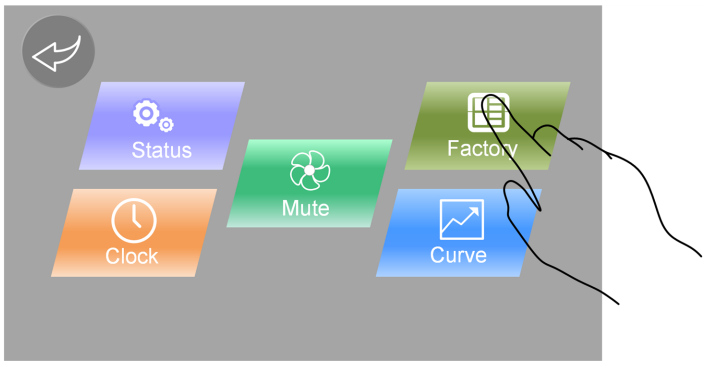


Figure 23 *Factory tile*

A keypad will appear. Enter the code **22**.

Figure 24 *Password keypad*

The Factory menu will appear: select **Parameters**

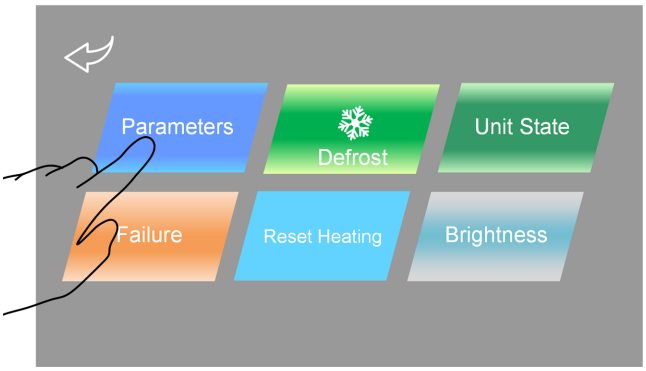


Figure 25 *Factory menu*

For control by a thermostat, a value on the first page, Parameter **H07**, **Display/Remote Control**, must be changed to **Remote Control**.

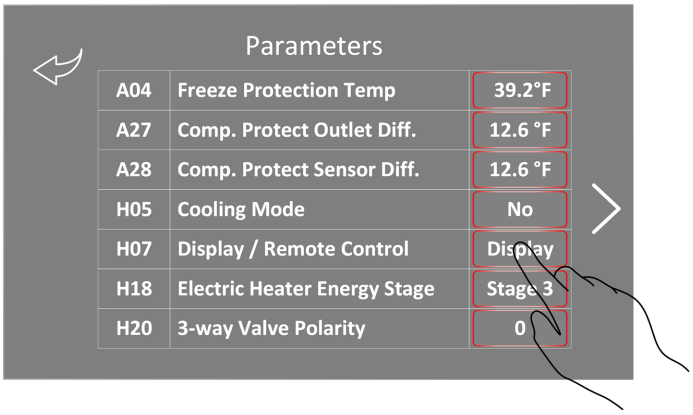


Figure 26 *H07, Parameters menu page 2*

Changes are saved by backing out from the Parameter menu.

7.6 Operating with buffer tank sensor

To operate the heat pump based on a buffer tank temperature, go to the Parameters table by the path **Settings > Factory > 22 > Parameters** described above. As thermostats do not determine the heating cycle, parameter **H07** should be set to the default setting **Display**. Press the **>** right arrow for the second Parameters page.

Parameter **H25**, **Target Sensor** must be changed from default **0-Outlet Water** to **2-Buffer Tank**.

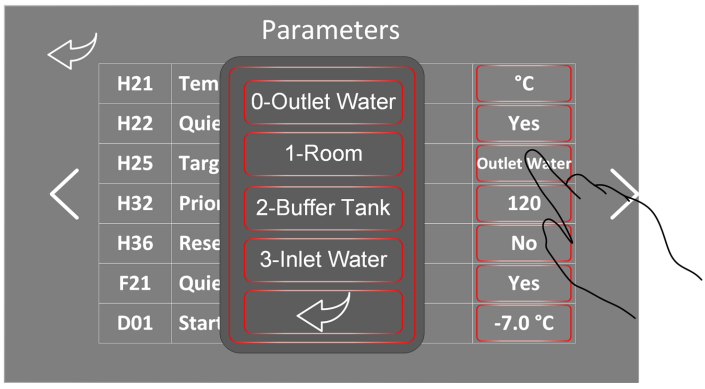


Figure 27 *H25 in Parameters menu page 2*

Press the **>** right arrow for the third Parameters page. The Buffer Tank target temperature is seen at **R02 Heating Setpoint**, although this can also be set from the main menu.

Parameter **R04**, **Differential below Heating Setpoint** should be set to the temperature drop that guarantees a minimum 8 min cycle time (see *Buffer tank sizing on page 36*). A typical minimum is 11°F/6°C. Parameter **R05**, **Differential above Heating Setpoint** is the differential above setpoint before heating cycle ends, i.e. would be set to **0** for no overshoot.

Changes are saved by backing out from the Parameter menu.

7.7 Enabling Reset heating

The amount of heat lost by a building is proportional to the temperature difference between the inside and the outside. Using a reset heating line you similarly scale the heat we put into the building. This allows you to maintain comfort as the outdoor temperature rises by using lower temperature water, which is particularly important for boosting heat pump efficiency.

To activate Reset Heating, from the main screen press the icon **(Settings) > Factory > 22 > Parameters > H36 Reset Heating> Yes**.

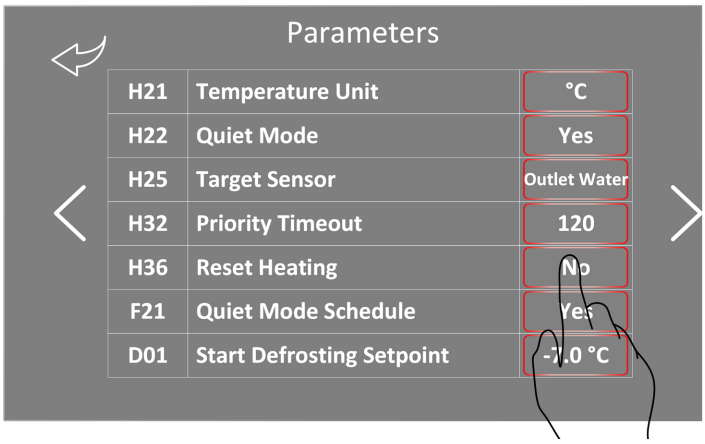


Figure 28 *H36, Parameters menu page 2*

Now that **Reset Heating** is activated, next you will fit a reset line to your installation's requirements.

On the main menu press the temperature setting icon .

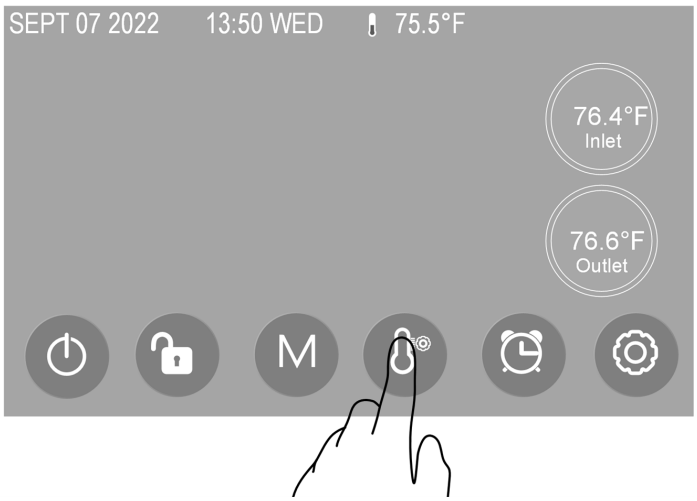


Figure 29 *Temperature Setting button*

This will bring you to the Reset Heating menu. The Reset menu is also available from the Settings menu.

