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SUBMITTAL

Job: **Park Forest**

Heating System

Contractor: **William E. Walter, Inc.**



APPROVING AUTHORITY	ATTACHMENTS	FORM #
	<p>HEATING EQUIPMENT</p> <p>GAHP-AR - Robur Heat Pump</p> <p>ACF 60 - Robur Heat Recovery Chillers</p> <p>SHTX-40 - ProFlex 2 Hydronic Expansion Tank</p> <p>SF100-D-P - Axiom Glycol Makeup</p> <p>SPA-3 Air Separator</p> <p>Tekmar C132 Pump Switching Relay</p> <p>Paco 25709 VL</p> <p>CBVF-2-1/2 - 2.5" Balancing Valve</p> <p>CBV-200 - 2" Balancing Valve</p> <p>CBV-150 - 1.5" Balancing Valve</p>	<p>D-1003A</p> <p>C-132</p>

Submittal Data

GAHP Line AR Series

Reversible Gas Fired Absorption Heat Pump

Heating and Cooling

GAHP is the acronym for Gas Absorption Heat Pump. The GAHP-AR is a High Efficiency Reversible Air-Water Heat Pump, utilizing a water-ammonia absorption cycle that is designed for outdoor use. The GAHP-AR is capable of chilling water down to a temperature of 37.4 °F, or

heating water up to 140 °F in the heat pump mode with a nominal efficiency of 126% in nominal conditions (external ambient temperature 44.6 °F, inlet water temperature 122 °F). Obtaining efficiencies up to 141% are possible depending on operating conditions. The cycle of the GAHP-AR is

driven by thermal energy provided by a gas burner. Therefore, the required electric energy is limited to driving the fan, pump motors and low voltage components. The GAHP-AR is fed by natural gas or LPG, and supplied with 208-230 V - 60 Hz SINGLE PHASE electrical power.



Operating mode

- **Cooling mode** (summer). The appliance operates as an absorption chiller, and the heat, taken away from the cooled environment via the hydronic circuit, is dissipated to the outside via the air-cooled finned coil.
- **Heating mode** (winter). The appliance uses the absorption cooling cycle to recover heat from the outside environment via the finned coil, which, when combined with the heat produced by the combustion of natural/LPG gas, is transferred into the exchanger and then into the environment to be heated, ensuring efficiency of 126 %

- (under nominal conditions). The GAHP-AR is equipped with the following devices:
- steel sealed circuit, externally coated with epoxy paint;
 - premixed multigas burner with ignition and flame sensing device managed by an electronic control box;
 - steel tube air exchanger with single-row coil and aluminum fins;
 - titanium stainless steel tube bundle water heat exchanger, with external insulation;
 - reversing valve on the refrigerant circuit; which switches the unit between heating and chilling mode;
 - two-way automatic defrosting valve, controlled

- by the microprocessor, allows for fin coil defrosting;
- variable speed condenser fan, controlled by the microprocessor.

Control and safety devices

- The GAHP-AR is controlled and monitored by the S60 control board through the peripheral AR10 card. These cards and other components compose the control and safeties of the GAHP-AR, listed below:
- S60 Electronic Control Board with integrated microprocessor, LCD display and encoder located inside the electric box; it is programmable and it controls and monitors the

- operation of the heat pump;
- water flow switch; located on the return chilled water line; monitors the water flow and helps prevent the freezing of the evaporator (cooling mode) or overheating of the condenser-absorber (heating mode);
- sealed circuit high temperature limit; located on the external wall of the generator; helps prevent overheating of the generator;
- hot water high temperature limit switch; located on the outlet water line; prevents water circuit from overheating;
- differential air pressure switch; located inside the

<p>electric box; it helps manage the combustion system by monitoring the air flowing into the air-gas mixing chamber and stopping the burner if the air flow is too low;</p> <ul style="list-style-type: none"> flue gas temperature limit switch; located inside the rear portion of the combustion chamber; helps 	<p>prevent overheating of the generator;</p> <ul style="list-style-type: none"> sealed circuit safety relief valve; safety by-pass valve; located inside the sealed system; prevents over pressurizing of the sealed system; antifreeze function for hydronic system; together 	<p>with the flow switch, this electronic function programmed into the microprocessor, helps prevent the freezing of water in the heat exchanger;</p> <ul style="list-style-type: none"> ignition control box; located inside the electric box; it manages the combustion system controlling the burner ignition, the gas 	<p>valve, the air pressure switch, the air blower and the flame sensor;</p> <ul style="list-style-type: none"> dual gas valve; temperature probes; located both on the sealed system and on the water lines; they monitor functional parameters of the unit.
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PERFORMANCE RATINGS - HEATING ⁽¹⁾			GAHP-AR
Heating capacity ⁽²⁾		BTU/h	120,400
Gas input (HHV)		BTU/h	95,500
Ambient operating temperature	maximum	°F	95
	minimum	°F	-20
Hot water temperature	maximum outlet (to hydronic system)	°F	140
	maximum inlet (to unit)	°F	122
Hot water flow	nominal	GPM	13.4
Internal pressure drop at nominal hot water flow		Feet of Head	9.8
		psi _g	4.2

PERFORMANCE RATINGS - COOLING ⁽¹⁾			
Cooling capacity ⁽³⁾		BTU/h	57,700
Gas input (HHV)		BTU/h	95,500
Ambient operating temperature	maximum	°F	120
	minimum	°F	32
Chilled water temperature	minimum outlet (to hydronic system)	°F	37.4
	maximum inlet (to unit)	°F	113
Chilled water flow	nominal	GPM	12.8
Internal pressure drop at nominal chilled water flow		Feet of Head	10.5
		psi _g	4.5

ELECTRICAL RATINGS			
Required voltage, 60 Hz, single phase ⁽⁴⁾		V	208 - 230
Operating consumption ⁽⁵⁾		kW	0.75

PHYSICAL DATA			
Operating weight		pounds	838
Dimensions	width	inches	33 1/2
	length	inches	48 1/2
	height	inches	50 3/4

⁽¹⁾ All illustrations and specifications contained herein are based on the latest information available at the time of publication.

⁽²⁾ Heating capacity at standard conditions of 44.6 °F ambient temperature. Hot water outlet temperature 122 °F, hot water inlet temperature 104 °F.

⁽³⁾ Cooling capacity at standard conditions of 95 °F ambient temperature. Chilled water outlet temperature 44.6 °F, chilled water inlet temperature 53.6 °F.

⁽⁴⁾ Units are factory-wired for 208-230 volts operation.

⁽⁵⁾ May vary by ± 10% as function of both power supply and electrical motor input tolerance.

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HEATING MODE CAPACITY (BTU/h)

External ambient operating temperature (dry bulb)	Outlet (to plant) hot water temperature			
	86 °F	113 °F	122 °F	140 °F
	$\Delta\Delta T = 18\text{ °F}$			$\Delta\Delta T = 27\text{ °F}$
-20.0 °F	91,100	82,900	82,900	80,900
-13.0 °F	92,100	83,900	83,900	81,900
-4.0 °F	93,200	85,000	85,000	82,900
5.0 °F	97,200	89,400	88,000	85,600
14.0 °F	105,400	94,500	92,100	90,100
19.4 °F	111,900	100,300	96,900	95,500
35.6 °F	123,900	118,700	109,900	102,400
44.6 °F	129,300	128,000	120,400	112,600
50.0 °F	131,700	131,000	124,200	117,700
59.0 °F	134,100	133,400	128,300	122,200
68.0 °F	134,800	134,400	129,300	123,900
77.0 °F	134,800	134,400	129,700	126,200

Nominal value in bold type.

ΔT is the difference between outlet and inlet temperature.

COOLING MODE CAPACITY (BTU/h)

External ambient operating temperature (dry bulb)	Outlet (to plant) chilled water temperature		
	37.4 °F	44.6 °F	50.0 °F
	$\Delta\Delta T = 9\text{ °F}$		
59.0 °F	64,800	63,800	64,800
68.0 °F	63,500	63,500	64,100
77.0 °F	60,100	62,400	63,300
86.0 °F	54,300	60,700	61,800
95.0 °F	44,000	57,700	59,400
104.0 °F	--	51,200	54,600
113.0 °F	--	--	46,100

Nominal value in bold type.

ΔT is the difference between outlet and inlet temperature.

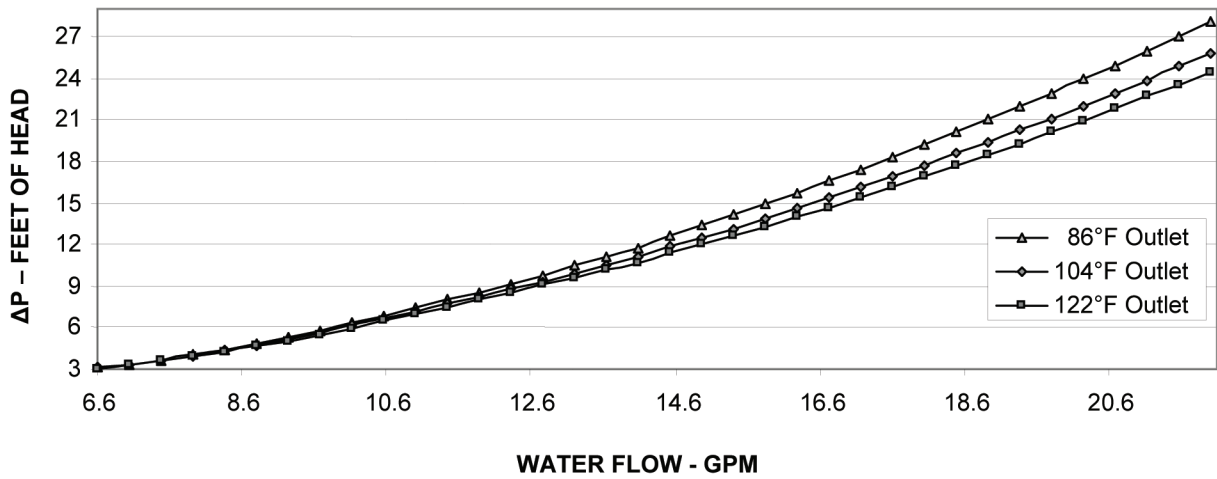
PRESSURE DROP - Heating mode (ΔP condenser / absorber)

Hot water flow	Outlet water temperature		
	122.0 °F	104.0 °F	86.0 °F
GPM	$\Delta\Delta P$ (Feet of Head)		
6.60	3.05	3.08	3.15
7.04	3.30	3.32	3.35
7.48	3.58	3.62	3.65
7.93	3.89	3.98	4.05
8.37	4.25	4.35	4.42
8.81	4.64	4.76	4.86
9.25	5.05	5.19	5.28
9.69	5.50	5.66	5.77
10.13	5.96	6.18	6.29
10.57	6.45	6.66	6.83
11.01	6.95	7.16	7.39
11.45	7.47	7.68	7.97
11.89	7.99	8.21	8.57
12.33	8.52	8.76	9.18
12.77	9.06	9.32	9.80
13.21	9.59	9.90	10.43
13.65	10.12	10.50	11.07
14.09	10.64	11.11	11.72
14.53	11.36	11.81	12.60
14.97	11.98	12.48	13.35
15.41	12.63	13.17	14.12
15.85	13.29	13.87	14.91
16.29	13.97	14.60	15.72
16.73	14.67	15.35	16.55
17.17	15.39	16.11	17.40
17.61	16.13	16.90	18.27
18.05	16.88	17.70	19.16
18.49	17.65	18.53	20.07
18.93	18.44	19.37	21.00
19.37	19.25	20.23	21.94
19.81	20.08	21.11	22.91
20.25	20.92	22.01	23.90
20.69	21.78	22.93	24.90
21.13	22.66	23.87	25.93
21.57	23.56	24.82	26.97
22.01	24.48	25.80	28.03

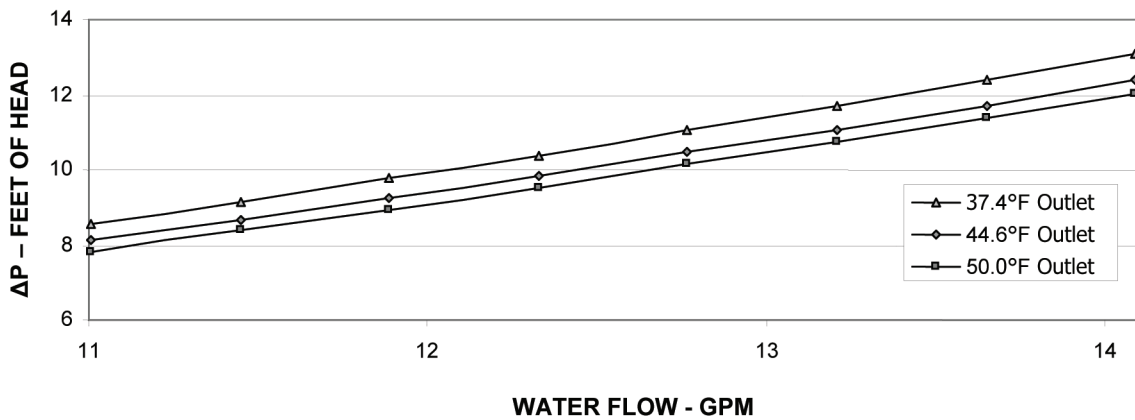
PRESSURE DROP - Cooling mode (ΔP evaporator)

Chilled water flow	Outlet water temperature		
	37.4 °F	44.6 °F	50.0 °F
GPM	$\Delta\Delta P$ (Feet of Head)		
11.01	8.55	8.11	7.84
11.45	9.15	8.67	8.39
11.89	9.77	9.25	8.96
12.33	10.40	9.85	9.54
12.77	11.05	10.46	10.15
13.21	11.71	11.08	10.76
13.65	12.38	11.72	11.40
14.09	13.07	12.38	12.04

PRESSURE DROP – HEATING MODE



PRESSURE DROP – CHILLING MODE

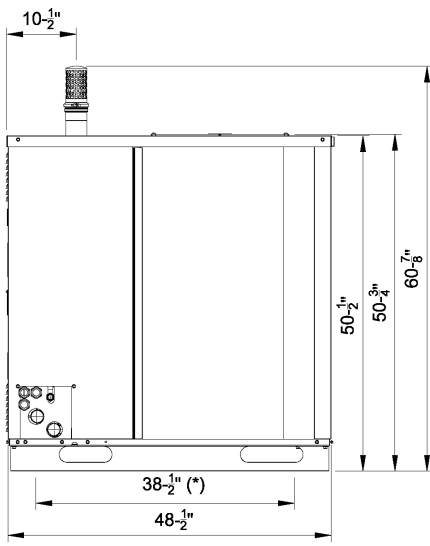


APPROXIMATE WATER FREEZING POINT TEMPERATURE

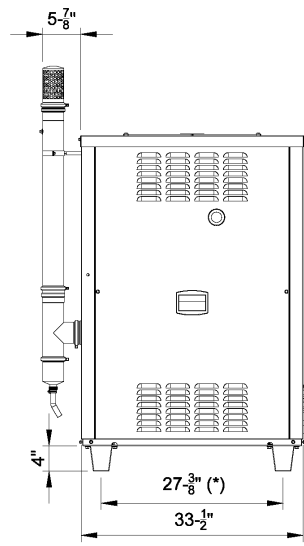
Percentage of monoethylene glycol	10	15	20	25	30	35	40
Water freezing point temperature (°F)	26.6	23.0	17.6	10.4	5.0	-4.0	-13.0
Percentage of increase in pressure drop	--	6	8	10	12	14	16
Loss of efficiency of unit	--	0.5	1	2	2.5	3	4

The numbers provided in this table are approximate and you must refer to the glycol manufacturer's instructions for additional instructions and amount of glycol required based on expected ambient conditions.

GAHP-AR DIMENSIONS

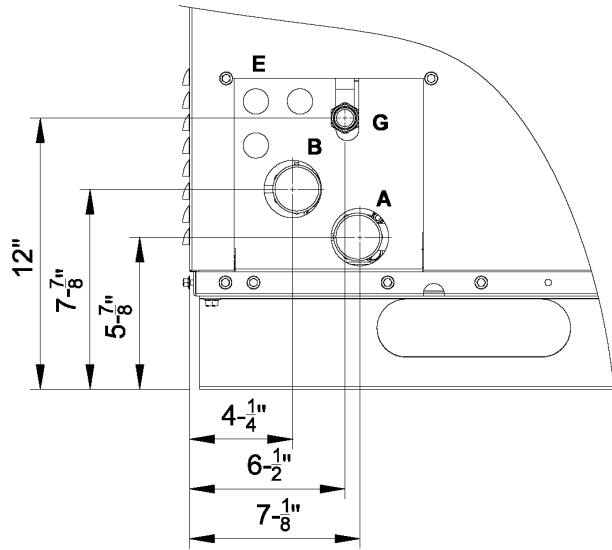


Side View



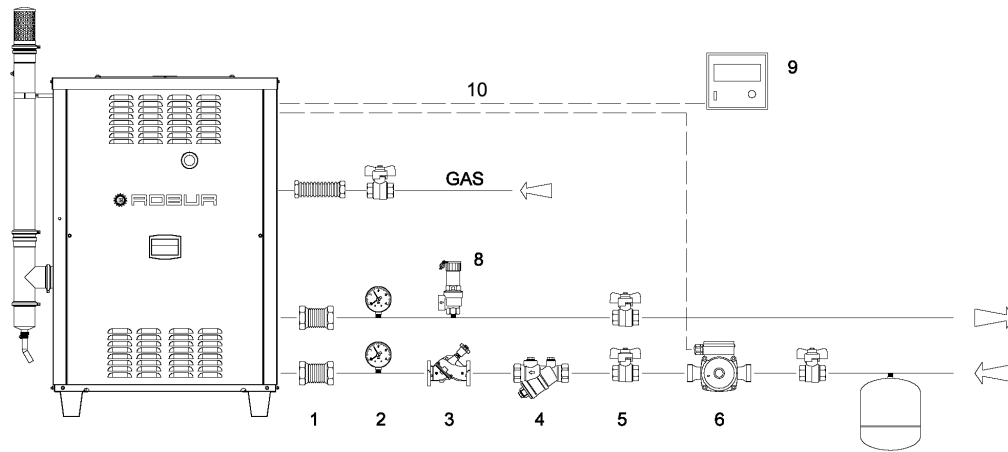
Front View

GAHP-AR SERVICE PLATE DIMENSIONS



- A** Water outlet (to water loop) ø 1" FPT
- B** Water inlet (to unit) ø 1" FPT
- E** Electrical knockouts ø 7/8" FPT
- G** Gas connection ø 1/2" FPT

GAHP-AR HYDRONIC SYSTEM: Typical Installation Arrangement (External Components not included with Robur Unit)



- | | |
|--------------------------------|--|
| 1 Antivibration flexible hoses | 6 Circulating water pump |
| 2 Pressure gauge | 7 Expansion tank |
| 3 Flow regulating valve | 8 Safety valve |
| 4 Water filter | 9 DDC (optional from Robur) |
| 5 Shut-off valve | 10 Can Bus cable (optional from Robur) |

Clearances

Position the appliance so that minimum clearances from combustible surfaces and constructions (walls and other equipment) are maintained, as shown in the figure below.

The appliance may be installed directly on wood flooring.

Minimum clearances are

necessary for operating performance, and in order to be able to carry out maintenance operations and to ensure the correct airflow required for proper heat exchange with the finned coil.

There must not be any obstructions or structural overhangs (roof edges, balconies) over the top of

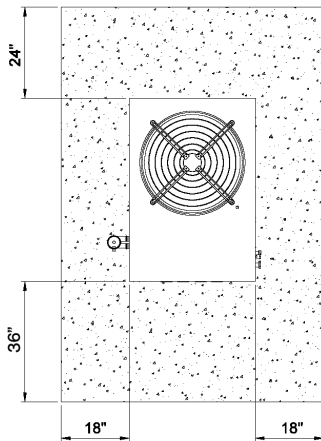
the unit. The re-circulation of the air discharged from the condenser results in poor unit performance.

When the unit is installed in close proximity to buildings, keep the unit away from the roof edge drip line.

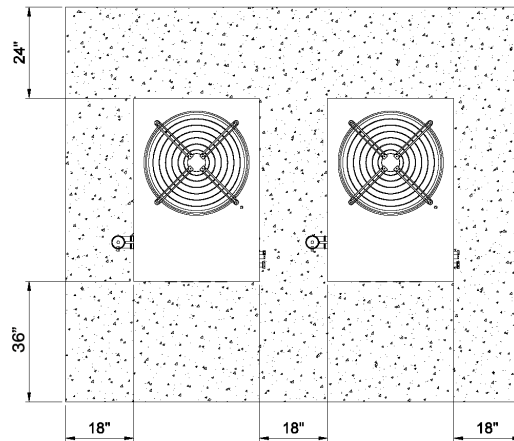
In no case should the unit be placed within 6 feet of any external air intakes of the building. For installations on

balconies or roofs, the unit must not be located within 8 feet from chimney flues, outlets and other such vents. It is important that the unit is located so that hot or contaminated air is not drawn into the air intakes of the unit.

Observe all local and State codes.



Single unit



Multiple units

Submittal Data

GA Line ACF - RTCF HR Series

Gas Fired Absorption Chillers

Cooling with Heat Recovery

The High Efficiency Chillers ACF HR and RTCF HR series are water chillers, equipped with an air-cooled condenser and designed for outdoor installation. The absorption cooling cycle is based upon a solution of water and

ammonia for the production of chilled water. The chilling system is fed by thermal energy provided by a gas burner, therefore the required electric energy is limited to driving the fan and pump motors.

The evacuation of combustion gases occurs by mixing them with condenser air using the axial fan of the appliance; no flue is needed. The combustion fuel is natural gas or LPG.



Version

The ACF and RTCF HR models are standard chillers with a heat recovery system capable of providing from 60,500 to 302,500 BTU/h (it is possible to link up to 5 chillers to obtain RTCF groups) of nominal cooling capacity when operating without the heat recovery system.

With the heat recovery system, it can obtain a cooling capacity from 61,240 to 306,200 BTU/h and, at the same time, provide from 86,400 to 432,000 BTU/h of heating capacity. Capable of producing hot water up to 180 °F and available in a 4-pipe configuration only.

Control and safety devices

The ACF and RTCF HR series units are equipped with the following components and safety devices:

- steel sealed circuit, painted with external epoxy paint;
- steel tube air exchanger with single-row coil and aluminum fins;
- titanium stainless steel tube bundle water heat exchanger, with external insulation;
- variable speed condenser fan, microprocessor controlled;
- S60 Electronic Control Board with integrated microprocessor, LCD display and encoder located inside the electric box; it is programmable and it controls and monitors the operation of the chiller;
- sealed circuit high temperature limit; located on the external wall of the generator; helps prevent overheating of the generator;
- hot water high temperature switch; located on the hot water outlet line; helps prevent overheating of the water circuit;
- flue gas temperature limit switch; located inside the rear portion of the combustion chamber; helps prevent overheating of the generator;
- sealed circuit safety relief valve;
- premixed multigas burner with ignition and flame sensing device managed by an electronic control box;
- differential air pressure switch; located inside the electric box; it helps manage the combustion system by monitoring the air flowing into the air-gas mixing chamber and stopping the burner if the air flow is too low;
- ignition control box; located inside the electric box; it manages the combustion system controlling the

- burner ignition, the gas valve, the air pressure switch, the air blower and the flame sensor;
- dual gas valve;
- chilled water flow sensor; located on the return chilled water line; it monitors the water flow and helps prevent freezing of the evaporator;
- safety by-pass valve; located inside the sealed system; prevents over pressurizing the sealed system;
- antifreeze function for hydronic system; together with the flow switch, this electronic function, programmed into the microprocessor, helps prevent freezing of the evaporator;
- temperature probes; located both on the sealed system and on the water lines; they monitor functional parameters of the unit.



PERFORMANCE RATINGS ⁽¹⁾			ACF60	RTCF120	RTCF180	RTCF240	RTCF300
Cooling capacity (no recovery) ⁽²⁾	BTU/h		60,500	121,000	181,500	242,000	302,500
Cooling capacity (with recovery) ⁽³⁾	BTU/h		61,240	122,500	183,700	245,000	306,200
Heating capacity ⁽³⁾	BTU/h		86,400	172,800	259,200	345,600	432,000
Gas input (HHV)	BTU/h		94,900	189,800	284,700	379,600	474,500
Ambient operating temperature	maximum	°F		120			
	minimum	°F		32			
Chilled water temperature	minimum outlet	°F		37.4			
	maximum inlet	°F		113			
Maximum hot water outlet temperature		°F		176			
Chilled water flow	nominal	GPM	12.2	24.4	36.6	48.8	61.0
	nominal	GPM	9.6	19.2	28.8	38.4	48.0
Recovery system hot water flow	minimum	GPM	0	0	0	0	0
	maximum	GPM	11.0	22.0	33.0	44.0	55.0
Internal pressure drop at nominal chilled water flow		Feet of Head		9.5			
		psi _g		4.0			
Pressure drop inside recovery system		Feet of Head		4.34			
		psi _g		3.0			
ELECTRICAL RATINGS ⁽¹⁾							
Required voltage, 60 Hz, single phase ⁽⁴⁾		V		208 - 230			
Operating consumption ⁽⁵⁾		kW		0.75			
PHYSICAL DATA ⁽¹⁾							
Operating weight	pounds		750	2,040	3,075	4,115	5,127
Chilled / hot water entering and leaving connections	FPT		1"	1 1/2"		2"	
Gas inlet connections	FPT		1/2"	1"		1 1/4"	
Dimensions	width	inches	33 1/2	49 1/2			
	length	inches	48 1/2	93	144	195	246
	height	inches	50 3/4	53 1/4			

⁽¹⁾ All illustrations and specifications contained herein are based on the latest information available at the time of publication.
⁽²⁾ Cooling capacity at standard conditions (no recovery): ambient temperature 95 °F. Chilled water outlet temperature 45 °F, chilled water inlet temperature 55 °F.
⁽³⁾ Cooling capacity at standard conditions (with recovery): ambient temperature 95 °F. Chilled water outlet temperature 45 °F, heat recovery system water temperature - delivery 122 °F - return 104 °F.

⁽⁴⁾ Units are factory-wired for 208-230 volts operation.
⁽⁵⁾ May vary by ± 10% as function of both power supply and electrical motor input tolerance.

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COOLING CAPACITY (BTU/h) - Cooling Only

External ambient operating temperature	Outlet chilled water temperature			
	37.4 °F	41.0 °F	44.6 °F	48.2 °F
32 °F	59,290	59,895	61,105	62,315
41 °F	59,290	59,895	61,105	62,315
50 °F	59,290	59,895	61,105	62,315
59 °F	59,290	59,895	61,105	62,315
68 °F	59,290	59,895	61,105	62,315
77 °F	58,685	59,895	61,105	62,315
86 °F	54,450	59,290	61,105	62,315
95 °F	40,535	52,635	60,500	61,710
104 °F	--	--	53,240	56,265
113 °F	--	--	40,535	47,190

COOLING CAPACITY (BTU/h) - Cooling + Recovery

External ambient operating temperature	Outlet chilled water temperature			
	37.4 °F	41.0 °F	44.6 °F	48.2 °F
32 °F	59,403	60,015	61,240	62,465
41 °F	59,403	60,015	61,240	62,465
50 °F	59,403	60,015	61,240	62,465
59 °F	59,403	60,015	61,240	62,465
68 °F	59,403	60,015	61,240	62,465
77 °F	58,790	60,015	61,240	62,465
86 °F	54,504	59,403	61,240	62,465
95 °F	44,705	55,728	61,240	62,465
104 °F	--	54,504	58,178	58,790
113 °F	--	--	48,992	52,054

HEATING CAPACITY OF THE HEAT RECOVERY UNIT (BTU/h)

Heat capacity - Output = 2.2 GPM (BTU/h)							
Recovery system hot water return temperature	External air temperature						
	59 °F	68 °F	77 °F	86 °F	95 °F	104 °F	113 °F
50 °F	92,210	92,893	93,576	93,917	95,283	96,308	97,333
68 °F	72,743	75,134	76,978	78,549	80,188	83,330	85,379
86 °F	52,628	55,667	58,570	61,644	65,162	68,577	72,231
104 °F	35,859	39,275	42,007	46,071	50,954	55,667	61,507
122 °F	21,857	24,248	27,356	31,761	37,567	43,714	50,818
140 °F	9,563	12,226	15,368	18,783	25,033	31,420	40,982
158 °F	--	--	8,196	8,982	13,831	21,003	30,395

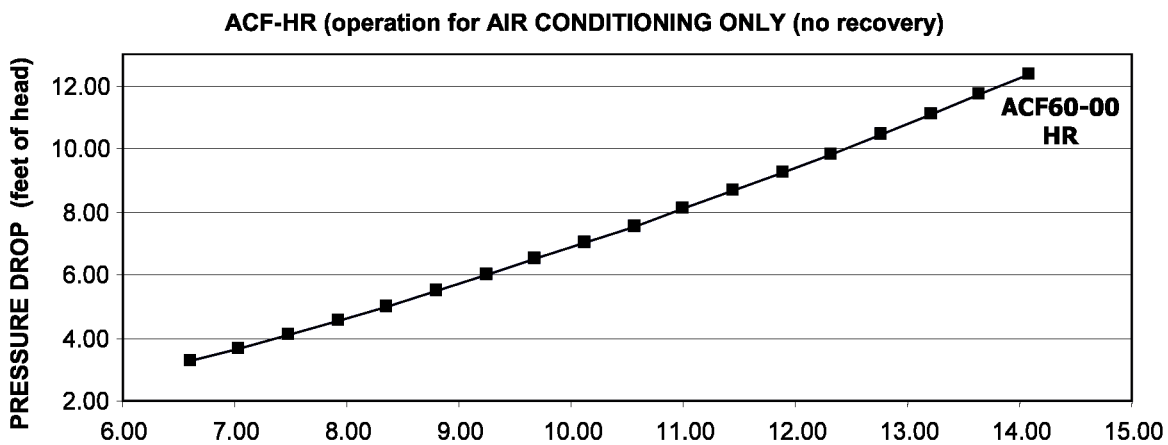
Heat capacity - Output = 4.4 GPM (BTU/h)							
Recovery system hot water return temperature	External air temperature						
	59 °F	68 °F	77 °F	86 °F	95 °F	104 °F	113 °F
68 °F	92,210	99,040	102,797	106,895	109,286	--	--
86 °F	71,719	78,208	83,604	85,755	89,546	95,625	102,455
104 °F	47,983	54,643	61,473	65,162	71,719	78,549	85,584
122 °F	27,765	34,083	41,426	45,149	53,004	59,868	65,640
140 °F	10,246	16,051	21,447	25,682	34,152	40,299	46,105
158 °F	--	--	8,538	11,953	19,330	23,906	31,078

Heat capacity - Output = 6.6 GPM (BTU/h)							
Recovery system hot water return temperature	External air temperature						
	59 °F	68 °F	77 °F	86 °F	95 °F	104 °F	113 °F
68 °F	96,991	102,455	109,286	--	--	--	--
86 °F	75,134	81,964	88,795	93,269	100,406	105,871	110,993
104 °F	50,886	60,107	66,596	72,368	80,257	87,429	93,917
122 °F	30,224	38,592	44,295	50,203	56,931	64,137	71,377
140 °F	10,929	17,076	22,779	28,346	34,152	40,982	47,813
158 °F	--	--	10,587	14,344	21,174	23,029	33,469

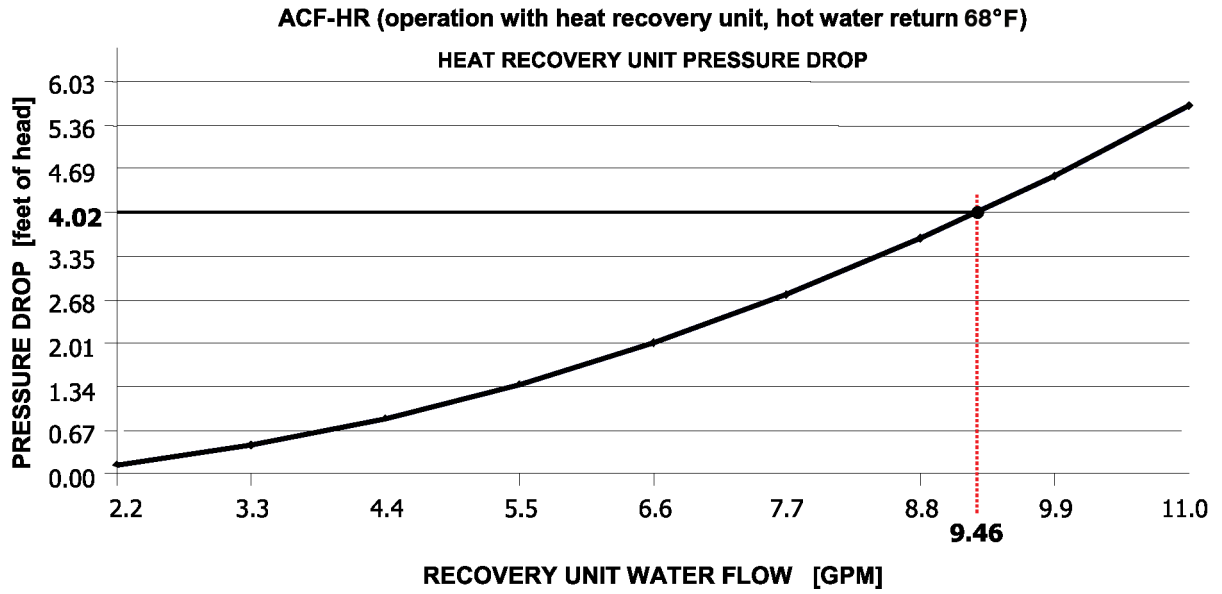
Heat capacity - Output = 8.8 GPM (BTU/h)							
Recovery system hot water return temperature	External air temperature						
	59 °F	68 °F	77 °F	86 °F	95 °F	104 °F	113 °F
68 °F	97,333	104,709	110,993	--	--	--	--
86 °F	76,158	83,399	91,868	97,333	--	--	--
104 °F	51,228	61,302	72,094	78,549	85,106	92,210	99,040
122 °F	30,258	39,275	47,813	54,643	59,902	66,596	76,158
140 °F	14,022	17,144	24,111	29,678	35,859	42,690	49,520
158 °F	--	--	12,704	17,076	22,882	29,712	35,859