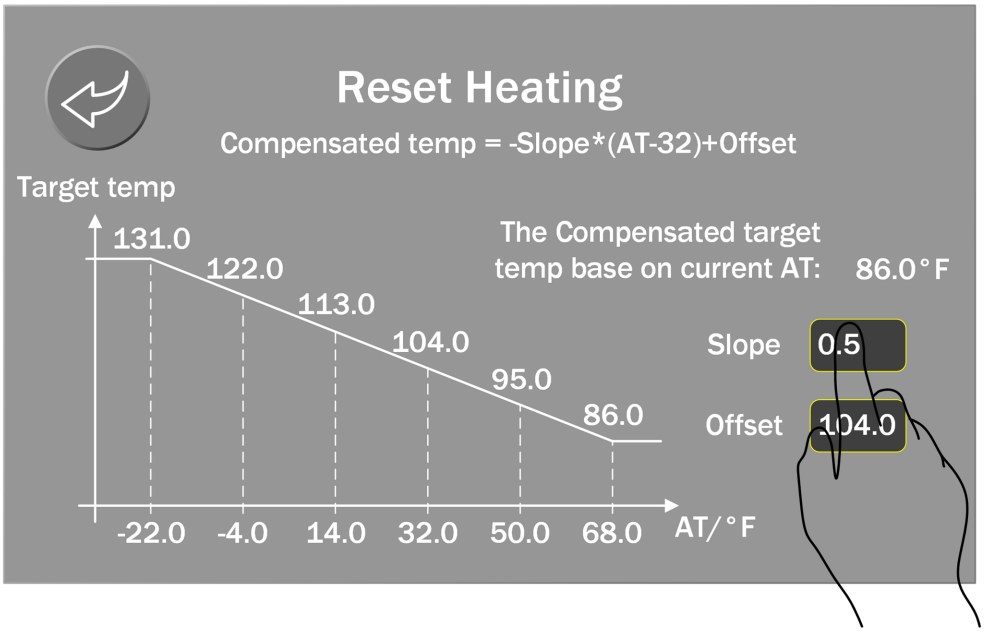


Figure 30 *Reset Heating menu*

(If you don't see it, verify that **H36** has been set to **Yes** as shown above.) Note **AT** stands for Ambient temperature (outdoors). In the **Reset Heating** menu you will enter two values:

- **Offset** This is the system supply water temperature when the outdoor (ambient) temperature is 32°F (0°C)
- **Slope** sets how gradually the water temperature changes from the offset. A low slope number will give a shallow reset, with little change over the heating season.

You can choose the reset line best suited to your installation using the following chart, then enter the chosen Slope and Offset:

Reset lines by Slope and Offset - Fahrenheit

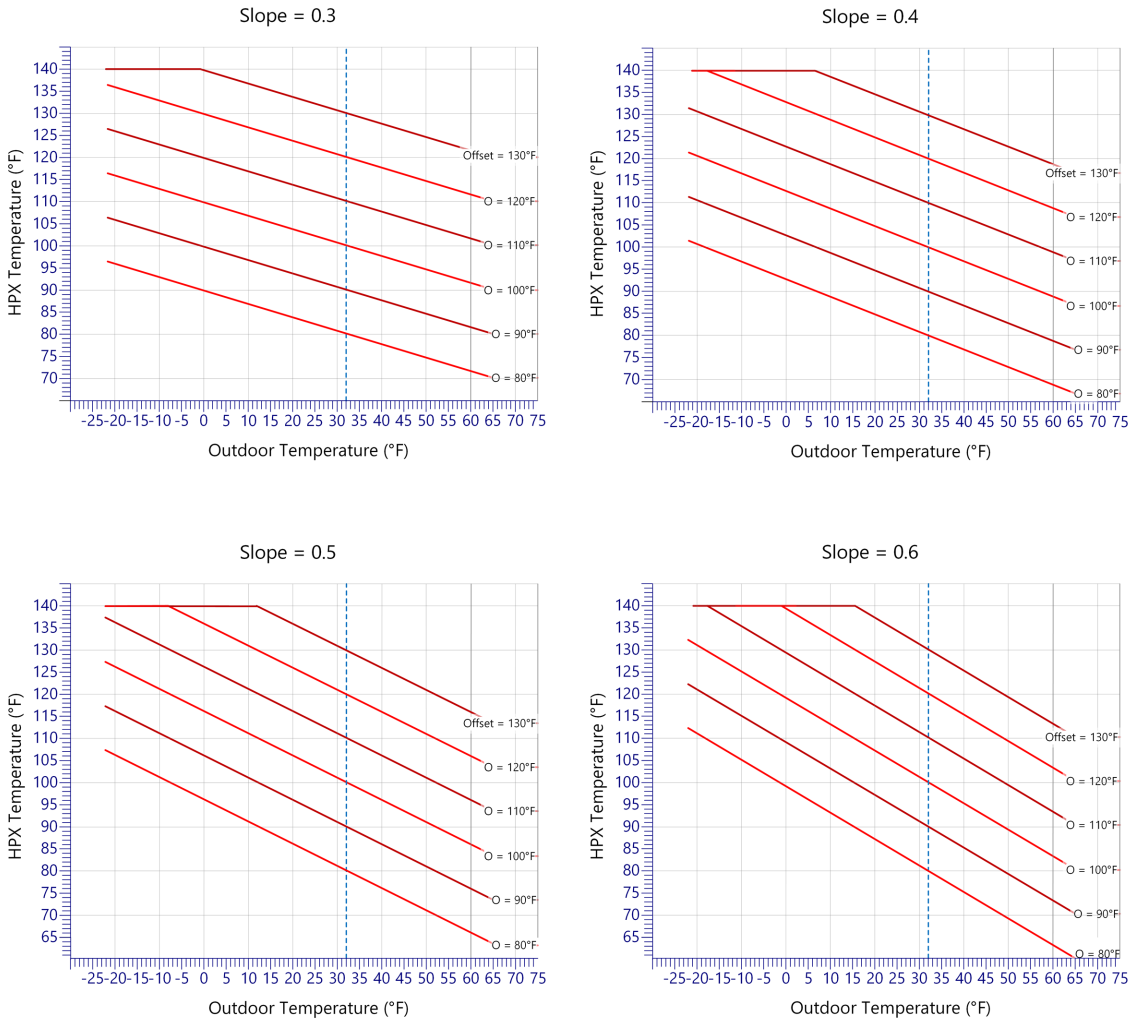


Figure 31 *Reset lines - °F*

Reset lines by Slope and Offset - Celcius

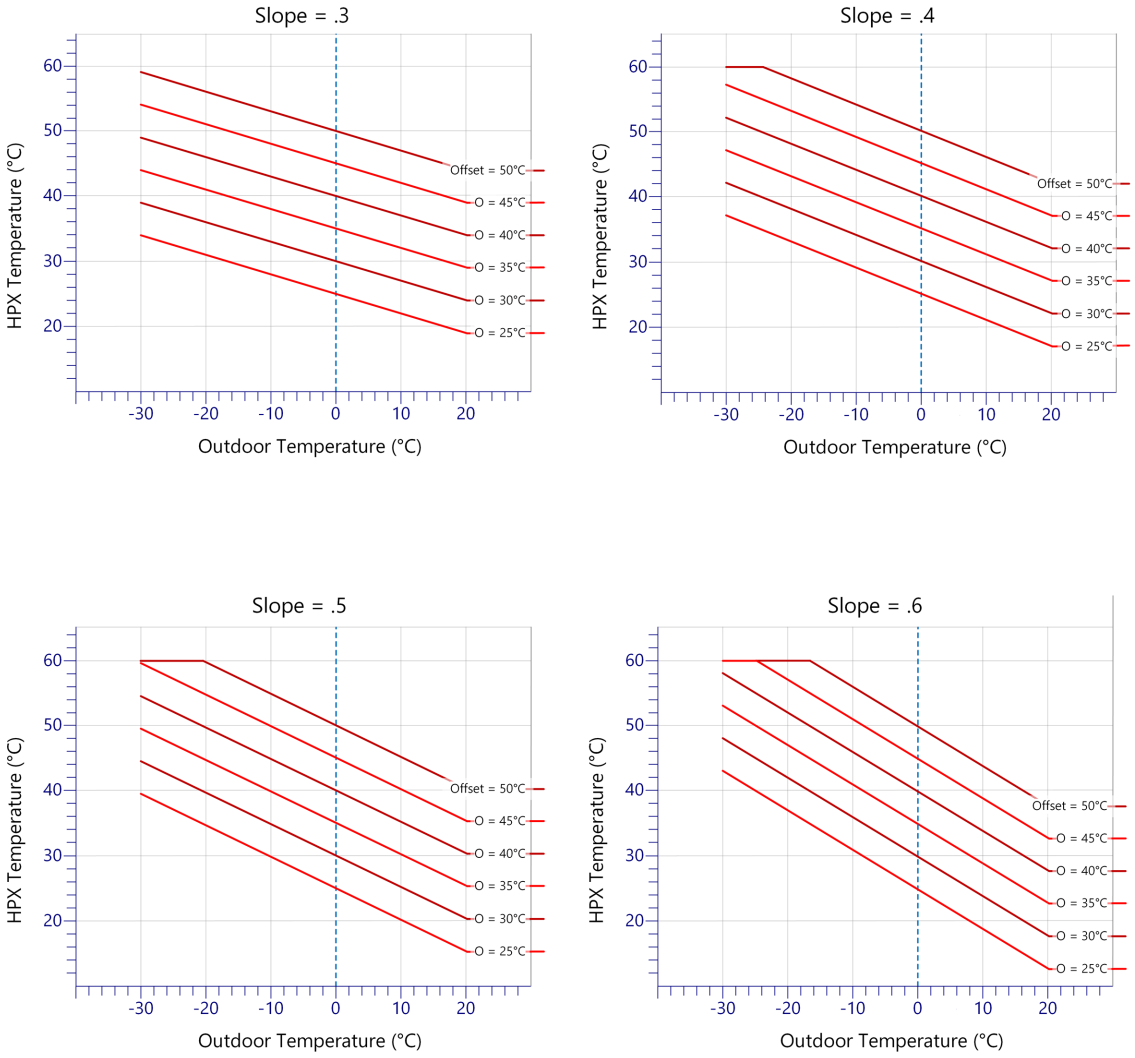


Figure 32 *Reset lines - °C*

Alternatively, you can get your variables by drawing your desired reset line using the blank graph in the Appendix; see *Reset line Worksheet on page 79*.

In some cases where there is a backup heat source the reset line will go above the maximum temperature you want from the heat pump: regardless of the Offset and slope entered, heat pump operation will not exceed parameter **R42**, **Maximum water heating temperature** (maximum and default value is 140°F / 60°C).

7.8 Adjusting Temperature Units in the Parameters Menu

To adjust the temperature units between °Fahrenheit and °Celcius, go to the Parameters table by the path **Settings > Factory > 22 > Parameters** described above. Press the **>** right arrow for the second Parameters page.

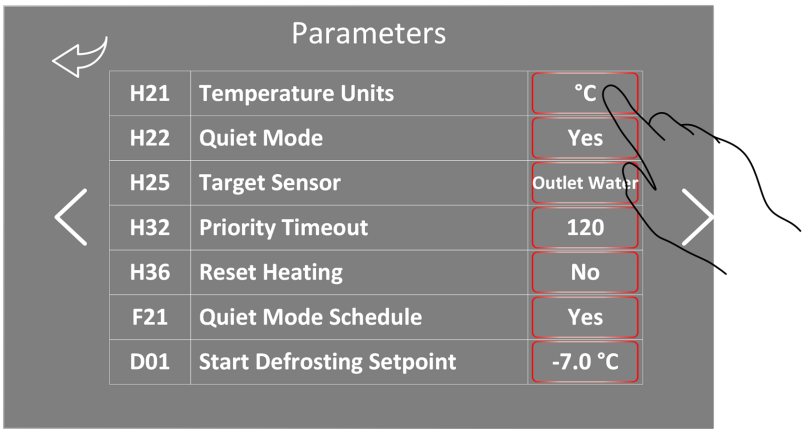


Figure 33 *H21- Temperature Units*

Parameter **H21**, **Temperature Unit**, allows selection of **0-°C** or **1-°F**. Changes are saved by backing out from the Parameter menu.

7.9 Adjustment in the Parameters Menu for Cooling

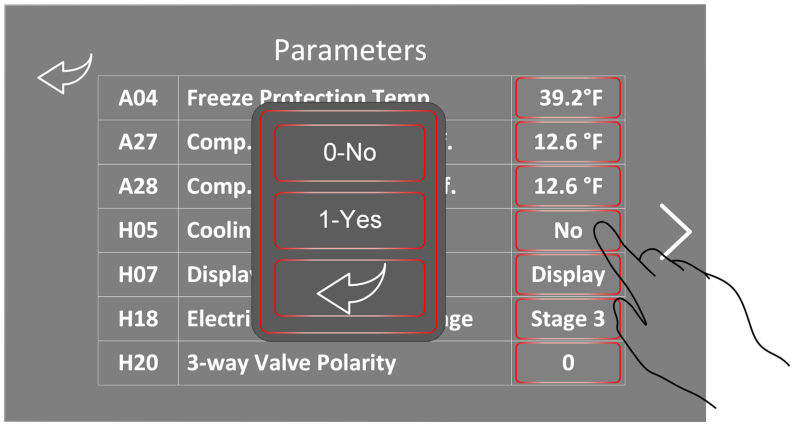


Figure 34 *H05 - Cooling enable*

To enable cooling mode, a value on the first page, Parameter **H05**, **Cooling Mode**, must be changed to **Yes**; see illustration above. Changes are saved by backing out from the Parameter menu.

Always Quiet Mode and Schedule Quiet Mode

You can set F21 **Always Quiet Mode** to **Yes** to always operate with reduced output and at a reduced noise level, or you can schedule reduced output and noise periods by setting F21 to **Yes** and also setting H22 **Schedule Quiet Mode** to **Yes**. Note that H22 **Schedule Quiet mode** overrides **Always Quiet Mode**.

7.10 Parameters Menu

Name	Description	Defaults	Ranges
A04	Freeze Protection Temp	4°C / 39.2°F	4°C - 10°C / 39.2°F - 50°F
A27	Compressor Protect Outlet Differential	7°C / 12.6°F	0°C - 20°C / 32°F - 68°F
A28	Compressor Protect Sensor Differential	7°C / 12.6°F	0°C - 20°C / 32°F - 68°F
H05	Cooling Mode	No	No / Yes
H07	Display Control / Remote control	Display	Display / Remote Control
H20	DHW 3-way Valve Polarity	Hot Water ON	Hot Water ON / Hot Water OFF
H21	Temperature Units	°F	°C / °F
H22	Always Quiet Mode	Yes	Yes / No
H25	Target Sensor	0-Outlet Water	0-Outlet Water 1-Room 2-Buffer Tank 3-Inlet
H32	Priority Timeout	120 minutes	1 – 300 min
H36	Reset Heating	No	No / Yes
F21	Schedule Quiet Mode	No	No / Yes
D01	Start Defrosting Setpoint	-7°C / 19.4°F	-30°C - 5°C / -22°F - 23°F
D02	Exit Defrosting Setpoint	13°C / 55.4°F	0°C - 30°C / 32°F - 86°F
D03	Defrosting Cycle	45 minutes	30 – 90 minutes
D04	Max Defrosting Time	8 minutes	1 – 12 minutes
R01	DHW Setpoint	55°C / 131°F	15°C - 58°C / 59°F - 136.4°F
R02	Heating Setpoint	55°C / 131°F	15°C - 60°C / 59°F - 140°F
R03	Cooling Setpoint	7°C / 44.6°F	5°C - 28°C / 41°F - 82.4°F
R04	Differential below Heating Setpoint	6°C / 10.8°F	0°C - 10°C / 0°F - 18°F
R05	Differential above Heating Setpoint	0°C / 0°F	0°C - 10°C / 0°F - 18°F
R37	Max. DHW Temperature	55°C / 131°F	15°C - 58°C / 59°F - 136.4°F
R42	Max. Heating Temperature	60°C / 140°F	20°C - 60°C / 68°F - 140°F
P01	Pump Exercise Mode	Interval	0-Ordinary 1-Special 2-Interval
P02	Pump Exercise Schedule	30 minutes	1 - 120 minutes
P03	Pump Exercise Duration	3 minutes	1 - 30 minutes

P05	Domestic Hot Water Pump Working Mode	Interval	0-Ordinary 1-Special 2-Interval
P06	Manual Pump Purge	No	No / Yes
P09	Pump Exercise Schedule	0 day	0 – 30 days
G01	Sanitization Setpoint	63.0°C / 145.4°F	60°C - 70°C / 140°F - 158°F
G02	Sanitization Duration	0 minutes	0 - 60 minutes
G03	Sanitization Start Time	1 o'clock	0 - 23 o'clock
G04	Sanitization Period	30 days	1 - 30 days
G05	High Temp. Sanitization	No	No / Yes

Table 10 *Parameters Menu*

Software and Firmware Versions

The software and firmware versions are listed on the last page of the **Load Status** menu. This document describes Software version 1.2 (main control board) and Firmware version 1.2 (display module).