Heat capacity - Output = 11.0 GPM (BTU/h)							
Recovery system hot water return temperature	External air temperature						
	59 °F	68 °F	77 °F	86 °F	95 °F	104 °F	113 °F
68 °F	103,924	--	--	--	--	--	--
86 °F	81,281	88,795	102,455	--	--	--	--
104 °F	57,033	64,888	76,295	82,613	88,795	97,572	102,455
122 °F	36,884	41,255	49,520	58,058	63,454	71,104	79,061
140 °F	17,452	21,345	26,331	31,112	38,113	45,798	55,736
158 °F	--	--	13,285	18,100	23,906	30,737	39,275

ACF-RTCF HR COOLING ONLY PRESSURE DROP



ACF-RTCF HR HEAT RECOVERY PRESSURE DROP

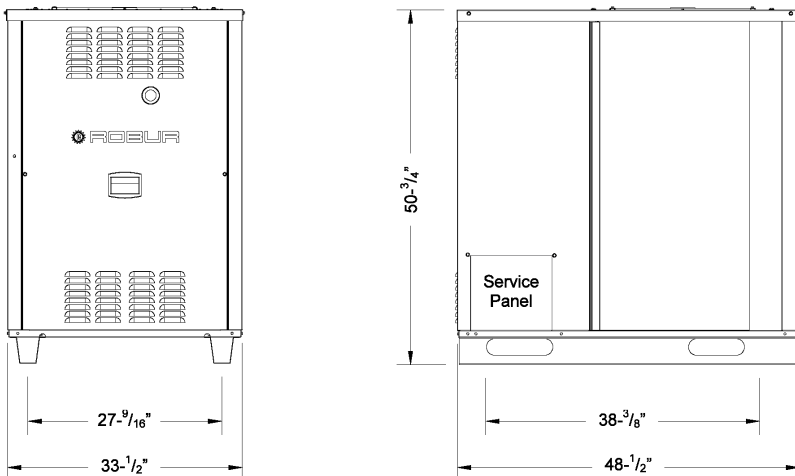


APPROXIMATE WATER FREEZING POINT TEMPERATURE

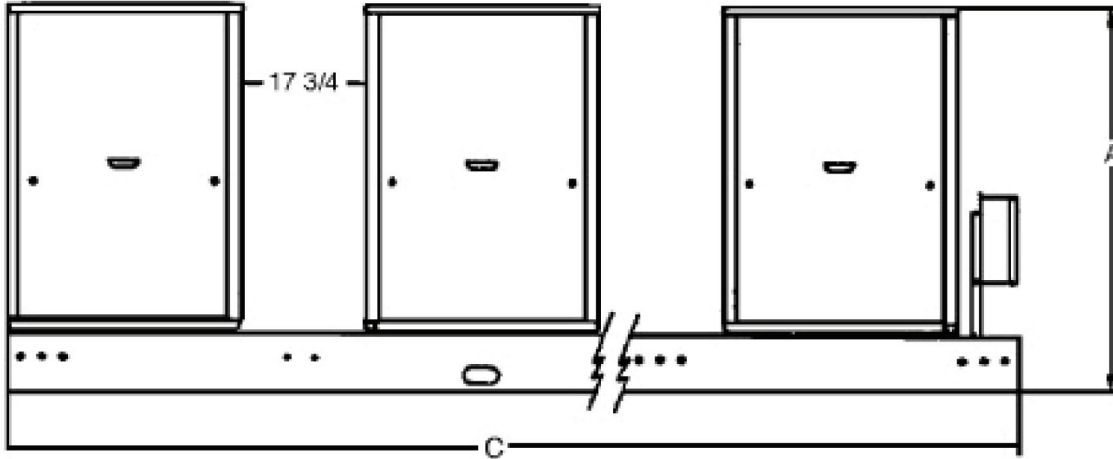
Percentage of monoethylene glycol	10	15	20	25	30	35	40
Water freezing point temperature (°F)	26.6	23.0	17.6	10.4	5.0	-4.0	-13.0
Percentage of increase in pressure drop	--	6	8	10	12	14	16
Loss of efficiency of unit	--	0.5	1	2	2.5	3	4

The numbers provided in this table are approximate and you must refer to the glycol manufacturer's instructions for additional instructions and amount of glycol required based on expected ambient conditions.

ACF HR DIMENSIONS

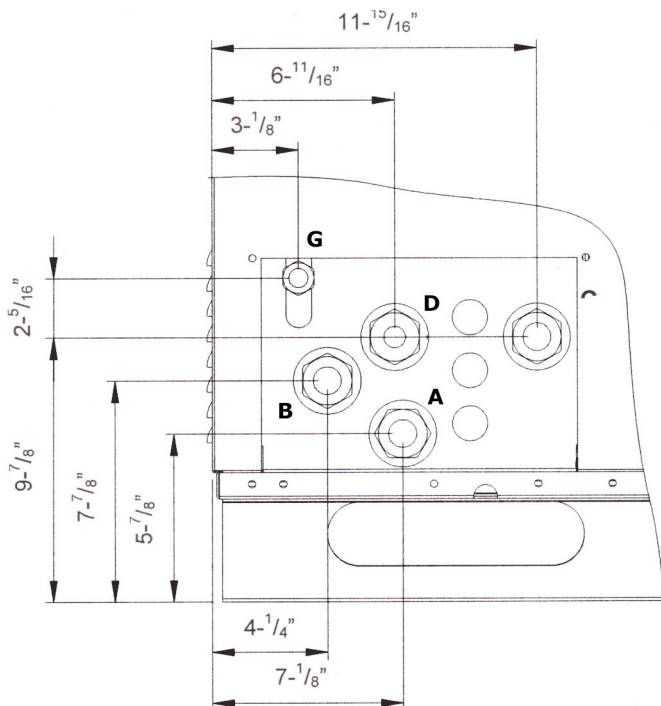


RTCF HR DIMENSIONS (ALL VERSIONS)



MODEL	A	B depth (not shown)	C	Approximate Weight (lb)	
				shipping	operating
RTCF120	53.25	49.0	93.0	1,870	1,910
RTCF180	53.25	49.0	144.0	2,825	2,880
RTCF240	55.25	49.0	195.0	3,765	3,855
RTCF300	55.25	49.0	246.0	4,690	4,802

ACF HR SERVICE PLATE DIMENSIONS



G Gas connection ø 1/2" FPT

Chiller - CHILLED WATER

A Water delivery to appliance ø 1" FPT

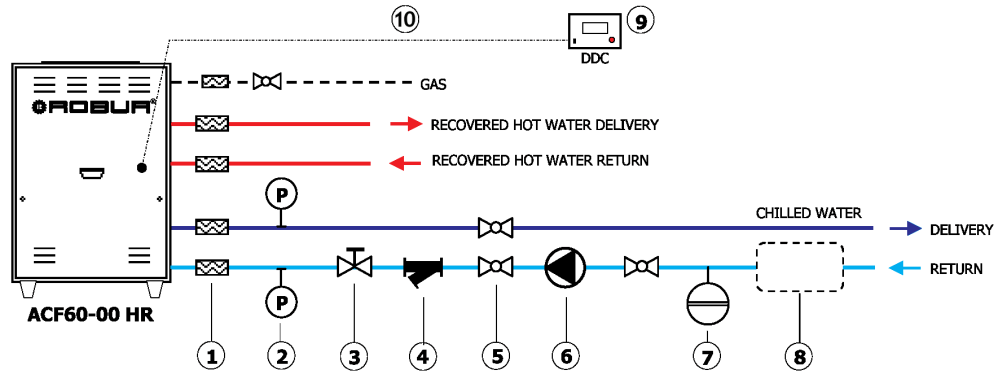
B Water return to unit ø 1" FPT

Recovery unit - HOT WATER

C Water delivery to appliance ø 1" FPT

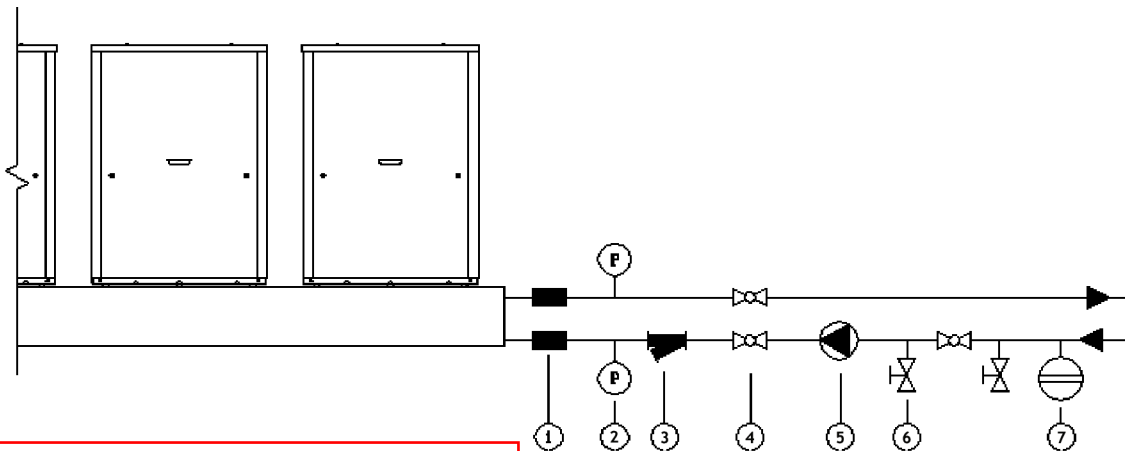
D Water return to unit ø 1" FPT

ACF HR HYDRONIC SYSTEM: Typical Installation Arrangement (External Components not included with Robur Unit)



- | | |
|--------------------------------|--|
| 1 Antivibration flexible hoses | 7 Expansion tank |
| 2 Pressure gauge | 8 Water storage |
| 3 Flow regulating valve | 9 DDC (optional from Robur) |
| 4 Water filter | 10 Can Bus cable (optional from Robur) |
| 5 Shut-off valve | |
| 6 Circulating water pump | |

RTCF HYDRONIC SYSTEM: Typical Installation Arrangement (External Components not included with Robur Unit)



- | | |
|--------------------------------|--------------------------|
| 1 Antivibration flexible hoses | 5 Circulating water pump |
| 2 Pressure gauge | 6 Fill/drain valve |
| 3 Water filter | 7 Expansion tank |
| 4 Shut-off valve | |

Location

The ACF and RTCF HR systems must be installed outdoors in an area of free natural air circulation. The installation inside a room or a building is not allowed. There must be a minimum clearance of 4 feet horizontally from electric meters, gas meters, regulators and relief

equipment and in no case located above or below these items unless a 4 foot horizontal distance is maintained. The noise generated by the condenser fan during unit operation is not excessive.

However, avoid locating the unit in an area adjacent to bedrooms or neighboring

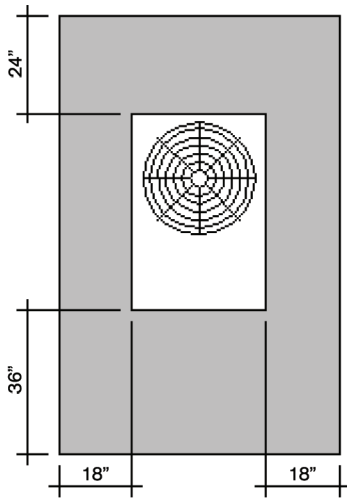
buildings. Also, avoid installing the unit in building corners, where air turbulence can take place or the unit noise (reverberation) can be amplified.

Clearances

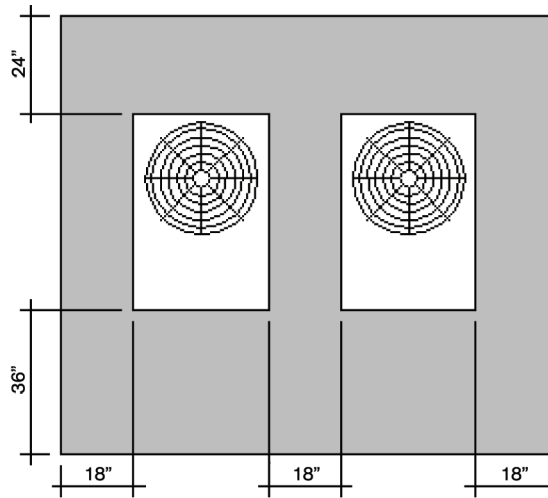
A free space is to be provided around the unit to allow for proper unit operation and for

servicing. The minimum clearance from walls, obstructions and other units must be as follows:
- right / left side: 18 inches;
- rear side: 24 inches;
- front side: 36 inches.

Observe all local and State codes.



Single unit



Multiple units

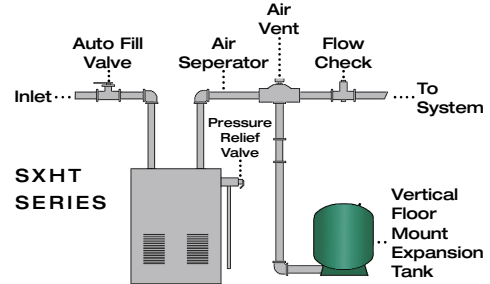
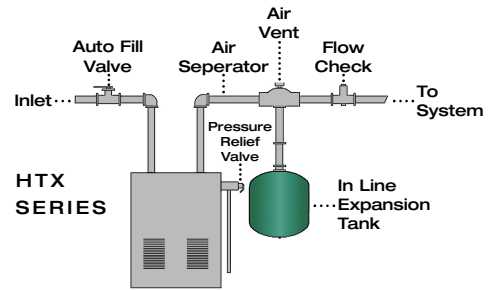


HTX & SXHT SERIES Hydronic Expansion Tanks

MATERIALS OF CONSTRUCTION

- Tank: 16-gauge cold rolled steel
- Finish: Appliance-quality paint for corrosion resistance
- Diaphragm Material: 100% butyl rubber
- Connection: Welded steel
- Testing: High pressure, seam weld, helium, final precharge check
- Air valve: Brass valve with O-ring seal
- Warranty: Five year

TYPICAL INSTALLATIONS

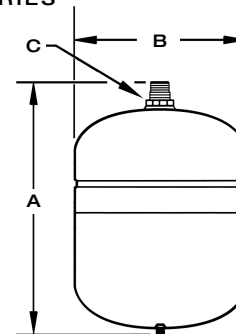


DIMENSIONS & CAPACITIES

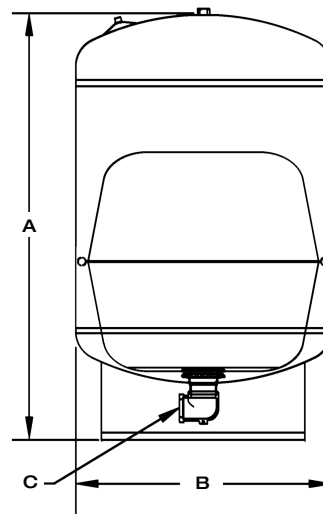
Model	Capacity Gallons	Maximum Acceptance Volume	System Connection	Dimensions		
				Diameter	Height	Weight (lbs)
HTX 15	2.1	1.0	1/2" MNPT	8.0	12.5	5.5
HTX 30	4.5	2.5	1/2" MNPT	11.0	14.0	10.0
HTX 60	6.0	3.0	1/2" MNPT	11.4	17.2	11.5
HTX 90	15.0	6.0	3/4" MNPT	16.0	20.8	28.0
SXHT 30	15.0	6.0	1" FNPT	16.0	21.7	32.0
SXHT 40	20.0	8.0	1" FNPT	16.0	28.8	39.0
SXHT 60	33.0	13.3	1" FNPT	16.0	42.8	57.0
SXHT 90	44.0	17.7	1 1/4" FNPT	21.0	36.2	72.0
SXHT 110	62.0	24.9	1 1/4" FNPT	21.0	47.9	112.0
SXHT160	81.0	32.6	1 1/4" FNPT	21.0	62.0	123.0

Maximum working pressure 100 PSI. Factory pre-charge 12 PSI.
Maximum working temperature 240° F.

HTX SERIES



SXHT SERIES



QUICK SIZING CHART

Boiler Output 1000's BTUH	Finned Tube Baseboard (Copper)	Type of Radiation		
		Convectors & Unit Htrs	Cast Iron	
			Radiators	Baseboard
25	HTX 15	HTX 15	HTX 15	HTX 15
50	HTX 15	HTX 30	HTX 30	HTX 30
75	HTX 30	HTX 30	HTX 60	HTX 60
100	HTX 30	HTX 30	HTX 60	HTX 60
125	HTX 30	HTX 60	HTX 60	HTX 60
150	HTX 30	HTX 60	HTX 90	HTX 90
175	HTX 60	HTX 60	HTX 90	HTX 90
200	HTX 60	HTX 60	HTX 90	HTX 90
250	SXHT 30	SXHT 30	SXHT 40	SXHT 30
300	SXHT 30	SXHT 40	SXHT 40	SXHT 30
350	SXHT 30	SXHT 40	SXHT 60	SXHT 40
400	SXHT 30	SXHT 60	SXHT 90	SXHT 40
500	SXHT 40	SXHT 60	SXHT 90	SXHT 40
600	SXHT 40	SXHT 90	SXHT 90	SXHT 60
700	SXHT 60	SXHT 90	SXHT 90	SXHT 60
800	SXHT 60	SXHT 110	SXHT 110	SXHT 90
900	SXHT 60	SXHT 110	SXHT 110	SXHT 90
1000	SXHT 90	SXHT 110	SXHT 110	SXHT 90

> www.flexconind.com
> 781-986-2424
> 300 Pond Street
> Randolph, MA 02368



AXIOM

INDUSTRIES LTD.