8.0 Before operating the hydronic heat pump

Danger

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance. If you smell gas vapors, do not try to operate any appliance - do not touch any electrical switch or use any phone in the building.

Do not use this hydronic heat pump if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the system that has been under water.

Checklist for electrical conditions and water connections

Checking electrical conditions	Check
Check all line voltage electrical connections to ensure all connections are correct and tight.	☐
Check thermostat connections.	☐
Thermostat in a suitable location.	☐

Checking piping connections	Check
All connections are pressure tested and leak free.	☐
All piping flushed to ensure all air is removed.	☐
A check valve is installed and the external pump circulates the water in the correct direction.	☐

Checking outside unit	Check
The unit is mounted above the snow line.	☐
Air circulation around the unit is unobstructed.	☐
Penetrations have been sealed.	☐

Powering on the Hydronic Heat Pump	Check
Perform a final check of electrical wiring, and provide power to the hydronic heat pump to initialize operation.	☐

Intentionally left empty

9.0 Heat Pump Operation

Before operating the appliance, there are some important checks that need to be performed. For more information, see *Before operating the hydronic heat pump on page 1*.

9.1 Starting and Shutting Down the Heat Pump

Start-up Checklist	Check
With the hydronic heat pump power turned off, check that all electrical connections are tight.	☐
Check with a gauge that the system pressure is stable and appropriate for the application: at all times it should be between 8 psi and 50 psi.	☐
Check that glycol concentration is between 25% and 50% as required.	
A pressure relief valve must be installed on the system.	☐
Perform a thorough visual check for any leaks or signs of corrosion.	☐

Intentionally left empty

10.0 Service and maintenance

Inspection of the hydronic heat pump is to be performed annually by a qualified service technician.

Caution

The owner is responsible for general care of the hydronic heat pump. Improper maintenance may result in a hazardous condition.

10.1 Maintenance checklist for homeowner

Maintenance Required	Frequency	Check
Inspect system for unusual noises. Call your local heating contractor for service if needed.	As needed	☐
Keep combustible materials and flammable liquids and vapors away from the hydronic heat pump.	As needed	☐
Inspection of the unit is to be performed annually by a qualified service technician.	Annually	☐
Keep outdoor unit grill free of paper, leaves, grass trimmings etc.	As needed	☐

10.2 Maintenance checklist for heating contractor

Caution

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Maintenance Required	Check
Check calibration of thermometers and pressure gauges	☐
Clean heat exchangers	☐
Clean water-side strainers	☐
Exercise all manual bypass and isolation valves	☐
Check expansion tank charge	☐
Obtain water sample	☐
Evaluate water quality	☐
Check glycol concentration and acidity	☐
Check / tighten electrical connections	☐
Test operation of all safety controls and devices	☐

Review logs	☐
Observe noises / vibrations / leaks / puddles	☐

As the refrigeration system is hermetically sealed, the compressor oil is likely to be in good condition. However, in the event of a compressor motor winding short, acidic oil is a possibility.

11.0 Troubleshooting

This section includes various conditions as well as possible solutions. Often, a problem can be identified and solved through basic checks: confirming the electrical power supply and resetting the thermostat control. Below are some common troubleshooting issues including fixes.

1. Preliminary Checks
    a. Confirm power to the hydronic heat pump: check that the display is lit.
    b. Check that the hydronic heat pump is not in a safety lockout.
    c. Ensure wiring is clean and secure.
    d. Confirm that the water pressure is within specifications.
2. Electronics Components Checks
    a. See sections on checking the status of various control circuit components such as:
        i. Temperature sensors
        ii. Water flow sensor
        iii. Water high limit switch
3. Symptoms, Diagnoses and Fixes
    a. See sections covering diagnoses and fixes including:
        i. Cycling
        ii. Temperature
        iii. Miscellaneous

11.1 Electronic components

This section details the method for troubleshooting the non-standard electronic components on the hydronic heat pump.

11.1.1 Temperature sensors

The resistance of the temperature sensors varies inversely with temperature. To test, measure the temperature of the sensed environment and compare with the value derived from the measurement of the resistance (obtained by connecting a good quality test meter capable of measuring up to 5,000 kΩ (5,000,000Ω) at the controller end of the sensor lead).

To obtain a resistance reading, remove power to the hydronic heat pump. For the supply water and return water temperature sensors, remove the wire leads by disconnecting their respective Molex connectors. Place multi-meter probes into the sensor’s female Molex connector socket. Do not apply voltage to the sensor, as damage may result.

11.2 Troubleshooting error messages

ERROR MESSAGES		
Code	**Error Description**	**Fix / Comment**
P01	Inlet temperature sensor fault	Check resistance across inlet temperature sensor circuit AI/DI 01
P02	Outlet temperature sensor fault	Check resistance across outlet temperature sensor circuit AI/DI 02
P04	AT sensor fault	Check resistance across ambient temperature sensor circuit AI/DI 04
P153	Coil temperature sensor fault	Check resistance across coil temperature sensor circuit AI/DI 03
P17	Suction temperature sensor fault	Check resistance across suction temperature sensor circuit AI/DI 05. Error may be logged without alarm icon appearing on display.
P181	Exhaust temperature sensor fault	Check resistance across exhaust temperature sensor circuit AI/DI 18
P182	Exhaust overtemp fault	Check compressor for high outlet temperature.
P191	Antifreeze temperature sensor fault	Check resistance across antifreeze temperature sensor circuit AI/DI 06
PP1	High side pressure sensor fault	Check high side pressure sensor for open line or short
PP2	Suction pressure sensor fault	Check low side pressure sensor for open line or short
P101	Inlet EVI temperature sensor fault	Check resistance across inlet EVI temperature sensor circuit AI/DI 10
P102	Outlet EVI temperature sensor fault	Check resistance across outlet EVI temperature sensor circuit AI/DI 11
TP	Low ambient temperature protection	Ambient temperature sensor is reading below -22°F /-30°C
E032	Flow switch protection	Check water level and pump operation; check flow switch is closing circuit AI/DI 14
E04	Electric overheat protection	Electric heater has a time-based thermal limit
E051	Compressor overcurrent shutdown fault	Check compressor for excessive amperage draw.
E065	Outlet water temp	May be provoked by P153 (see above)
E08	Communication fault	Check wire connector between touchscreen controller and main board
E081	Fan communication fault	Check wire connector between main board and fan speed control board

ERROR MESSAGES		
Code	**Error Description**	**Fix / Comment**
E11	High pressure [HP] protection	Monitor operating pressure, and check pressure switch safety circuit AI/DI 12
E12	Low pressure [LP] protection	Monitor operating pressure, and check pressure switch safety circuit AI/DI 13. HPX may require power cycle after pressure resoled.
E171	Freeze protection	Return water temperature is low.
E19	Primary (outdoors) freeze protection	Ambient temperature is low.
E29	Secondary (outdoors) freeze protection	Ambient temperature is low.
F031	DC fan motor 1 fault	Check for poor wire connection to fan motor. Check for locked rotor state.
F031	DC fan motor 2 fault	Check for poor wire connection to fan motor. Check for locked rotor state.

11.2.1 Temperature issues

Temperature issues		
Issue	**Diagnosis**	**Fix**
Low heat	Operating temperature too low.	Increase temperature target.
	Load configuration improperly set up.	Review load configuration parameters.
	Hydronic Heat Pump undersized.	Compare heat load calculation to maximum unit output.
	Air trapped within system.	Bleed system as required.
	Improper system piping.	Refer to recommended piping guidelines for the respective model.
	System pump undersized.	Check pump manufacturer's data / check temp differential across heat exchanger.
	Defective thermostat.	Refer to manufacturer's instructions.
	Cycling on operating / safety controls.	Check operation with ohmmeter / voltmeter.
	System radiation undersized.	Check manufacturer's rating tables for capacity per foot.
Temperature exceeds mercury thermostat setting	Incorrect anticipator setting.	Check with ammeter.
	Thermostat not level.	Check level.
One or more zones do not heat properly	Air trapped within zone(s) piping	Vent system / zone as required.
	Low radiation/ excessive heat loss.	Check actual length of pipe using radiation / heat loss calculation.
	Low flow rate to zone(s).	Check temperature drop across zone.
	Defective zone valve/ zone circulator.	Check operation per manufacturer's instructions.

11.2.2 Miscellaneous issues

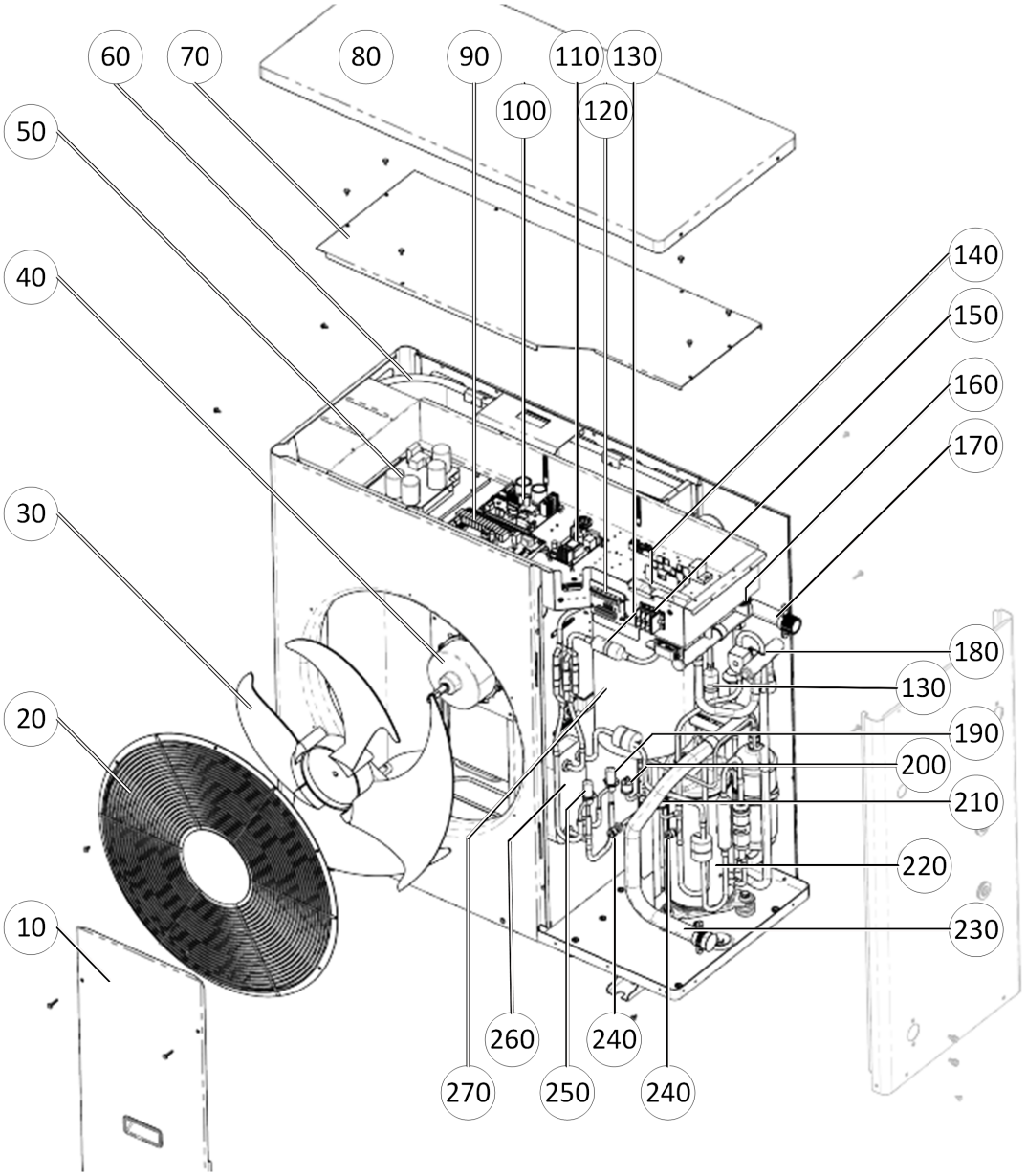
Miscellaneous issues		
Issue	**Diagnosis**	**Fix**
'Ghost' call for heat.	Triac or 'Power-robbing' thermostat sending current to hydronic heat pump.	Remove connections from hydronic heat pump to confirm that stray voltage, or current induced in thermostat wiring, is source of nuisance signal. If so, replace the Power Robbing thermostat or isolate the thermostat with a relay.

11.2.3 Cycling issues

Cycling issues		
Issue	**Diagnosis**	**Fix**
Rapid Cycling	Incorrect settings or defective thermostat.	Check operation. Refer to manufacturer's instructions. Check setting with ammeter.
	Air in system or marginal water flow.	Bleed / purge system as required. Confirm adequate pump size and temp rise in the heat exchanger.
	Low water flow due to improper piping.	Review pressure drop of hydronic heat pump piping.
	Low water flow due to restrictions in water pipe.	Check temperature differential across zone / heat exchanger.
	Low radiation.	Check actual amount of radiation per zone and refer to manufacturer's rating tables.
	Appliance Oversized.	Compare heat load calculation to minimum hydronic heat pump output.
	Improperly set or defective controls.	Check operation with ohmmeter / voltmeter.

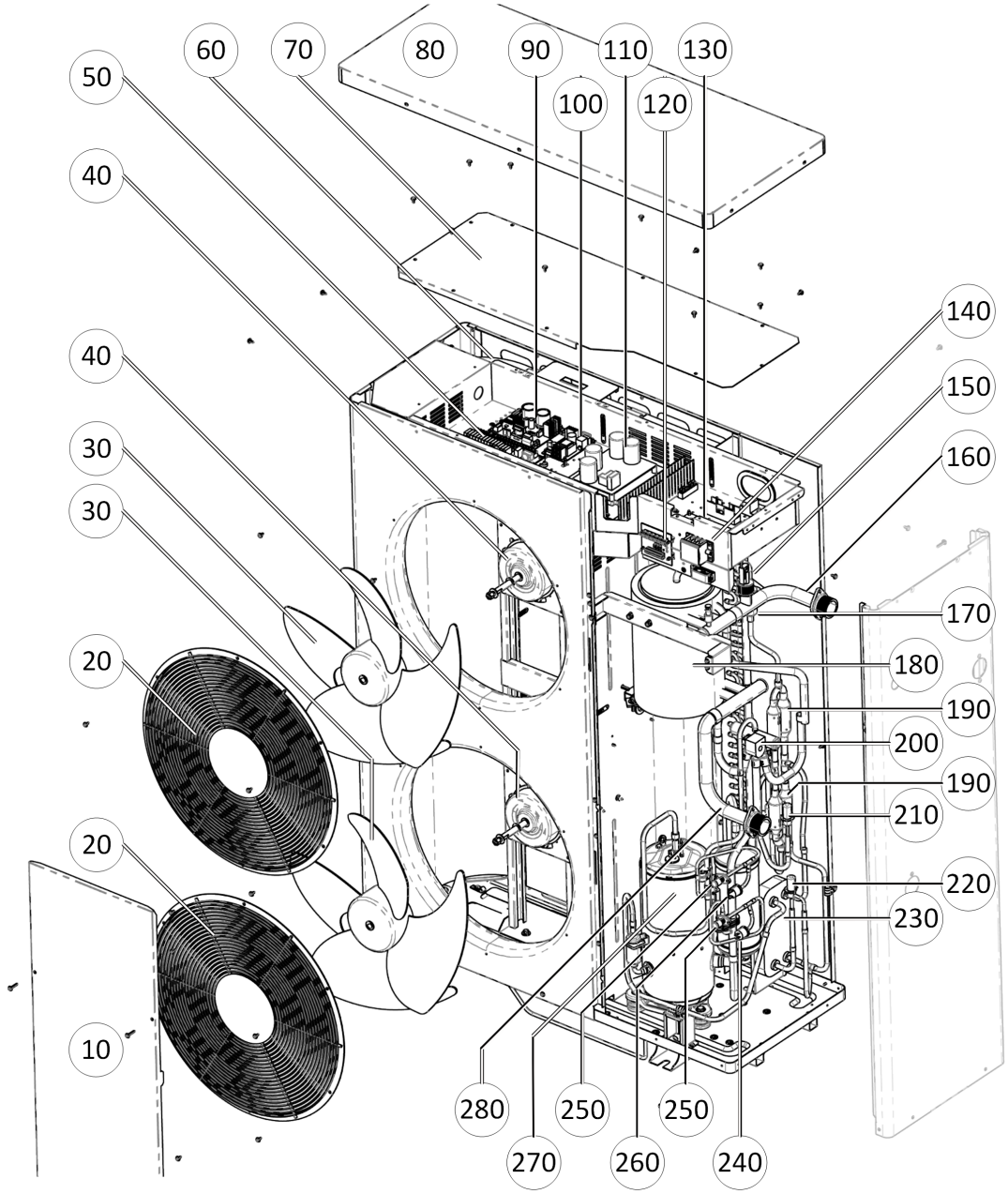
12.0 Exploded views of the HPX series Heat Pumps