MODEL SF100-D-P PACKAGED HYDRONIC SYSTEM FEEDER “DUPLEX UNIT c/w ALTERNATING CONTROL PANEL”

The SF100-D-P contains everything required to feed and pressurize closed hydronic heating or cooling systems in a neat, simple package that is easy to install and operate. It is compatible with both water and water/glycol solutions.

Duplex Unit c/w Alternating control panel



FEATURES and BENEFITS

- *Two pumps for seamless and reliable operation*
- *Alternating panel with Lead/Lag pump operation, High/Low level alarm etc. See specification*
- *208 litre (55 US gallon) tank for storage and mixing*
- *Fluid level switch shuts the pump off if the storage tank level gets low*
- *Accumulator tank prevents excessive pump cycling*
- *No direct connection to potable water supply eliminates need for backflow prevention*
- *Make-up fluid stored in the feeder tank can be pre-treated*
- *Diverter valve for purging of air on initial start-up and manual agitation of solution*
- *Prevents major floods - in the event of system rupture, only the contents of the tank can be pumped into the system*
- *Provides leak detection - dropping fluid level provides immediate notice that the system has developed a leak*
- *Fluid drained for service can easily be put back into the system*
- *Flexible connection hose with system check valve makes installation easy*

Represented By:

AXIOM INDUSTRIES LIMITED 2615 WENTZ AVENUE SASKATOON, SK S7K 5J1
TOLL FREE : (877) 651-1815 PHONE : (306) 651-1815 FAX : (306) 242-3373

www.axiomind.com



INDUSTRIES LIMITED

SF100-D-P HYDRONIC DUPLEX SYSTEM FEEDER TECHNICAL INFORMATION

WEIGHT - 18 kg, 40 lbs.

PUMP ELECTRICAL

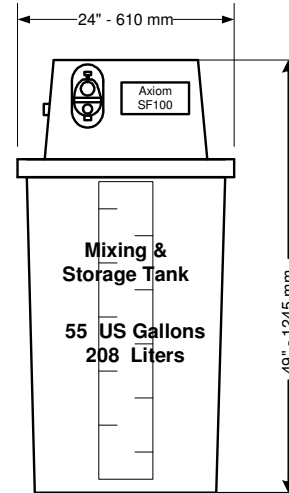
115/60/1, 0.7 amps

PUMP PERFORMANCE (2 pumps)

0.09 l/s (1.4 gpm) @ free flow
Combined Flow: 0.18 l/s (2.8 gpm)

0.06 l/s (1.0 gpm) @ 345KPa (50 psig)
Combined Flow: 0.12 l/s (2.0 gpm)

Self-priming up to 2.1 m (7 feet)
Maximum liquid temp. 77 C (170 F)



SPECIFICATION

Hydronic system feeder and Alternating panel shall be AXIOM INDUSTRIES LTD. Model SF100-D-P. System shall include 208 litre (55 US gallon) storage/mixing tank with cover; pump suction hose with inlet strainer; two pressure pumps with thermal cut-out; pump isolation valves; two integral pressure switches; integral check valve; pre-charged accumulator tank with EPDM diaphragm; manual diverter valve for purging air and agitating contents of storage tank; factory set pressure relief valve; pressure regulating valve adjustable (35 – 380 KPa; 5 – 55 psig) complete with pressure gauge; built-in check valve; union connection; 12 mm (1/2”) x 900 mm (36”) long flexible connection hose with check valve; low level pump cut-out. Pressure pumps shall be capable of running dry without damage. Power supply 115/60/1 3.8 A. Unit shall be completely pre-assembled.

ACCESSORIES

- 2PRV** – Second Pressure Reducing Valve, Pressure Gauge, System Connector Hose and Check Valve to allow for independent pressure supply to a second system.

LIMITED WARRANTY

The SF100-D-P is warranted against defects in materials and workmanship for one year.

Project Park Forest Location Jackson, MI
Consultant _____ Contractor Wm E Walter, Inc.
Unit Tag _____ Sales Agent Performance Engineering Group, Inc.



INDUSTRIES LTD.

ALTERNATING PANEL FOR DUPLEX SYSTEM FEEDER SF100-D-P



DUPLEX ELECTRICAL PANEL

UL listed

Enclosure..... NEMA / CSA 1 ASA 61 Grey

Main disconnect switch (HP rated) c/w door interlocked handle

Overload & Short Circuit protection..... Two thermomagnetic motor protectors

Starter:..... Across the line contactors (HP rated)

Alternator..... One Electric Alternating Relay

Pump Control Panel interface includes

- 2 “Hand-Off-Auto” switches for pump control
- 1 Power Indication Light
- 2 “Run” Green Pilot Lights
- 1 “Low Level Alarm” Red Pilot Light, Dry contacts and Audible Alarm c/w Silence Button
- 1 “High Level Alarm” Red Pilot Light, Dry contacts and Audible Alarm c/w Silence Button

WEIGHT – 16Kg, 35 lbs.

Duplex Operation

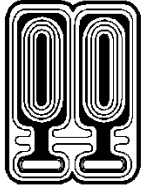
Dual pressure switches internal to the system pressurisation unit maintain the internal pressure. A pressure regulator on the SF100 maintains the minimum system pressure at its set point.

The lead pump alternates each time the high-pressure switch turns on a pump. If the first pump cannot maintain the internal pressure, the second pressure switch calls on the stand-by (lag) pump.

Automatic transfer to stand-by (lag) pump in case of motor overload or short circuit.

A low-level switch will disable the pumps, activate the audio/visual alarm and close a set of Dry-Contacts (For remote indication if connected to BMS). A High-level switch will activate the audio/visual alarm and close a set of Dry-Contacts (For remote indication if connected to BMS).

AXIOM INDUSTRIES LIMITED 2615 WENTZ AVENUE SASKATOON, SK S7K 5J1
TOLL FREE : (877) 651-1815 **PHONE :** (306) 651-1815 **FAX :** (306) 242-3373



SINCE 1908
wessels
 company

SUBMITTAL

SPA-SERIES

AIR SEPARATOR

Models: SPA-2 thru SPA-24

Submittal Sheet No. D-1003A

Date: 4/16

Job Name	<u>Friendship Manor</u>	Submitted By	_____	Date	_____
Location	<u>Lansing, MI</u>	Approved By	_____	Date	_____
Engineer	_____	Order No.	_____	Date	_____
Contractor	<u>Wm E Walter, Inc.</u>	Notes	_____		
Sales Rep.	<u>Performance Engineering Group, Inc.</u>	_____			

Description

Wessels SPA ASME Vortex type Air Separators eliminate air quickly and efficiently from open and closed loop heating/cooling systems. Water enters and exits through unique "tangential" connections, which promote a low velocity swirling effect in the center of the unit. Natural centrifugal forces allow the heavier air-free water to move toward the outer edges while entrained air is captured within the "eye" of the vortex and released out of the top of the separator. The bubble-free water then exits near the bottom of the unit, protecting the systems against the noise, corrosion, and damage commonly caused by entrained air.

Construction

Shell: Carbon Steel
 Heads: Carbon Steel
 Exterior: Primer Painted

Performance Limitations

Maximum Design Temperature: 450°F
 Maximum Design Pressure: 125 PSIG*

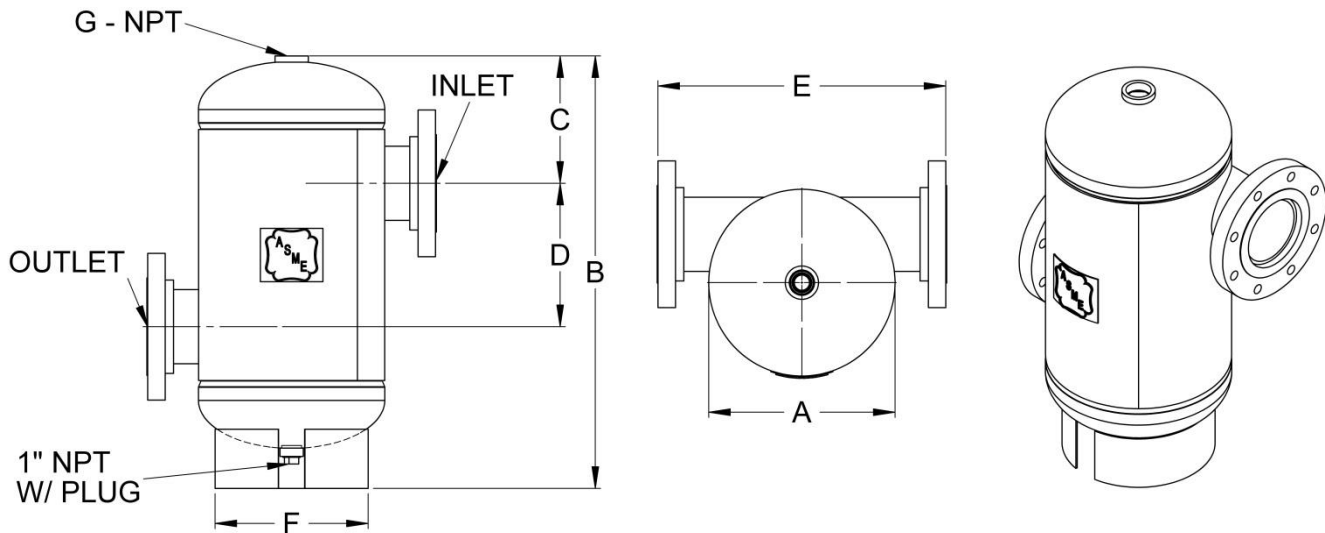
*200 & 250 PSIG available

Model Number	Part Number	Max Flow (GPM)	Tagging Information	Quantity
SPA-2	72006019	56		
SPA-2.5	72006025	90		
SPA-3	72006030	190		2
SPA-4	72006035	300		1
SPA-5	72016036	530		
SPA-6	72001060	850		
SPA-8	72016080	1900		
SPA-10	72030010	3200		
SPA-12	72030012	4800		
SPA-14	72072014	6100		
SPA-16	72072016	8000		
SPA-18	72072018	9700		
SPA-20	72072020	12000		
SPA-22	72072022	15000		
SPA-24	72072024	17000		

Typical Specification

Furnish and install, as shown on plans, a vortex type air separator model SPA _____ sized for _____ GPM, with _____" (NPT/Flanged) tangential connections, as manufactured by Wessels Company. A blowdown connection shall be provided to facilitate routine cleaning of the unit. The tank must be constructed in accordance with most recent addendum of Section VIII Division 1 of the ASME Boiler and Pressure Vessel Code, and shall be constructed and stamped for 125 PSI working pressure @ 450°F.

Each air separator shall be Wessels model number SPA-_____ or approved equal.



SPA-2 thru SPA-24

Dimensions & Weights

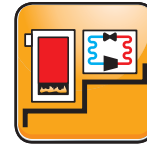
Model Number	Dimensions in Inches								Approx. Shipping Wt (lbs)
	Connection Size	A	B	C	D	E	F	G	
SPA-2	2 NPT	12	22 1/2	5 1/2	8 1/2	16 5/8	9 1/2	1 1/4	34
SPA-2.5	2.5 NPT		25	6 1/4	8	19 3/4			37
SPA-3	3		32	9 1/8	10 3/4	21 3/4			45
SPA-4	4	14	44	13 1/4	14 1/2	28	18	1 1/2	80
SPA-5	5		60 1/2	19	20	41			125
SPA-6	6	20	78	22	31 1/2	46 3/8	30	2	175
SPA-8	8		108	30	40	60			210
SPA-10	10		124	33	50	66			460
SPA-12	12	30	138	35	60	72	50	3346	577
SPA-14	14		150	38	66	78			850
SPA-16	16	66	150	38	66	80	56	4211	1858
SPA-18	18					78			56
SPA-20	20	66	150	38	66	80	56	4211	3346
SPA-22	22								78
SPA-24	24	66	150	38	66	80	56	4211	4211

Notes

- Available with mounting clips.

tekmar® Submittal

Pump Sequencer 132



Multi-Staging

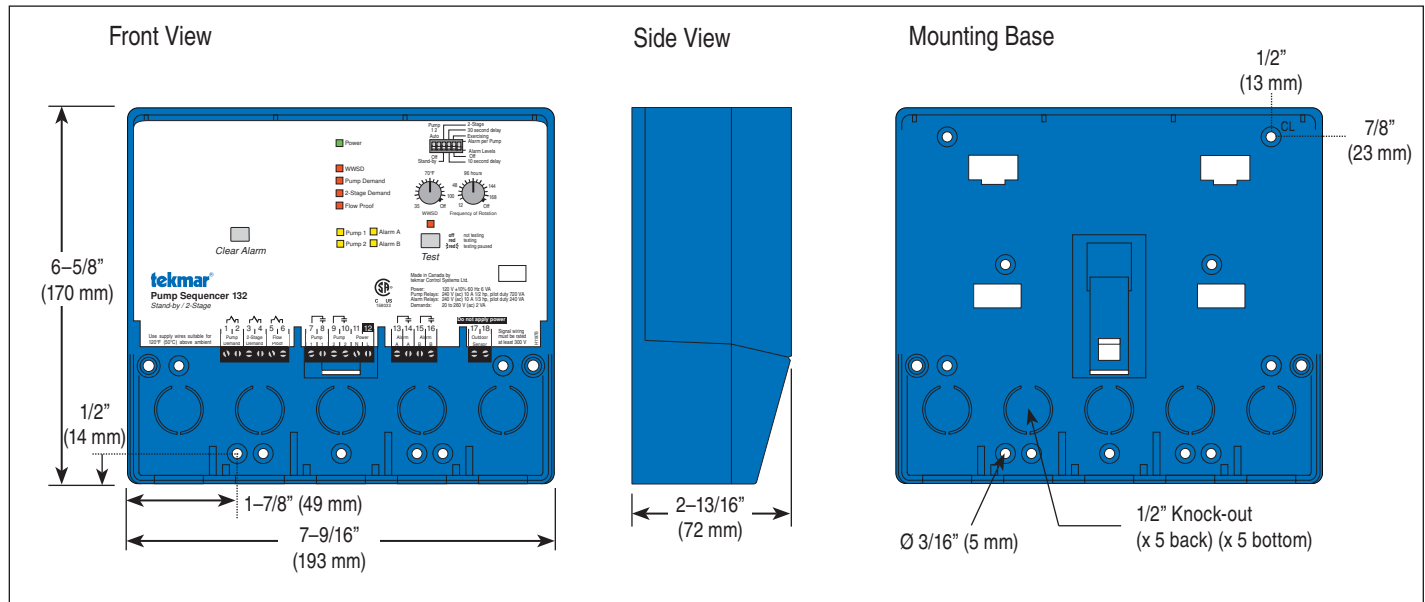
C 132

01/11

Replaces: New

Job Park Forest Designer _____ Contact _____

The Pump Sequencer 132 is designed to operate 2 pumps by providing stand by or staging operation. It can be used in a wide range of applications, including residential installations using a backup system pump to commercial applications that require energizing a second stage for increased flow or head. The main function of the 132 is to provide lead lag capability to a standby pump setup, or to provide staging capability for a dual pump installation. The 132 can energize up to 2 pumps, as well as provide alert contacts that can be used in the event of a failure.



Specifications

Pump Sequencer 132 Stand-by / 2-Stage	
Literature	D132, A132, D001
Control	Microprocessor control. This is not a safety (limit) control
Packaged weight	2.9 lb. (1320 g)
Dimensions	6-5/8" H x 7-9/16" W x 2-13/16" D (170 x 193 x 72 mm)
Enclosure	Blue PVC plastic, NEMA type 1
Approvals	CSA C US, meets class B: ICES & FCC Part 15
Ambient conditions	Indoor use only, 32 to 120°F (0 to 50°C), RH ≤90% Non-condensing
Power supply	120 V ±10%, 50/60 Hz, 6 VA
Pump relays	240 V (ac) 10 A 1/2 hp
Alert relays	240 V (ac) 10 A 1/3 hp
Demands	20 to 260 V (ac) 2 VA
Sensors	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
-Optional	Outdoor Sensor 070
Warranty	Limited 3 Year (See D132 for full warranty)

Energy Saving Features

- Warm Weather Shut Down

Additional Features

- Equal Run Time Rotation
- Lead lag operation
- 2 Stage capability
- Exercising
- Alert per pump or alert levels
- Adjustable flow proof delay
- Test sequence
- CSA C US certified (approved to applicable UL standards)

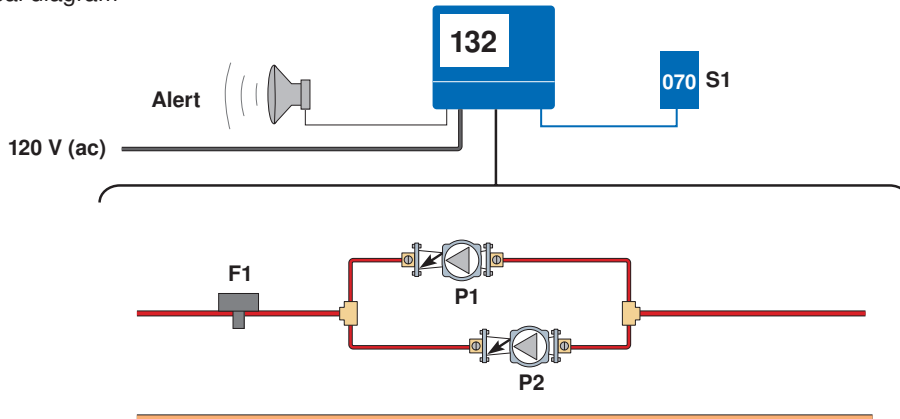
SPECIAL REQUIREMENTS

N / A

Sample Application Drawing

Below is a sample application drawing for this product. This application may include other tekmar products that are required for installation. More sample applications can be found at www.tekmarcontrols.com.

Sample Mechanical diagram

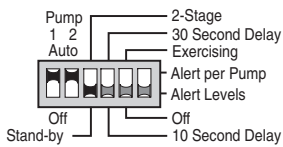


Sample Electrical diagram

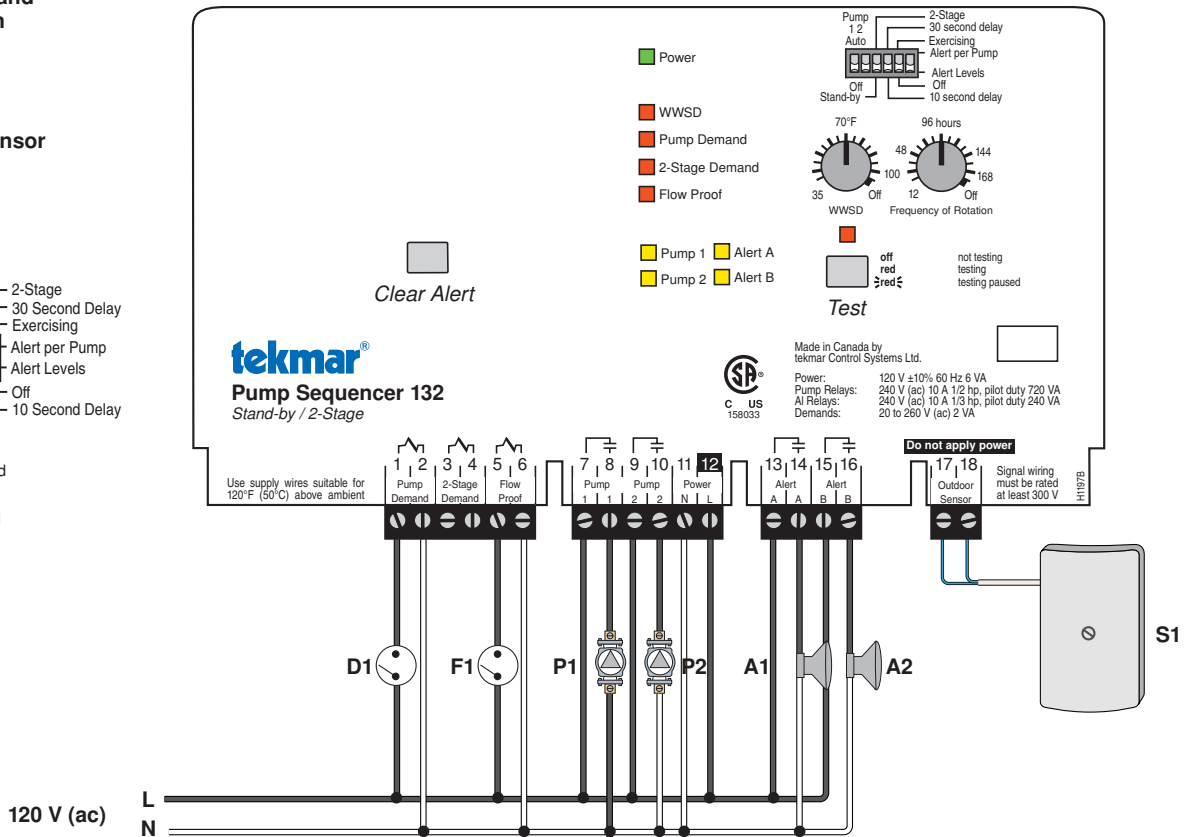
Legend:

- D1 = Pump Demand**
- F1 = Flow Switch**
- P1 = Pump 1**
- P2 = Pump 2**
- A1 = Alert 1**
- A2 = Alert 2**
- S1 = Outdoor Sensor**

DIP Setting



- = Required
- = Optional



tekmar Control Systems Ltd., Canada, tekmar Control Systems, Inc., U.S.A. **Head Office: 5100 Silver Star Road, Vernon, B.C. Canada V1B 3K4, 250-545-7749, Fax. 250-545-0650 Web Site: www.tekmarcontrols.com**

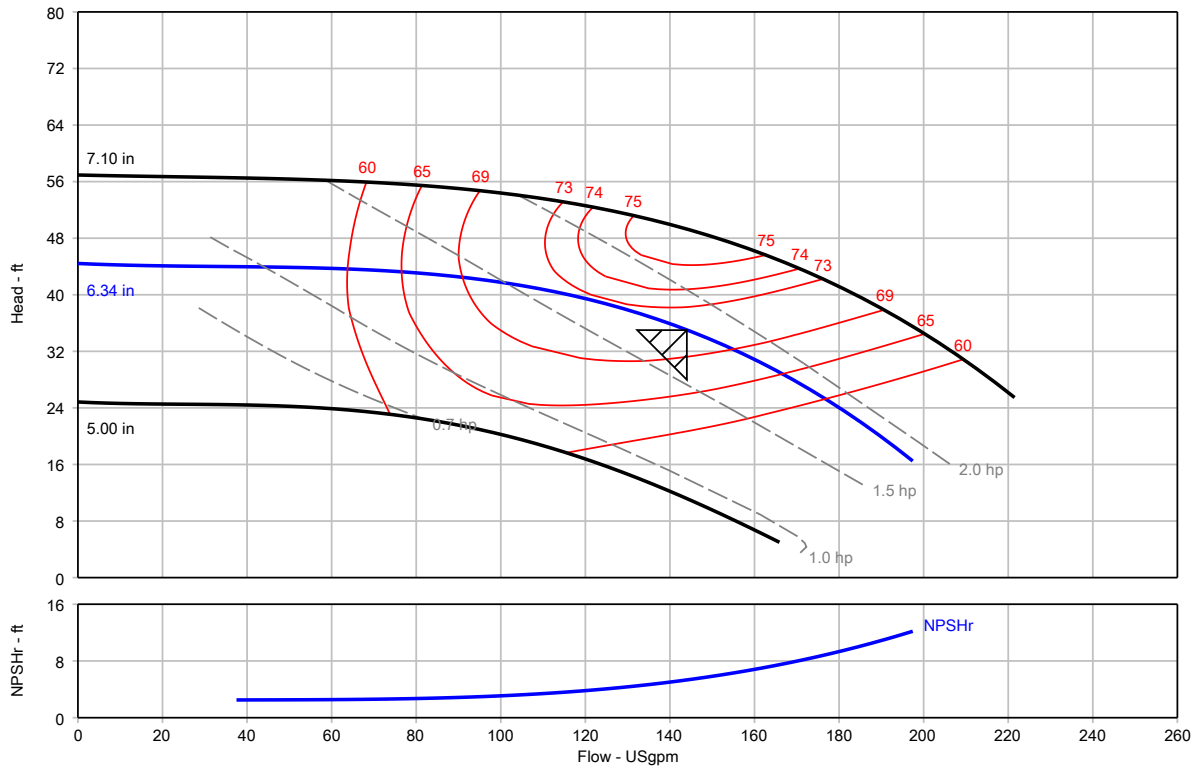


Pump Performance Datasheet

Project name / location	:		Tag Number	:	001
Consulting engineer	:		Service	:	
Customer	:		Model	:	25709 VL
Customer ref. / PO	:		Quantity	:	4
Quote number	:	alan deal 8/3/16	Quoted By (Sales Office)	:	HS Buy Van Associates Inc.
Date last saved	:	08/03/2016 11:22 AM	Quoted By (Sales Engineer)	:	Randy Walker

Operating Conditions		Liquid	
Flow, rated	: 144.0 USgpm	Liquid type	: Cold Water
Differential head / pressure, rated (requested)	: 35.00 ft	Additional liquid description	:
Differential head / pressure, rated (actual)	: 34.98 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids concentration, by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 68.00 deg F
Frequency	: 60 Hz	Fluid density, rated / max	: 1.000 / 1.000 SG
		Viscosity, rated	: 1.00 cP
		Vapor pressure, rated	: 0.34 psi.a

Performance		Material	
Speed, rated	: 1765 rpm	Material selected	: Cast iron
Impeller diameter, rated	: 6.34 in		
Impeller diameter, maximum	: 7.10 in	Pressure Data	
Impeller diameter, minimum	: 5.00 in	Maximum working pressure	: 19.23 psi.g
Efficiency	: 71.32 %	Maximum allowable working pressure	: 175.0 psi.g
NPSH required / margin required	: 5.33 / 0.00 ft	Maximum allowable suction pressure	: 175.0 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 23 / 109 Metric units	Hydrostatic test pressure	: 263.0 psi.g
MCSF	: 40.00 USgpm	Driver & Power Data	
Head, maximum, rated diameter	: 44.42 ft	Motor sizing specification	: Max power (non-overloading)
Head rise to shutoff	: 26.82 %	Margin over specification	: 0.00 %
Flow, best eff. point	: 124.6 USgpm	Service factor	: 1.00
Flow ratio, rated / BEP	: 115.56 %	Power, hydraulic	: 1.27 hp
Diameter ratio (rated / max)	: 89.30 %	Rated power (based on duty point)	: 1.79 hp
Head ratio (rated dia / max dia)	: 71.07 %	Max power (non-overloading)	: 1.88 hp
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00	Nameplate motor rating	: 2.00 hp / 1.49 kW
Selection status	: Acceptable		



PACO Series VL In Line Centrifugal Pump, Close Coupled

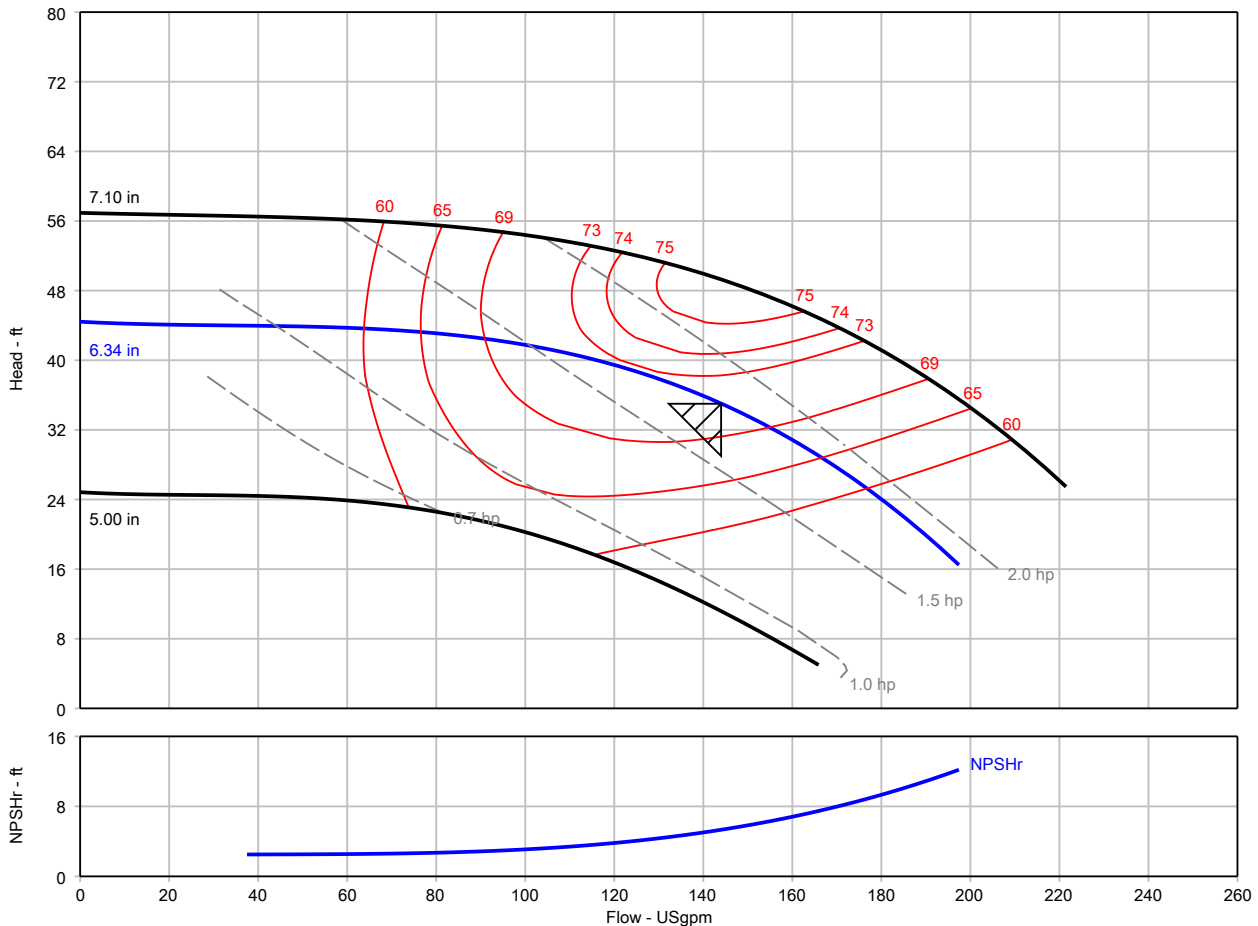
PROJECT: alan deal 8/3/16	UNIT TAG: 001	QUANTITY: 4
REPRESENTATIVE:	SERVICE:	DATE:
ENGINEER:	SUBMITTED BY:	DATE:
CONTRACTOR:	APPROVED BY:	DATE:
	ORDER #:	DATE:



VL 25709
1765 rpm

Part Number: N/A

Conditions of Service		Pump Data		Motor Data	
Flow:	144.0 USgpm	Impeller Diameter:	6.34 in	Motor HP:	2.00 hp
Head:	35.00 ft	Max. Imp. Dia.:	7.10 in	BHP:	1.79 hp
Liquid:	Cold Water	Min. Imp. Dia.:	5.00 in	Enclosure:	TEFC
Temperature:	68.00 deg F	Efficiency:	71.32 %	Voltage:	208-230/460 V
NPSHr:	5.33 ft	Suction:		Phase:	3 Phase
Viscosity:	1.00 cP	Discharge:		Cycle:	60 Hz
Specific Gravity:	1.000 SG	Configuration:	Vertical	Frame Size:	145JM

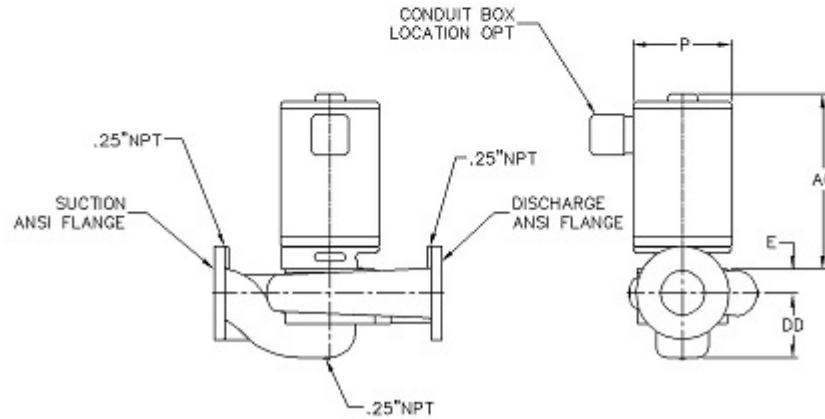


PACO Series VL In Line Centrifugal Pump, Close Coupled

Do not install pump larger than 215JM in vertical piping.

Pressure and drain tap locations are approximate.

Suction and discharge flanges, are cast per 250# ANSI thickness and diameter. All flanges are flat face. Some holes may be threaded because of nut clearances.