HPX 3 parts diagram



Item ID	Description	P-kit replacement #	Quantity
10	Front door, HPX 3	P-1921	1
20	Axial fan grill cover, HPX 3	P-1915	1
30	Axial fan blade, HPX 3	P-1913	1
40	Axial fan DC motor, HPX 3	P-1911	1
50	Compressor driver module, HPX 3	P-1909	1
60	Outdoor fin coil, HPX 3	P-1925	1
70	Top controls cover, HPX 3	P-1919	1
80	Top chassis cover, HPX 3	P-1917	1
90	Main control board	P-1905	1
100	Fan speed control board	P-1906	1
110	Switch supply board	P-1907	1
120	Low-voltage protection board	P-1903	1
130	Refrigerant filter	P-1933	1
140	Inverter driver filter board	P-1908	1
150	Power interface, HPX 3	P-1901	1
160	Flow switch, HPX 3	P-1942	1
170	Outlet connector pipe, HPX 3	P-1936	1
180	Reversing valve, HPX 3	P-1939	1
190	EVI expansion valve	P-1934	1
200	Low pressure switch	P-1931	1
210	High pressure switch	P-1932	1
220	Compressor, HPX 3	P-1923	1
230	Inlet connector pipe, HPX 3	P-1935	1
240	Refrigerant test port, HPX 3	P-1941	2
250	Electronic expansion valve	P-1930	1
260	Plate heat exchanger, HPX 3	P-1929	1
270	Tube-in-shell heat exchanger, HPX 3	P-1927	1
	Refrigerant check valve (not shown), HPX 3	P-1948	2
	Display unit, HPX 3 (not shown)	P-1900	1
	Display extension cable (not shown)	P-1904	1
	Buffer tank temperature sensor (not shown)	P-1902	1

HPX 5 parts diagram



10	Front door, HPX 5	P-1922	1
20	Axial fan grill cover, HPX 5	P-1916	2
30	Axial fan blade, HPX 5	P-1914	2
40	Axial fan DC motor, HPX 5	P-1912	2

50	Main control board	P-1905	1
60	Outdoor fin coil, HPX 5	P-1926	1
70	Top controls cover, HPX 5	P-1920	1
80	Top chassis cover, HPX 5	P-1918	1
90	Fan speed control board	P-1906	1
100	Switch supply board	P-1907	1
110	Compressor driver module, HPX 5	P-1910	1
120	Low-voltage protection board	P-1903	1
130	Inverter driver filter board	P-1908	1
140	Power interface, HPX 5	P-1944	1
150	Flow switch, HPX 5	P-1947	1
160	Outlet connector pipe, HPX 5	P-1938	1
170	Refrigerant filter (obscured behind outlet pipe)	P-1933	4
180	Tube-in-shell heat exchanger, HPX 5	P-1928	1
190	Refrigerant check valve, HPX 5	P-1940	1
200	Reversing valve, HPX 5	P-1943	1
210	Electronic expansion valve	P-1930	1
220	EVI expansion valve	P-1934	1
230	Plate heat exchanger, HPX 5	P-1945	1
240	Low pressure switch	P-1931	1
250	Refrigerant test port, HPX 5	P-1946	1
260	High pressure switch	P-1932	1
270	Compressor, HPX 5	P-1924	1
280	Inlet connector pipe, HPX 5	P-1937	1
	Buffer tank temperature sensor (not shown)	P-1902	1
	Display unit, HPX 5 (not shown)	P-1949	1
	Display extension cable (not shown)	P-1904	1

Optional Parts: Description	P-kit replacement #
Outdoor Sensor	P-9067
Air Vent Piping Kit	P-195
External Tridicator	P-9014
Pressure Relief Valve: 30 psi	P-9009
Pressure Relief Valve: 45 psi	P-9020
Pressure Relief Valve: 50 psi	P-9134

Installation & Commissioning Report

Model Number _____ Serial Number _____

Date of Installation _____ Address of installation _____

User contact information _____

Installer Information (Company & Address)_____

Phone/Fax/E-mail _____

Circuit Breaker # ____ Labeled? ☐

Power supply wire gauge _____

☐Leak testing completed

☐ System Cleaned and Flushed (type of cleaner used) _____

☐ System Filled (type/concentration of any glycol/chemicals used) _____

☐ Air purge completed

☐ Relief Valve correctly installed and piped Relief valve “try lever” test performed

☐ Owner advised and instructed in the safe operation and maintenance of the hydronic heat pump and system.

☐ Information regarding the appliance and installation received and left with owner

Commissioning has been completed as listed on this report - Installer's Signature _____