NOT FOR CONSTRUCTION, unless certified and referenced on order

Units	Frame	S x D	AG (Max)	DC	DD	DE	E	P (Max)	X	YY	Weight
inches	145JM	2.5 X 2.5	18.00	4.75	6.00	5.62	1.63	8.00	8.50	8.50	TBD

PACO Series VL In Line Centrifugal Pump, Close Coupled

PROJECT: alan deal 8/3/16	UNIT TAG: 001	: VL 25709
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MATERIALS OF CONSTRUCTION			
PART	MATERIAL	PART	MATERIAL
Rotation Options	Clockwise	Impeller Washer	S.S., AISI-303
Base/Stand Type	No Stand Provided	Impeller Key	Steel, AISI 1045
Connections	125# ANSI	Sleeve Material	Bronze, III932, C89835 or No Sleeves
Wear Ring Material	NiAl-Bronze, ASTM-B148, C95500	Wear Ring Type	Case Wear Ring
Pump Coatings	Standard Paint	Packing Gland	Not Applicable
NSF-50 Certification	Not Required	Lantern Ring	None
NSF-61 Certification	Not Required	Seal Type	Type 21
Motor Drip Canopy	Provided	Casing	Cast Iron, ASTM-A48, CL 30
Seal Material	Ceramic/Carbon/Buna	O-Rings	Buna N
Motor Shaft	Steel, AISI 1045 or S.S	Seal Flush Options	External Flush, plastic tubing
Backplate/Seal Plate	Cast Iron, ASTM-A48, CL 30	Motor Bracket	Cast Iron, ASTM-A48, CL 30
Gaskets	Vegetable Fiber	Impeller	Silicon Bronze, ASTM-B584, C87600
Casing Bolts	Steel, Grade 5	Impeller Cap Screw	S.S., AISI-303
Comments			

* All materials based on STANDARD configuration

Construction Datasheet

Project name / location	:	Tag Number	:	001
Consulting engineer	:	Service	:	
Customer	:	Model	:	25709 VL
Customer ref. / PO	:	Quantity	:	4
Quote number	:	Quoted By (Sales Office)	:	HS Buy Van Associates Inc.
Date last saved	:	Quoted By (Sales Engineer)	:	Randy Walker

Construction				Motor Information	
--------------	--	--	--	-------------------	--

Nozzle	Size (in.)	Nozzle Configuration	Pos'n	Manufacturer	: Baldor
Suction	2.5	125# ANSI	Side	Frame Size	: 145JM
Discharge	2.5	125# ANSI	Side	Power	: 2.00 hp

Orientation / Configuration	:	Vertical	RPM	:	1800 rpm
Rotation	:	Clockwise	Enclosure	:	TEFC
Wear Ring Configuration	:	Single - Case	Operating Power Supply	:	230/460/3/60
Discharge Elbow Size	:	-	Efficiency	:	Premium
Subplate	:	-	Service factor	:	1.15
Sump Depth (feet)	:	-	Motor Application	:	General Purpose
Bearing Frame	:	-	Motor Options/Accessories	:	-
Bearing Frame Foot	:	-	Cord Length (feet)	:	-
Bearing Type (Radial/Thrust)	:	In motor	Materials		

Bearing Lubrication	:	Regreasable	Case	:	Cast Iron, ASTM A48 - Class 30
Thrust Bearing	:	-	Motor Bracket	:	Cast Iron, ASTM-A48, CL 30
Intermediate Bearing	:	-	Impeller	:	Silicon Bronze, ASTM B584 C87600 (B21)
Lower Bearing	:	-	Impeller Cap Screw and Washer	:	Stainless Steel, AISI-303
Bearing Housing Accessories	:	-	Impeller Key	:	Steel, Cold Drawn C1018
PACO Construction code	:	16-25709-130101-2562P	Case wear ring	:	Tin Bronze, ASTM B584-90500 (B18)

Baseplate, Coupling and Guard	
-------------------------------	--

Baseplate	:	Not Applicable	Impeller wear ring	:	-
Drip Pan	:	-	Pump Shaft	:	Steel, AISI-1040
Coupling	:	-	Sleeve	:	Bronze, III932, C89835
Guard	:	OSHA Approved	Line Shaft	:	-

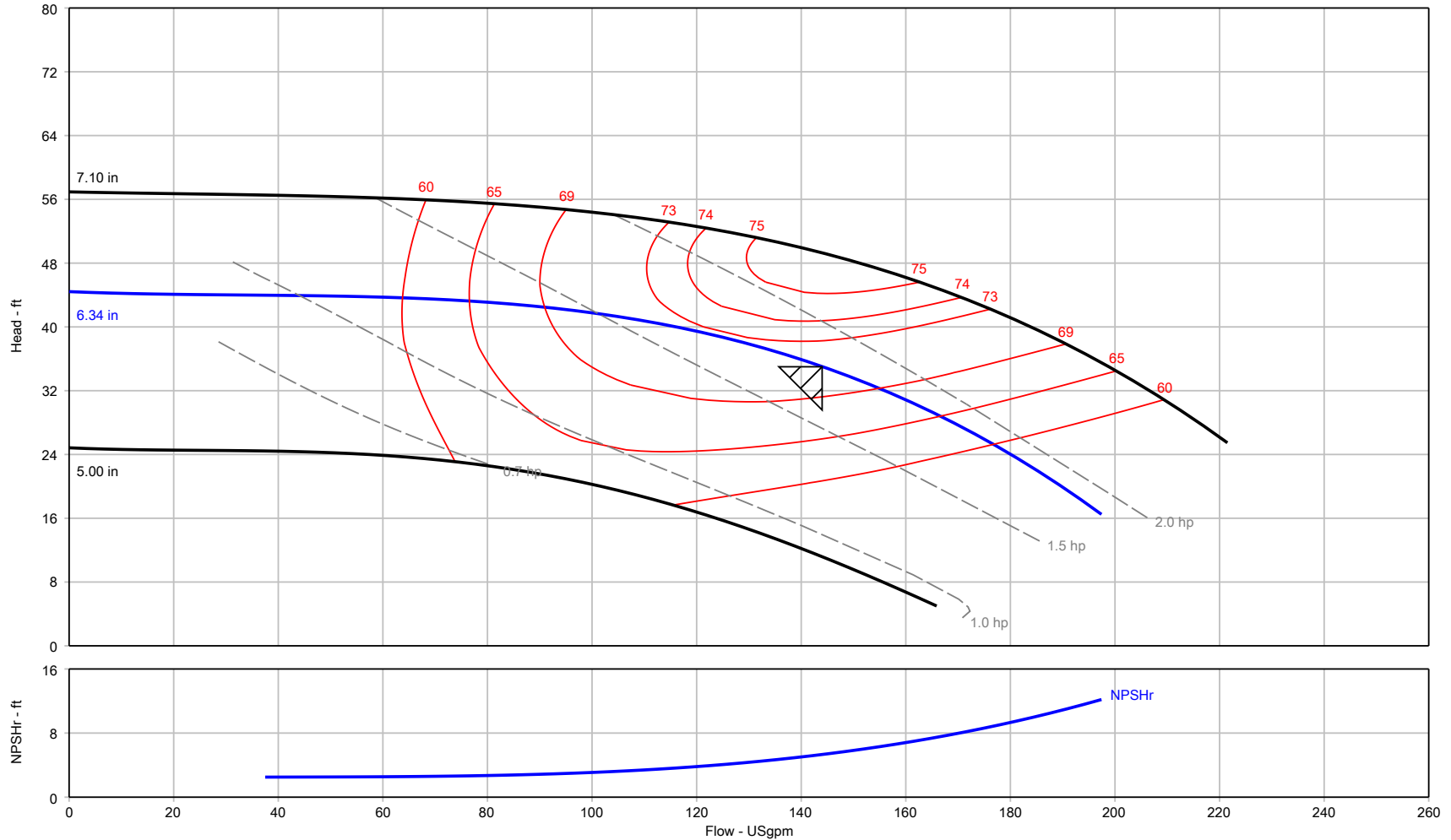
Seal & Packing Construction	
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Sealing Method	:	Single Seal, Type 21S	Discharge Pipe	:	-
Seal Material	:	Buna Carbon Ceramic SS-Spring and Hardware	Discharge Elbow	:	-
Packing Gland	:	-	Suction Elbow	:	-
Lantern Ring	:	-	Subplate	:	-
Recirculation Lines	:	Nylon Tubing with Brass Fittings	Hardware	:	Steel, Grade 5

Weights (Approx.)	
-------------------	--

Pump	:	91.00 lb	O Rings	:	Buna N
Baseplate	:	-	Pump Coatings	:	Standard Manufacturers Paint
Driver	:	53.00 lb			
Estimated Shipping gross weight	:	144.0 lb			

Pump Performance Curve



Project name / location :	Tag Number :	001	Speed, rated :	1765 rpm
Consulting engineer :	Service :		Flow, rated :	144.0 USgpm
Customer :	Model :	25709 VL	Differential head / pressure, rated :	35.00 ft
Customer ref. / PO :	Quantity :	4	Rated power (based on duty point) :	1.79 hp
Quote number : alan deal 8/3/16	Quoted By (Sales Office) :	HS Buy Van Associates Inc.	Max power (non-overloading) :	1.88 hp
Date last saved : 08/03/2016 11:22 AM	Quoted By (Sales Engineer) :	Randy Walker	Efficiency :	71.32 %
:	Stages :	1	Based on curve number :	RC9905-1 Rev 1

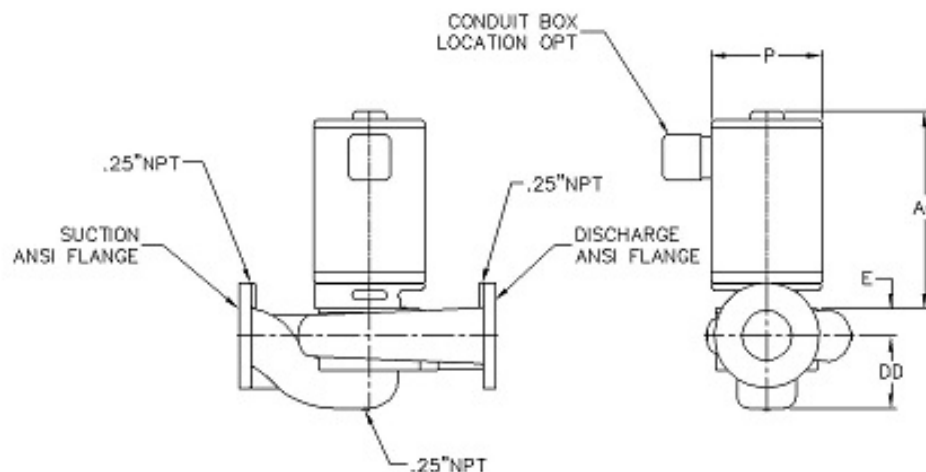
General Arrangement

Project name / location :	Tag Number : 001
Consulting engineer :	Service :
Customer :	Model : 25709 VL
Customer ref. / PO :	Quantity of pumps : 4
Quote number : alan deal 8/3/16	Quoted By (Sales Office) : HS Buy Van Associates Inc.
Date last saved : 08/03/2016 11:22 AM	Quoted By (Sales Engineer) : Randy Walker

Do not install pump larger than 215JM in vertical piping.

Pressure and drain tap locations are approximate.

Suction and discharge flanges, are cast per 250# ANSI thickness and diameter. All flanges are flat face. Some holes may be threaded because of nut clearances.



NOT FOR CONSTRUCTION, Unless certified and referenced on order

Units	Frame	S x D (in.)	AG (Max)	DC	DD	DE	E	P (Max)	X	YY	Weight ea
inches	145JM	2.5 X 2.5	18.00	4.75	6.00	5.62	1.63	8.00	8.50	8.50	144.0

Conditions of Service			Motor Data			
Flow: 144.0 USgpm	Fluid: Cold Water	HP: 2	Encl: TEFC	Phase: 3	Efficiency: Premium	
TDH: 35.00 ft	Temp.: 68.00 deg F	RPM: 1765 rpm	Hz: 60	Voltage: 230/460	S.F.: 1.15	

Pump

Qty	Description	Average Unit Price	Extended Price
	Leadtime: 3 wks Estimated Weights ea: 127 lbs Paint & Coatings Coating: Standard Manufacturers Paint Certifications: None		

Performance Engineering Group, Inc.
32995 Industrial Road
Livonia, MI 48150-1617
Phone: 734.266.5300
Fax: 734.266.5310

SUBMITTAL

Job: **Park Forest**

Domestic Hot Water System

Contractor: **William E. Walter, Inc.**

PERFORMANCE
engineering group



APPROVING AUTHORITY	ATTACHMENTS	FORM #
	DOMESTIC HOT WATER EQUIPMENT iQ1001 - Intellihot Tankless Water Heater TTP4-50 - Brazed Plate Heat Exchanger HTX-30 - ProFlex 2 Hydronic Expansion Tank Smart 80 - Indirect Fired Water Heater, SS VJR150TM - Spirotherm Spirovent Air Eliminator TTA-12 - Wessels Thermal Expansion Tank ALPHA 15-55SF - Grundfos Circulator UPS 43-100CI	 102913 2009-8 VJR-1C B-1003C 59896879 95906636

Date:

Bid Date:

Project Name:

Project #:

City/St/ZIP:

Engineer:

Contractor:

Fuel Type:

Natural Gas

Propane

Factory Option:

iNTouch-BMS

Key Features

- **Multiple Stainless** (316L) heat exchanger
- **Flexible-Floating** Design, stress relieving and thermal shock capable.
- **Built in Redundancy**- Multiple heat engines with individual control.
- **Multi-Unit**- masterless cascading with common venting
- **Gas Pressures**- Operates on gas pressures range of 2.5"-14" w.c.
- **ASME-HLW compliant**
- **Designed and Built** in the U.S.

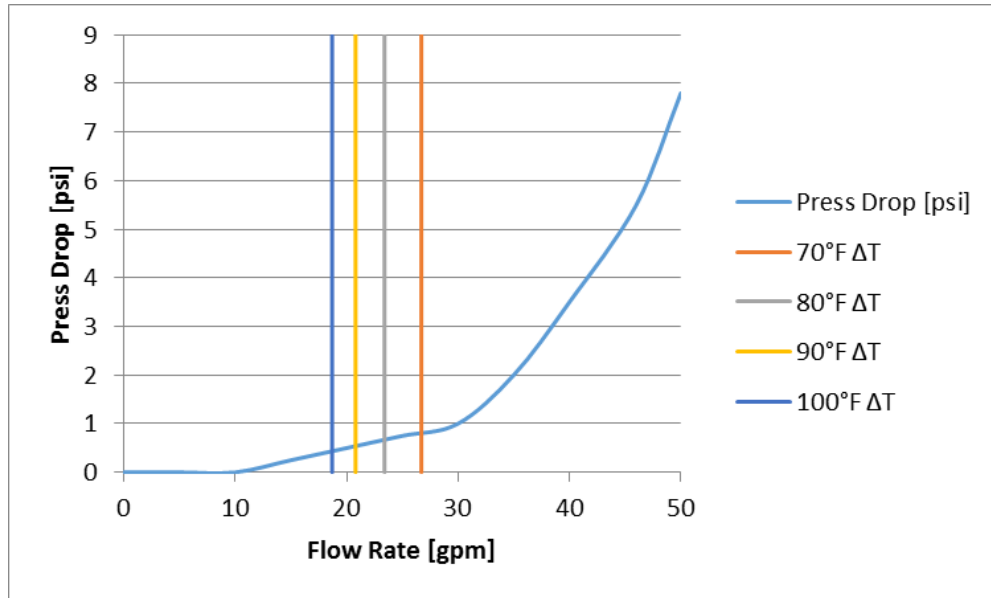


Performance

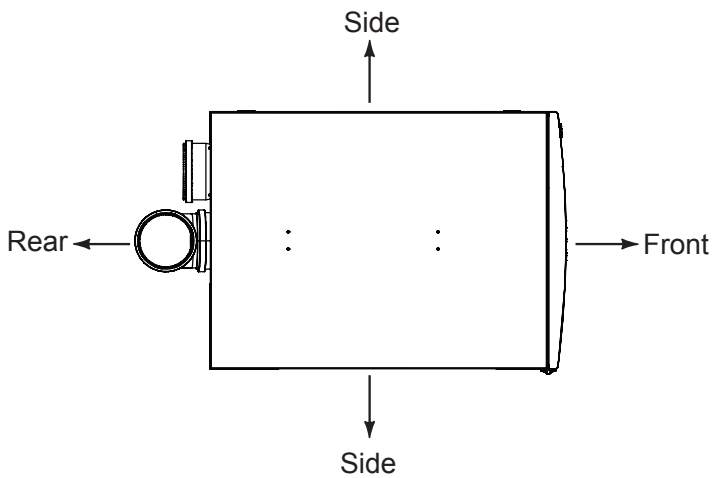
- Turndown Ratio of 33:1 per unit.
- Cascade up to 4 units with common venting for a total of over 4000MBH and a 132:1 total turndown ratio

	Temperature Rise (ΔT) °F						
	40	50	60	70	80	90	100
Flow (GPM)	47.2	37.8	31.5	27.0	23.6	21.0	18.9

Pressure Drop



Clearances



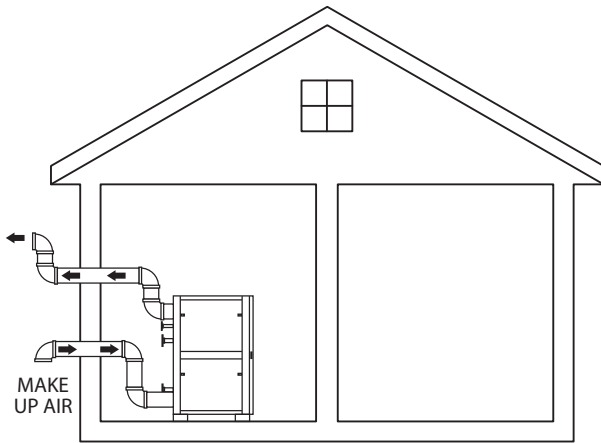
Required Mounting Clearances			
Location	From Combustibles	From Non-Combustibles	Service Clearance ¹
Top	6" (15.2cm)	20" (50.8cm)	18" (46cm)
Back	5/8" (15.8mm)	5/8" (15.8mm)	24" (61mm)
Sides	1" (25.4mm)	1/2" (12.7mm)	24" (61mm)
Front	2" (5.1cm)	2" (5.1cm)	32" (81cm)
Bottom	0" (0mm)	0" (0mm)	0" (0mm)

¹ Service clearances are suggested to allow for normal service

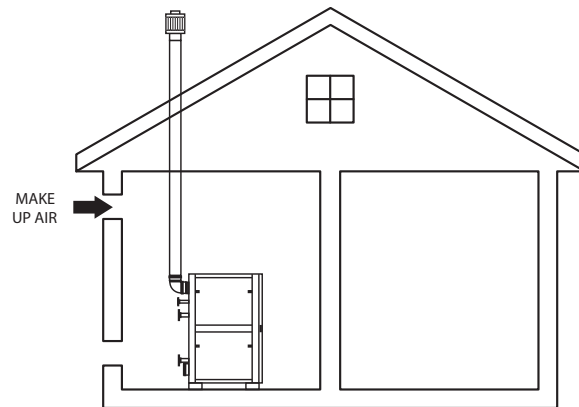
Venting

Maximum Vent Length (ft.)					
Number of units vented together	Venting Type	Duct Size			
		6"	8"	10"	12"
1	1 pipe - PV	130	500	-	-
	2 pipe - DV	65	250	-	-
2	1 pipe - PV	36	150	440	-
	2 pipe - DV	18	75	220	-
3	1 pipe - PV	-	70	212	500
	2 pipe - DV	-	35	106	250
4	1 pipe - PV	-	42	124	124
	2 pipe - DV	-	21	62	62

Note: Reduce the maximum equivalent length above by 5 feet per 90° elbow and by 2 feet per 45° elbow used. Do not exceed the above set limits. PV = Power vent, DV = direct vent



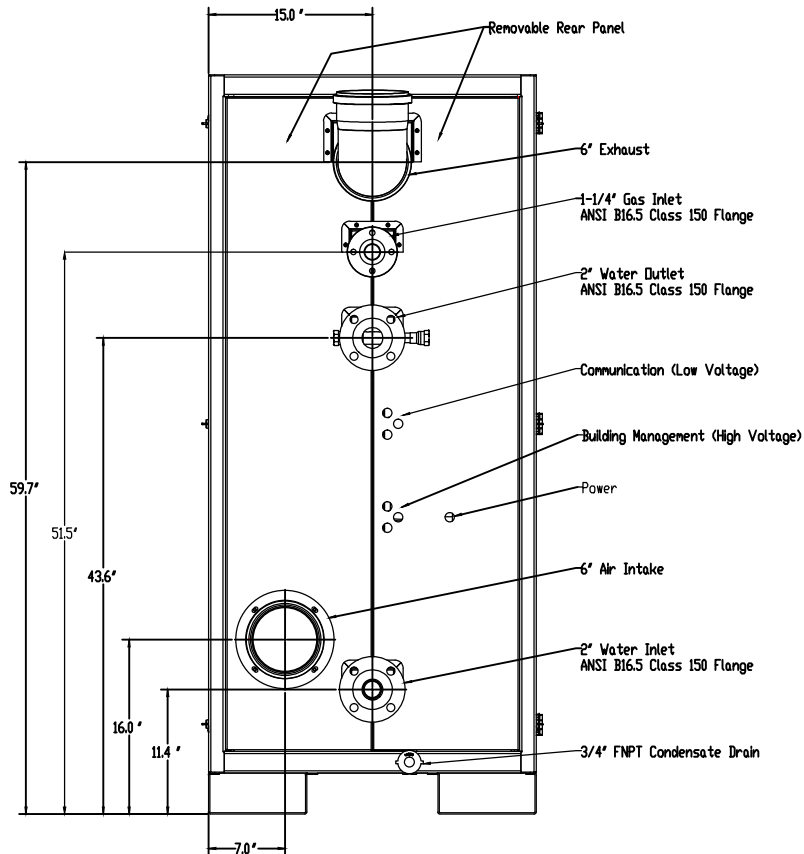
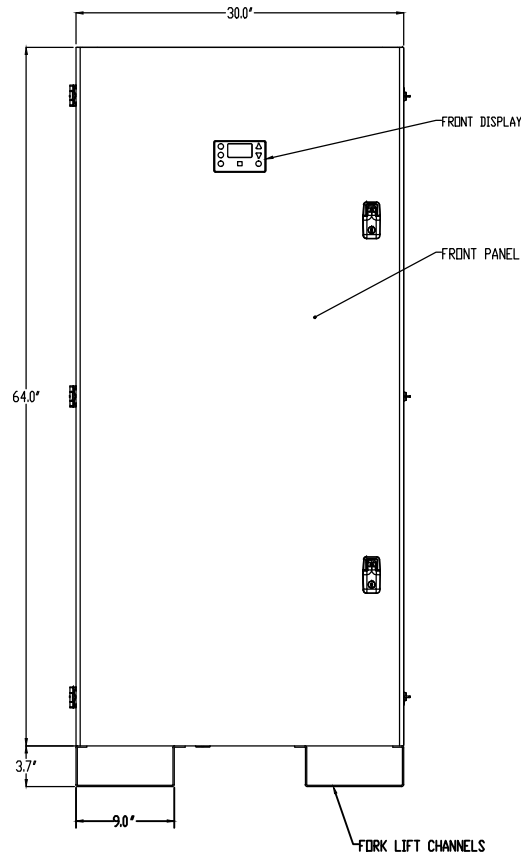
Ex: 2-Pipe Direct Vent

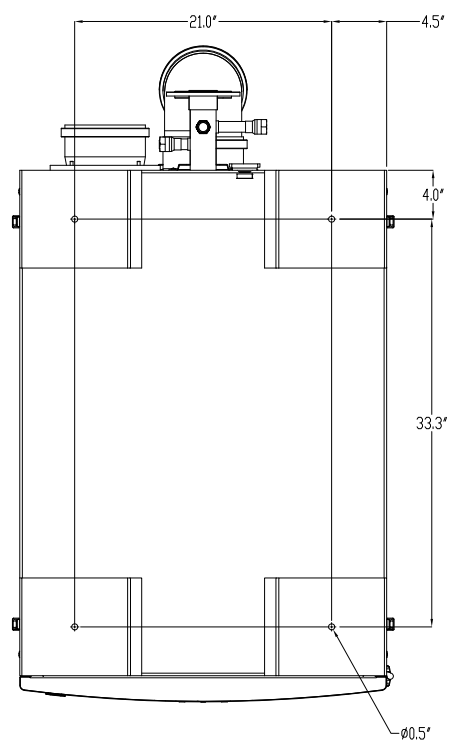
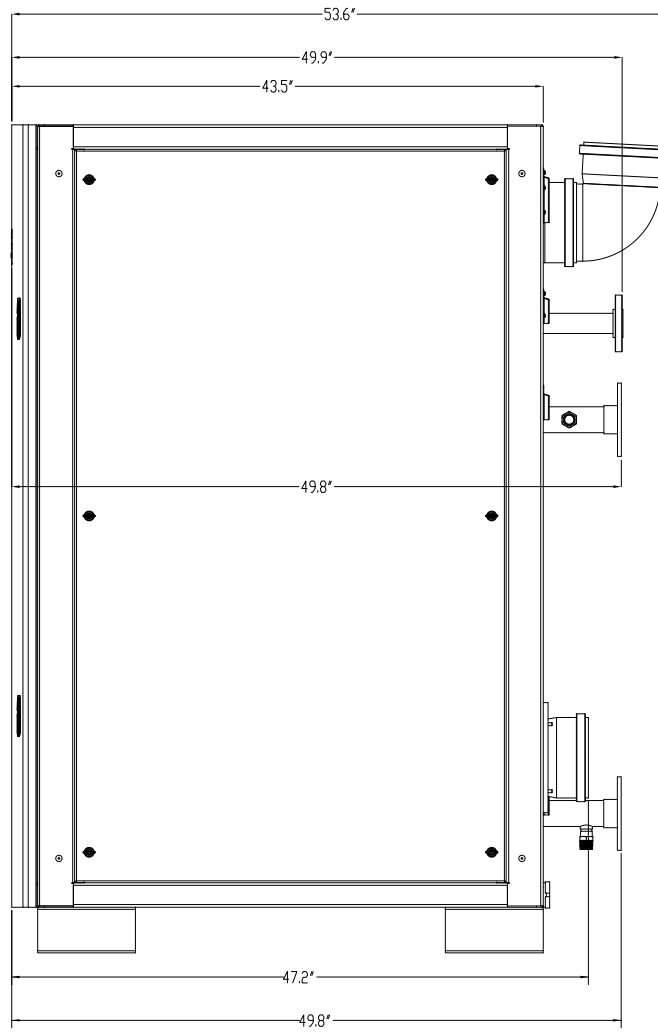


Ex: 1-Pipe Power Vent

Electrical Data

Electrical power required for the water heater is 120V AC, 60 Hz. The circuit breaker shall be sized a minimum of 20 amps for a single heater. Larger breakers can be used for multiple units. Please ensure correct polarity of wiring before powering up unit.





PARAMETERS	iQ1001
Type	Indoor/Outdoor, Floor Mounted, Condensing, Fully Modulating, On-demand
Fuel	Preset for NG / LP convertible without additional parts
Minimum Input (Btu/h)	30,000
Maximum Input (Btu/h)	1,001,000
Maximum Output (Btu/h)	940,940
Thermal Efficiency	94%
Turn Down Ratio (TDR)	33:1
Water Inlet / Outlet Connections	2" Headers with 6" OD Flange
Gas Inlet Connection	1-1/4" Gas Inlet With 4-5/8" OD Flange
Condensate Drain Connection	3/4" Flex PVC
Maximum Condensate Flow Rate (GPH)	7.2
Dimensions H X W X D (inches)	64 X 30 X 43.4 (48 cu. ft)
Service Clearances	Recommend 24" on all sides
Weight (lbs)	590
Venting Type	Direct Vent (2 pipe - intake & exhaust), Power Vent (1 pipe - exhaust only)
Venting Materials (USA)	Sch. 40 PVC, Sch. 40 CPVC, Polypropylene, Stainless Steel
Venting Materials (Canada)	Type BH Gas Vent Classes: II A (PVC), II B (CPVC), II C (Polypropylene), I (AL294C SS)
Vent Size (Diameter)	6" Ø
Max 6" Vent Length - Single Pipe / Power Vent	130 ft*
Max 6" Vent Length - Two Pipe / Direct Vent	65 ft*
* Venting Note: From the maximum lengths above, deduct 5 ft. per 90° elbow and 2 ft. per 45° elbow	
Ignition	Electronic Spark Ignition
Temperature Range	100°F - 190°F
Temperature Stability	+/- 4°F
Installation Location Ambient Temperature	40°F - 130°F
Safety	Flame Rod, Thermal Fuse, Overheat Prevention Device, Fan Speed Monitor, Flue Temperature Monitor, Blocked Vent Detector, Dual Flame Sensing
Water Pressure Min / Max (PSIG)	30 / 160
Pressure Relief Valve	1" Ø / Select Btu/h Input Rating to match Model Maximum Input / 160 PSIG
NG/LP - Min. Dynamic Gas Pressure (Full Fire)	2.5" (non-corrugated, black iron)
NG/LP - Maximum Static Gas Pressure	14"
Gas Pressure for Adjustments	8" for NG, 11" for LP
Electrical	120V AC, 60 Hz
Power Consumption	Max 20 Amps, 32W (Standby)
Internal Water Volume (gallons)	4
Features	
High Turn Down	33:1 TDR per iQ1001 Quad; 132:1 TDR (4 x iQ1001 / 4MMBH)
Built-In Redundancy	Multiple Heat Engines w/ Individual Control
Cascading	Masterless, 4 units, Automatic Rotation
Common Venting	Yes - up to 4 units
Heat Exchanger	Expandable, Stainless 316L
Listing	ETL (Z21.10.3 / CSA 4.3), ASME HLW
Performance GPM	
Hot Water Capacity (45F Rise)	42.0
Hot Water Capacity (70F Rise)	27.0
Hot Water Capacity (90F Rise)	21.0
Hot Water Capacity (100F Rise)	18.9
Hot Water Capacity (140F Rise)	13.5
Warranty	
Heat Exchanger Coil - 10 years, All Other Parts - 2 year	

Note: due to Intellihot's policy of continuous product improvements, design and technical specifications are subject to change without notice. 02/18/16



Intellihot Green Technologies Inc.
 2900 W. Main Street, Galesburg, IL 61401 · phone: 877.835.1705
 email: sales@intellihot.com · www.intellihot.com





**Domestic Hot Water, Snow melting,
Hydro Air, Radiant floor,...**

Superior Design

TTP brazed plate heat exchangers consist of as many as 150 pattern-embossed stainless steel plates. The plates are brazed together, with every second plate turned 180° to create two separate flow channels with two mediums in counter current. The design of the plates creates a high turbulence resulting in an outstanding heat transfer. The result is a highly efficient heat exchanger that utilizes all the material in the heat transfer process.

Customer Support and Service

When you choose a TTP heat exchanger, you gain access to the TTP software package - a sophisticated computer program that will select the optimum heat exchanger for your particular application.

Non Corrosive

The plates are made of stainless, acid-resistant steel, with 99.9% pure copper and brazed, which ensures a very high resistance to corrosion.

Self Cleaning

The TTP heat exchanger operates with a turbulent flow, even at low velocities, creating a self cleaning, self descaling design that resists scaling.

Compact Brazed Plate Heat Exchangers

Specifications

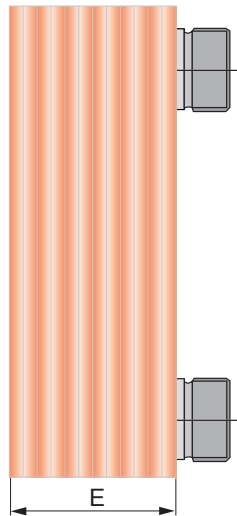
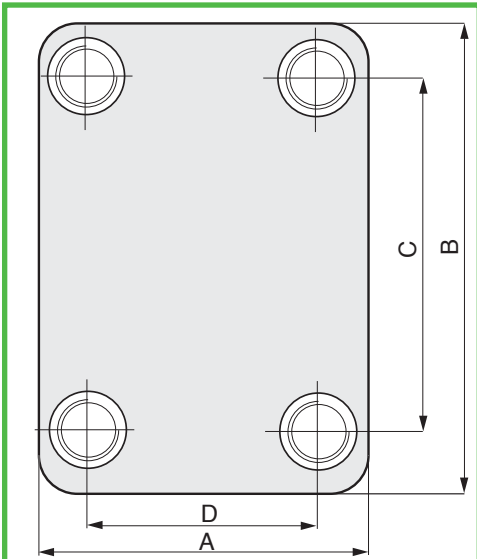
Materials : Plates and Connections: AISI 316L Stainless Steel, Braze: 99.9% Copper

Operating Conditions : Max. Operating Pressure: 450psig, 150 psig ("E" Models), 362 psig ("DW" models)
 Max. Operating Temperature: 350°F

Approvals:



ASME (available option)



Dimensions

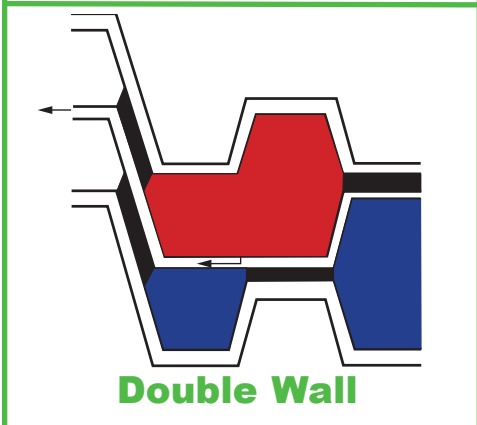
Single Wall

Model	Threaded Connections (inch) NPT	Sweetened Connection (inch)	Dimensions (inch)					Empty Weight lbs	Plates
			A	B	C	D	E		
TTP1-14E	3/4	7/8	2.9	8.0	6.7	1.6	1.6	3.1	14
TTP1-20E	3/4	7/8	2.9	8.0	6.7	1.6	1.6	3.8	20
TTP1-30E	3/4	7/8	2.9	8.0	6.7	1.6	1.6	4.9	30
TTP3-14	1	1 1/8	4.9	12.2	10.0	2.7	1.6	5.5	14
TTP3-16	1	1 1/8	4.9	12.2	10.0	2.7	1.8	6.2	16
TTP3-30	1	1 1/8	4.9	12.2	10.0	2.7	3.1	11.7	30
TTP3-36	1	1 1/8	4.9	12.2	10.0	2.7	3.6	14.0	36
TTP4-10	1	1 1/8	5.1	13.3	11.1	2.9	1.3	6.6	10
TTP4-14	1	1 1/8	5.1	13.3	11.1	2.9	1.6	7.8	14
TTP4-24	1	1 1/8	5.1	13.3	11.1	2.9	2.5	10.8	24
TTP4-30	1	1 1/8	5.1	13.3	11.1	2.9	3.0	12.6	30
TTP4-50	1	1 1/8	5.1	13.3	11.1	2.9	4.8	18.6	50
TTP4-70	1	1 1/8	5.1	13.3	11.1	2.9	6.6	24.6	70
TTP7-20	2	2 1/8	11.1	21.4	18.1	7.8	2.5	51.0	20
TTP7-24	2	2 1/8	11.1	21.4	18.1	7.8	2.9	55.4	24
TTP7-30	2	2 1/8	11.1	21.4	18.1	7.8	3.6	62.0	30
TTP7-40	2	2 1/8	11.1	21.4	18.1	7.8	4.6	73.0	40
TTP7-50	2	2 1/8	11.1	21.4	18.1	7.8	5.7	84.0	50
TTP7-60	2	2 1/8	11.1	21.4	18.1	7.8	6.7	95.0	60
TTP7-100	2	2 1/8	11.1	21.4	18.1	7.8	10.9	139.0	100
TTP7-120	2	2 1/8	11.1	21.4	18.1	7.8	12.9	161.0	120
TTP7-150	2	2 1/8	11.1	21.4	18.1	7.8	16.1	194.0	150

Double Wall

For extra protection against leakage a special double wall system is available. The heat exchanger consists of two stainless steel plates instead of one, which significantly reduces the chance of fluid contamination.