Intentionally left empty

13.0 Appendices

Wiring diagrams

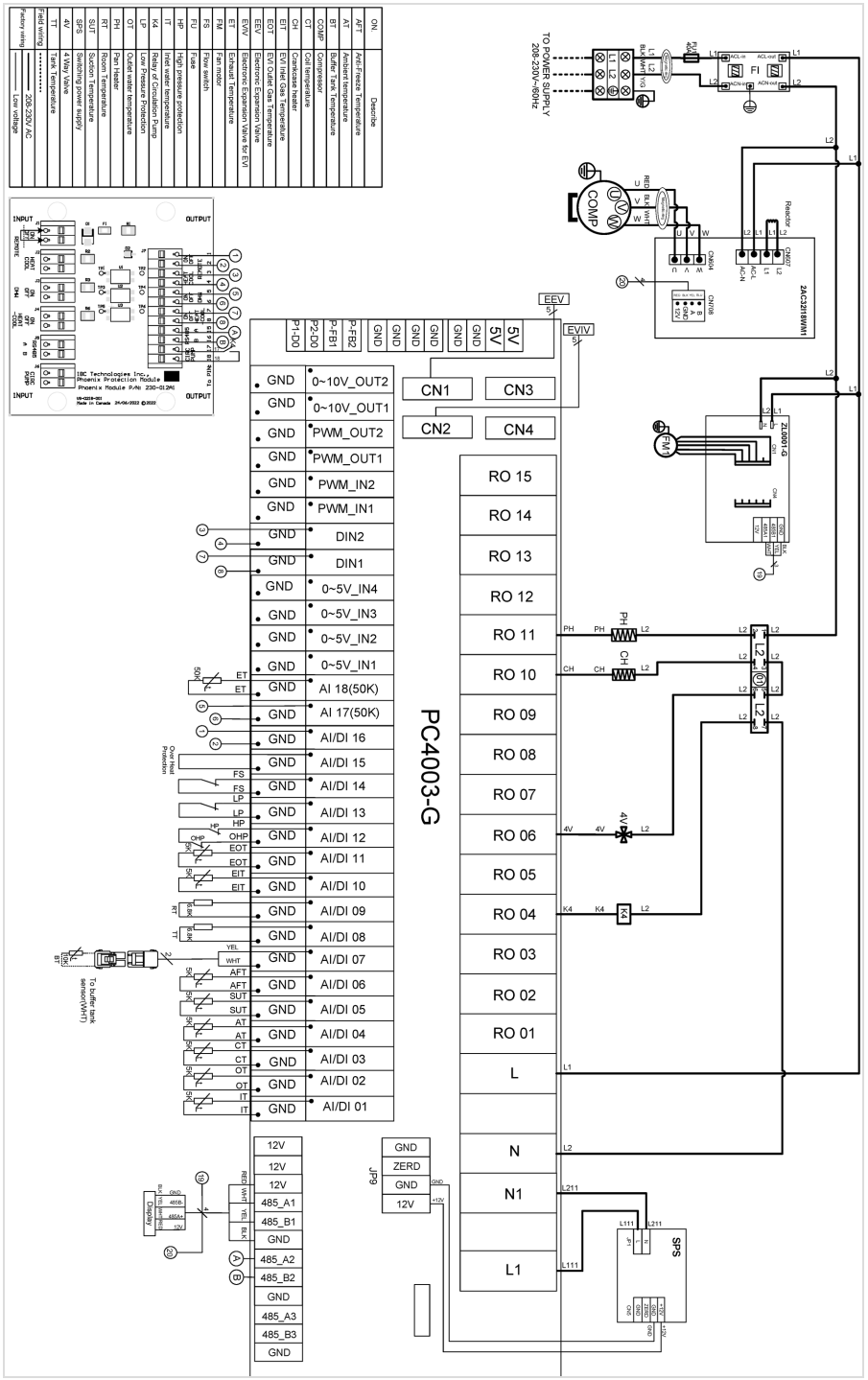


Figure 35 *HPX 3 internal wiring diagram*

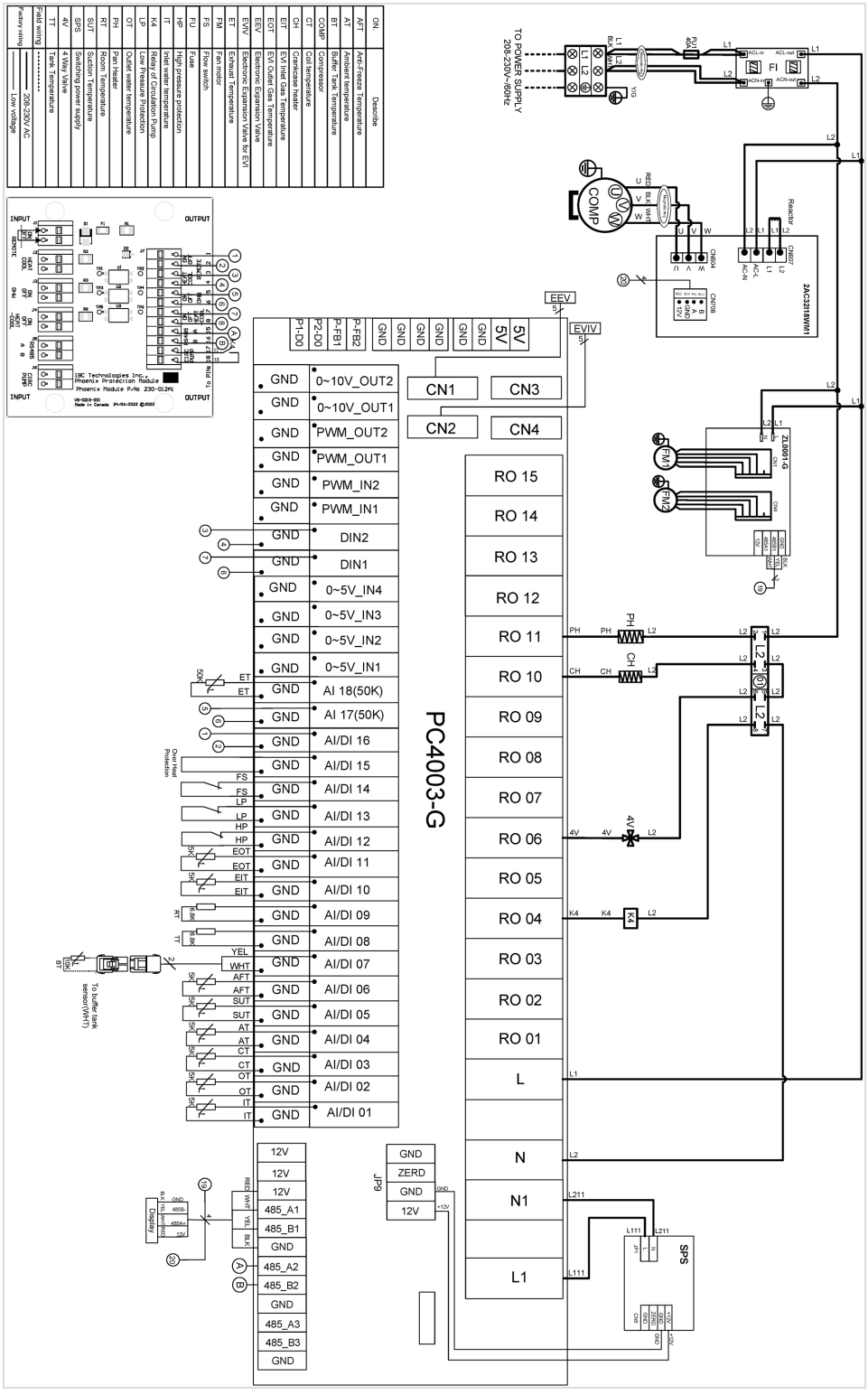


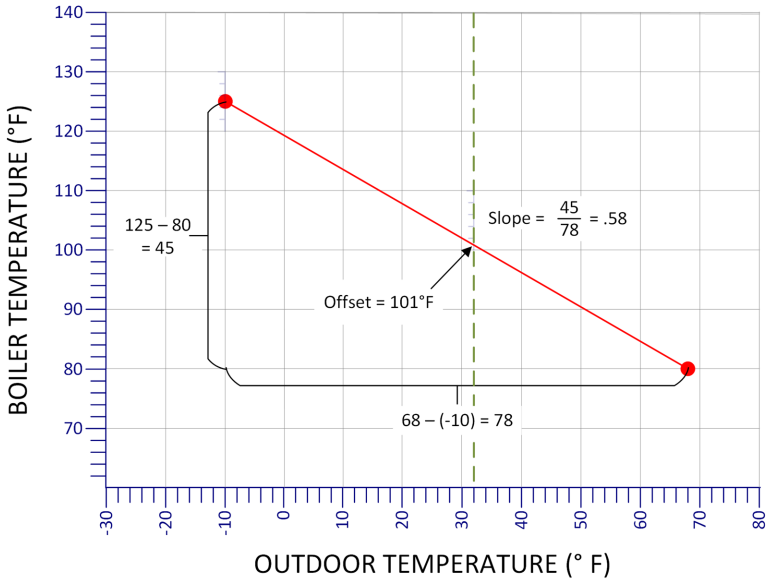
Figure 36 *HPX 5 internal wiring diagram*

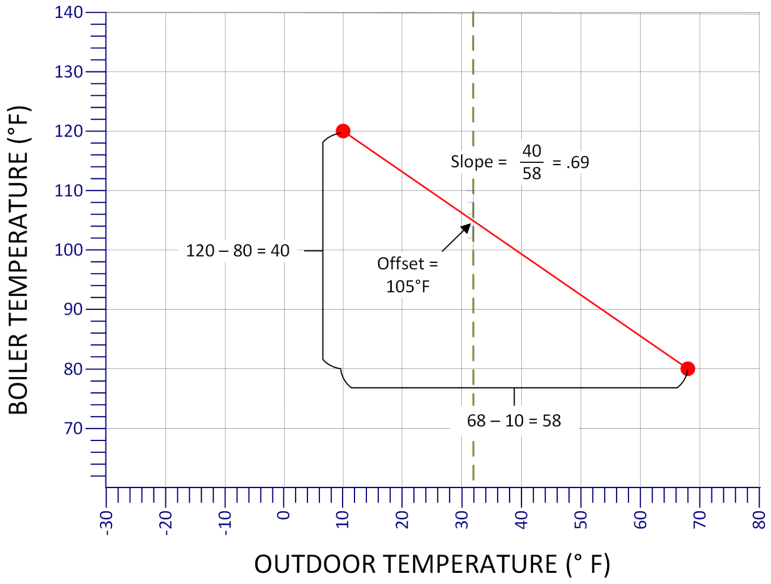
Reset line Worksheet

When setting up a Reset heating line (see *Enabling Reset heating on page 51*) you need to enter a **Slope** and an **Offset**. For these you can:

» 1. draw your line with the desired supply temperatures, from a design outdoor temperature to your summer shutdown temperature

» 2. read the 32°F intersection for the **Offset**. Calculate the **Slope** by dividing the water temperature differential by the outdoor temperature differential





You'll need to round your Slope to one decimal place.

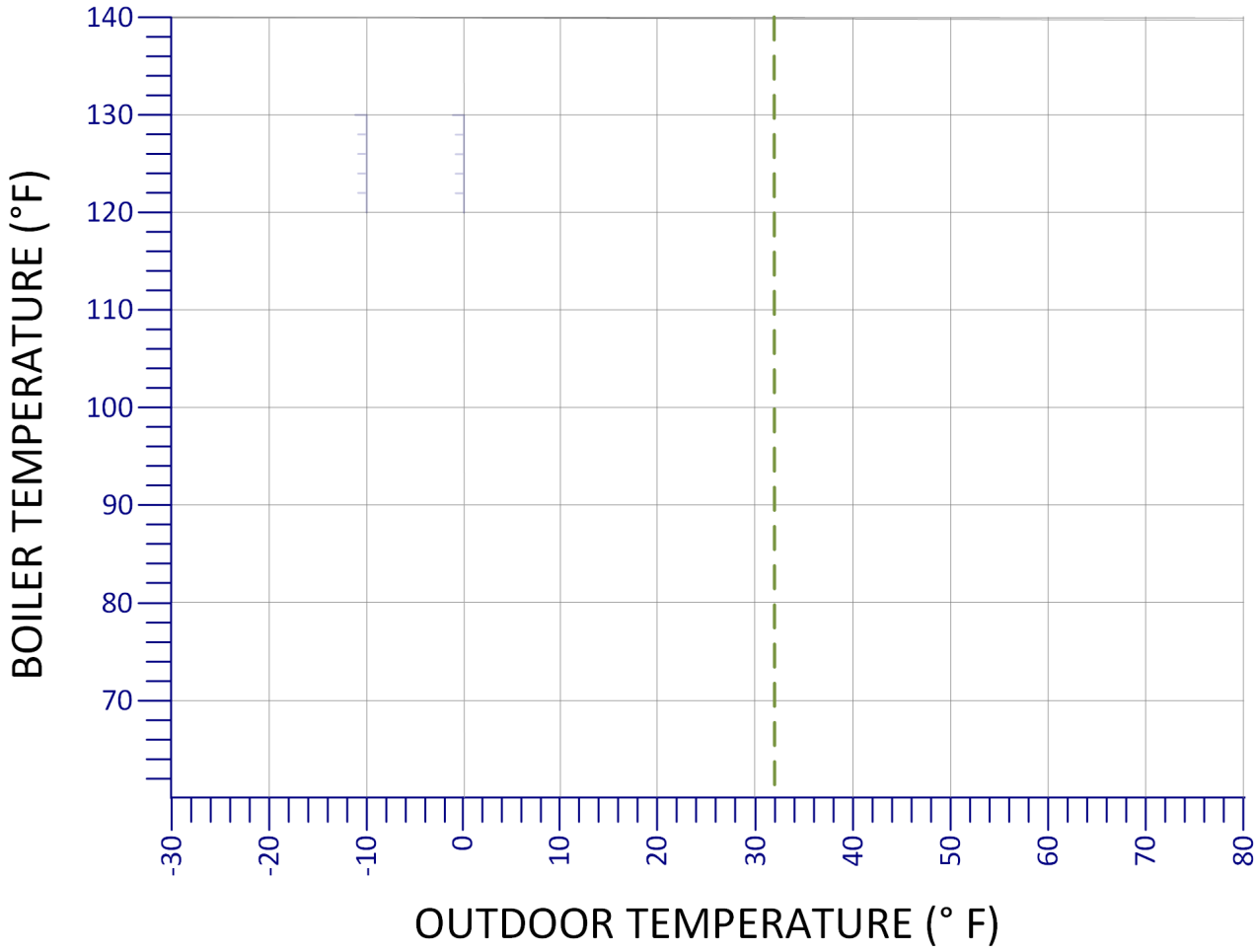


Figure 37 *Reset worksheet - °F*

Note the **Offset** at 32°F to complete your setup.

In some cases where there is a backup heat source the reset line will go above the maximum temperature you want from the heat pump: regardless of the Offset and slope entered, heat pump operation will not exceed parameter **R42**, **Maximum water heating temperature** (default value is 140°F / 60°C).

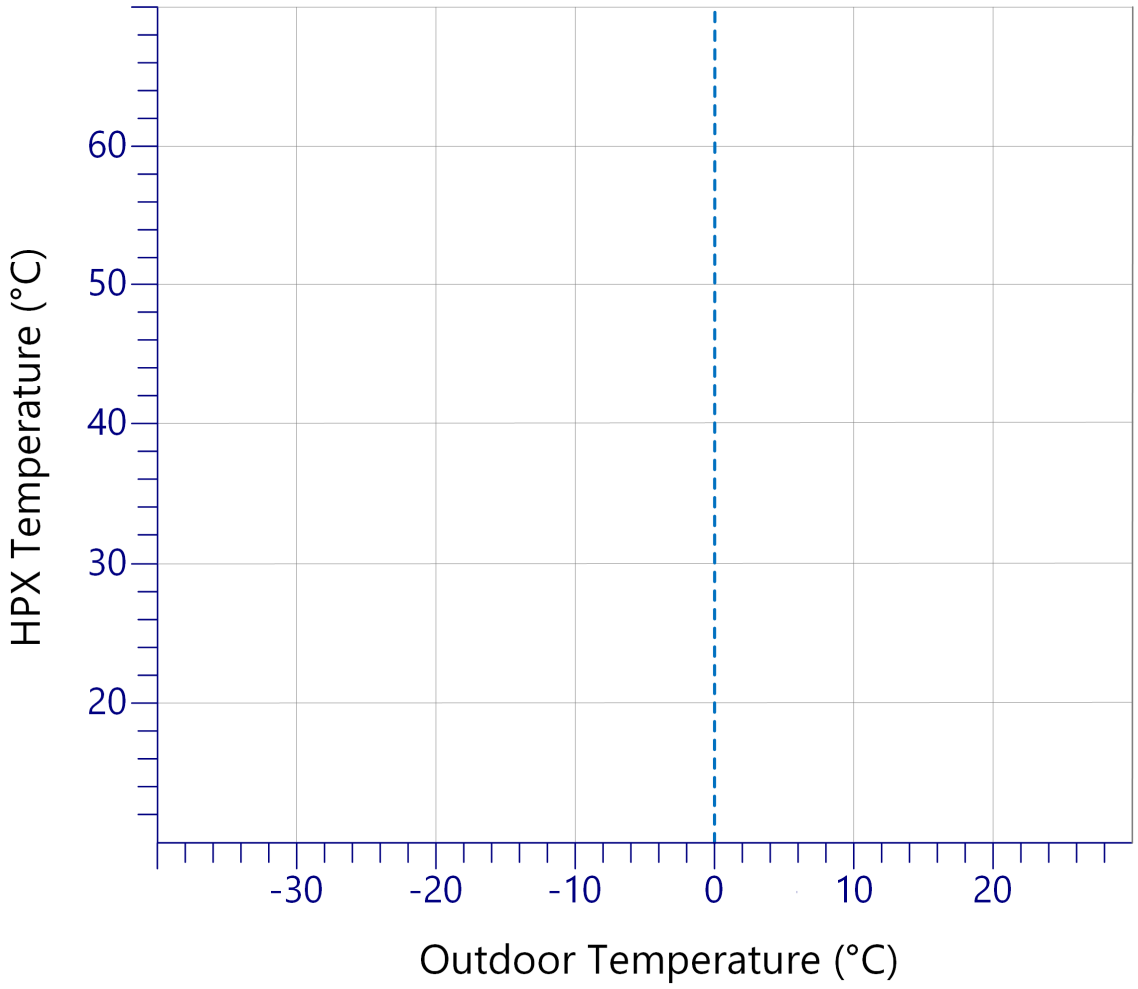


Figure 38 *Reset worksheet - °C*

Note the **Offset** at 0°C to complete your setup.

Notes

The following message is relevant to users in the USA

Important

This hydronic heat pump is equipped with a feature that saves energy by reducing the supplied water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

THIS OVERRIDE MUST NOT BE USED UNLESS AT LEAST ONE OF THE FOLLOWING CONDITIONS IS TRUE:

- An external energy management system is installed that reduces the supplied water temperature as the heating load decreases.
- This unit is not used for any space heating.
- This unit is part of a modular or multiple unit system having a total input of 300,000 BTU/hr or greater.
- This unit is equipped with a tankless coil (not applicable to these hydronic heat pumps).

US installers should contact IBC for any further information required.

For Tech Support, call toll-free **1-844-432-8422**. For Technical Information online, scan:

CAN **IBC Technologies Inc.**
A 8015 North Fraser Way
Burnaby, BC Canada V5J 5M8
T 604-877-0277
F 604-877-0295

USA **IBC Technologies USA Inc**
A 121 Walter A Gaines Way
Lawnside, NJ 08045 USA
T 856-877-0544
F 856-735-5584

Toll Free: 1-844-HEAT-IBC / 1-844-432-8422
www.ibcboiler.com

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