For double wall application, contact ACV - Triangle Tube's Technical Support Department for sizing assistance.

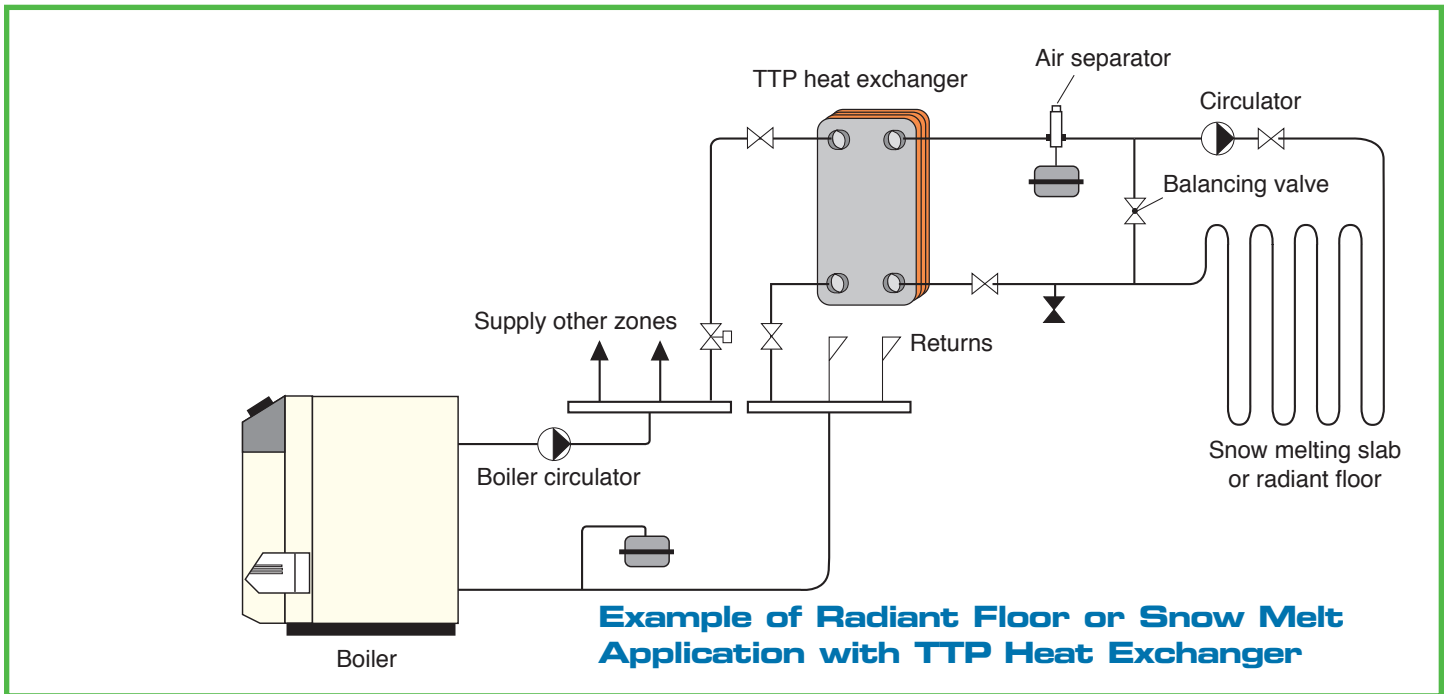


Double Wall

Model	Threaded Connections (inch) NPT	Solder Connection (inch)	Dimensions (inch)					Empty Weight lbs
			A	B	C	D	E	
TTP5-8DW	1	1 1/8	4.9	20.8	18.8	2.9	1.0	9.2
TTP5-14DW	1	1 1/8	4.9	20.8	18.8	2.9	1.6	12.8
TTP5-20DW	1	1 1/8	4.9	20.8	18.8	2.9	2.1	16.4
TTP5-30DW	1	1 1/8	4.9	20.8	18.8	2.9	3.0	22.4
TTP5-50DW	1 1/4	1 3/8	4.9	20.8	18.8	2.9	4.8	34.4
TTP5-60DW	1 1/4	1 3/8	4.9	20.8	18.8	2.9	7.5	52.4
TTP5-100DW	1 1/4	1 3/8	4.9	20.8	18.8	2.9	9.3	64.4

Applications

Radiant Floor or Snow Melt



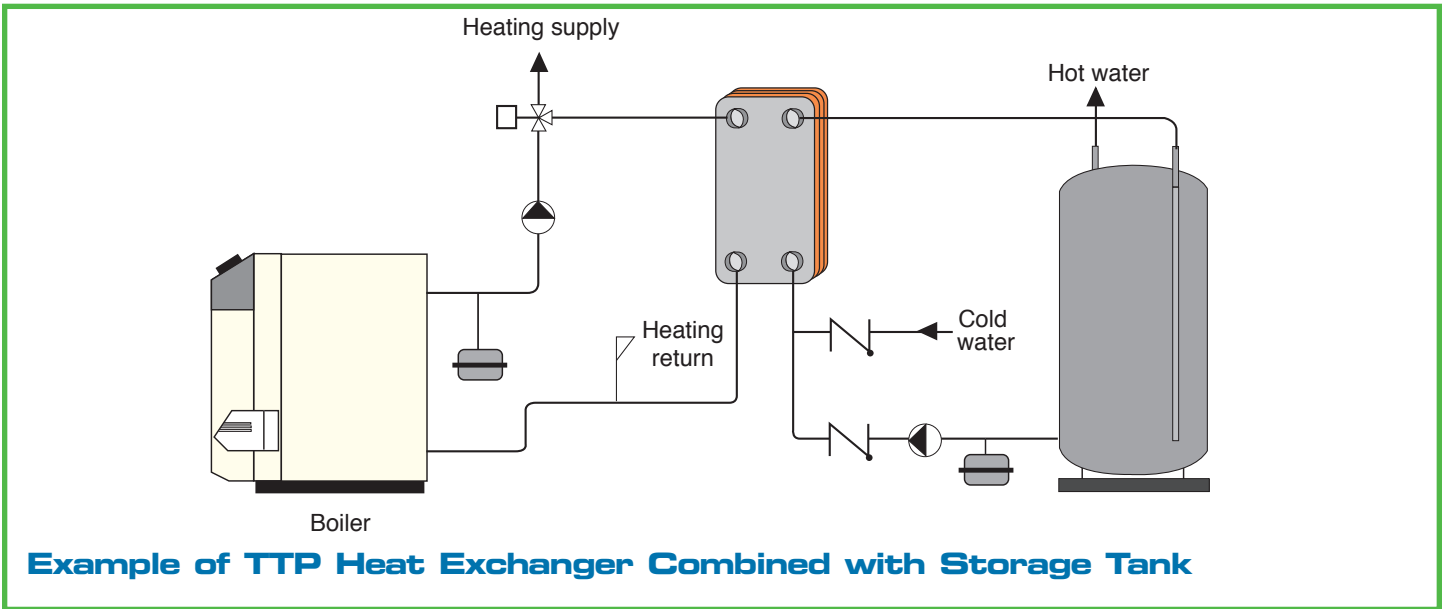
Model	Btu/Hr Supplied	Boiler GPM	Pressure Drop PSI Boiler	Radiant/Snowmelt GPM	Pressure Drop PSI Radiant/Snowmelt
TTP1-14E	25,000	2.6	0.5	2.5	0.4
TTP1-14E	30,000	3.1	0.8	3.0	0.6
TTP1-14E	35,000	3.6	1.1	3.5	0.9
TTP1-14E	40,000	4.1	1.4	4.0	1.1
TTP1-14E	45,000	4.6	1.8	4.5	1.4
TTP1-14E	50,000	5.2	2.3	5.0	1.7
TTP1-14E	55,000	5.7	2.8	5.5	2.1
TTP1-14E	60,000	6.2	3.4	6.0	2.5
TTP1-14E	65,000	6.7	4.0	6.5	2.9
TTP1-14E	70,000	7.2	4.6	7.0	3.4
TTP3-20	100,000	10.3	1.6	10.1	1.3
TTP3-20	125,000	12.9	2.6	12.6	2.1
TTP3-20	150,000	15.5	3.8	15.2	3.0
TTP3-20	175,000	18.8	5.2	17.7	4.1
TTP3-20	200,000	20.6	6.9	20.2	5.5
TTP3-20	225,000	23.2	8.8	22.7	7.0

Boiler (180°F - 160°F) - Radiant (100°F - 120°F)

- The sizing given includes only a general overview of sizing applications available. For additional or more detailed sizing parameters contact your local ACV - Triangle Tube Distributor or ACV - Triangle Tube Technical Support Department.
- The sizing given does not account for any glycol solution used in a snowmelt application.

Domestic Hot Water

TTP Heat exchanger's compact size and light weight will reduce the time required to heat domestic water by 50% over conventional heat exchangers.



Model	Btu/Hr Supplied	Boiler Cir. Flow Rate GPM	Pressure Drop PSI Boiler	GPM Domestic Hot Water @ 90° Temp. Rise	Pressure Drop PSI Domestic	Performance GPH with 50 gal Storage Tank 90° Rise	
						1st Hour	Continuous Flow
TTP1-14E	40,000	4.1	1.8	0.9	0.1	103	53
TTP1-14E	45,000	4.6	2.3	1.0	0.1	110	60
TTP1-14E	50,000	5.1	2.9	1.1	0.1	117	67
TTP1-14E	55,000	5.6	3.5	1.2	0.1	123	73
TTP1-20E	60,000	6.1	2.0	1.3	0.1	130	80
TTP1-20E	70,000	7.2	2.8	1.6	0.1	143	93
TTP1-20E	75,000	7.7	3.3	1.7	0.1	150	100
TTP1-20E	80,000	8.2	3.7	1.8	0.1	157	107
TTP1-30E	90,000	9.2	2.6	2.0	0.1	170	120
TTP1-30E	100,000	10.2	3.3	2.2	0.1	183	133
TTP1-30E	110,000	11.3	3.9	2.5	0.2	197	147
TTP3-20	120,000	12.3	2.7	2.7	0.1	210	160
TTP3-20	130,000	13.1	3.2	2.9	0.1	223	173
TTP3-20	150,000	15.4	4.4	3.4	0.2	250	200
TTP3-40	200,000	20.5	1.5	4.5	0.1	317	267
TTP3-40	250,000	25.6	2.4	5.6	0.1	383	333
TTP3-40	300,000	30.0	3.4	6.7	0.2	452	402
TTP7L-24	350,000	36.0	4.6	7.8	0.1	518	468
TTP7L-24	400,000	41.0	4.0	8.9	0.1	584	534
TTP7M-40	450,000	46.0	3.9	10.0	0.1	650	600
TTP7M-40	500,000	51.2	4.9	11.1	0.2	716	666

- The sizing given includes only a general overview of sizing applications available. For additional or more detailed sizing parameters contact your local ACV - Triangle Tube Distributor or ACV - Triangle Tube Technical Support Department

Boiler Water Supply: 180°F - Domestic Inlet Temperature: 50°F



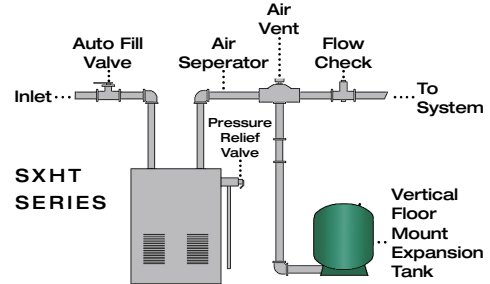
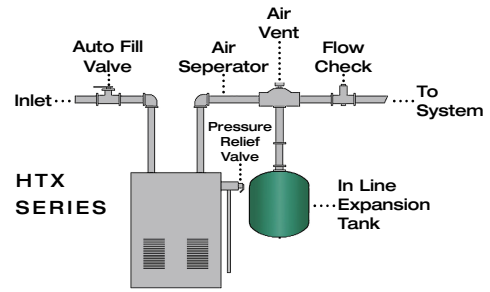


HTX & SXHT SERIES Hydronic Expansion Tanks

MATERIALS OF CONSTRUCTION

- Tank: 16-gauge cold rolled steel
- Finish: Appliance-quality paint for corrosion resistance
- Diaphragm Material: 100% butyl rubber
- Connection: Welded steel
- Testing: High pressure, seam weld, helium, final precharge check
- Air valve: Brass valve with O-ring seal
- Warranty: Five year

TYPICAL INSTALLATIONS

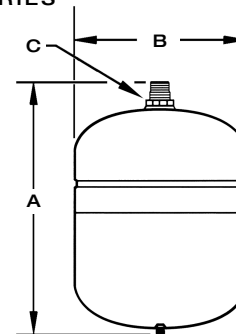


DIMENSIONS & CAPACITIES

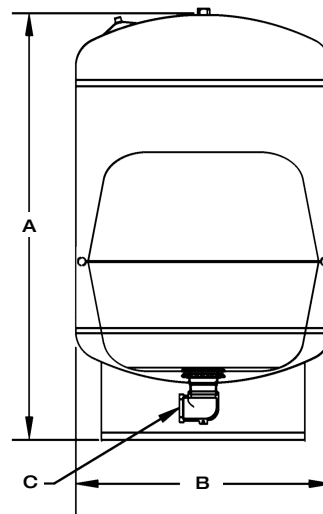
Model	Capacity Gallons	Maximum Acceptance Volume	System Connection	Dimensions		
				Diameter	Height	Weight (lbs)
HTX 15	2.1	1.0	1/2" MNPT	8.0	12.5	5.5
HTX 30	4.5	2.5	1/2" MNPT	11.0	14.0	10.0
HTX 60	6.0	3.0	1/2" MNPT	11.4	17.2	11.5
HTX 90	15.0	6.0	3/4" MNPT	16.0	20.8	28.0
SXHT 30	15.0	6.0	1" FNPT	16.0	21.7	32.0
SXHT 40	20.0	8.0	1" FNPT	16.0	28.8	39.0
SXHT 60	33.0	13.3	1" FNPT	16.0	42.8	57.0
SXHT 90	44.0	17.7	1 1/4" FNPT	21.0	36.2	72.0
SXHT 110	62.0	24.9	1 1/4" FNPT	21.0	47.9	112.0
SXHT160	81.0	32.6	1 1/4" FNPT	21.0	62.0	123.0

Maximum working pressure 100 PSI. Factory pre-charge 12 PSI.
Maximum working temperature 240° F.

HTX SERIES



SXHT SERIES



QUICK SIZING CHART

Boiler Output 1000's BTUH	Finned Tube Baseboard (Copper)	Type of Radiation		
		Convectors & Unit Htrs	Cast Iron	
			Radiators	Baseboard
25	HTX 15	HTX 15	HTX 15	HTX 15
50	HTX 15	HTX 30	HTX 30	HTX 30
75	HTX 30	HTX 30	HTX 60	HTX 60
100	HTX 30	HTX 30	HTX 60	HTX 60
125	HTX 30	HTX 60	HTX 60	HTX 60
150	HTX 30	HTX 60	HTX 90	HTX 90
175	HTX 60	HTX 60	HTX 90	HTX 90
200	HTX 60	HTX 60	HTX 90	HTX 90
250	SXHT 30	SXHT 30	SXHT 40	SXHT 30
300	SXHT 30	SXHT 40	SXHT 40	SXHT 30
350	SXHT 30	SXHT 40	SXHT 60	SXHT 40
400	SXHT 30	SXHT 60	SXHT 90	SXHT 40
500	SXHT 40	SXHT 60	SXHT 90	SXHT 40
600	SXHT 40	SXHT 90	SXHT 90	SXHT 60
700	SXHT 60	SXHT 90	SXHT 90	SXHT 60
800	SXHT 60	SXHT 110	SXHT 110	SXHT 90
900	SXHT 60	SXHT 110	SXHT 110	SXHT 90
1000	SXHT 90	SXHT 110	SXHT 110	SXHT 90

> www.flexconind.com
> 781-986-2424
> 300 Pond Street
> Randolph, MA 02368



THE SMART CHOICE

in Domestic Hot Water



Smart Series

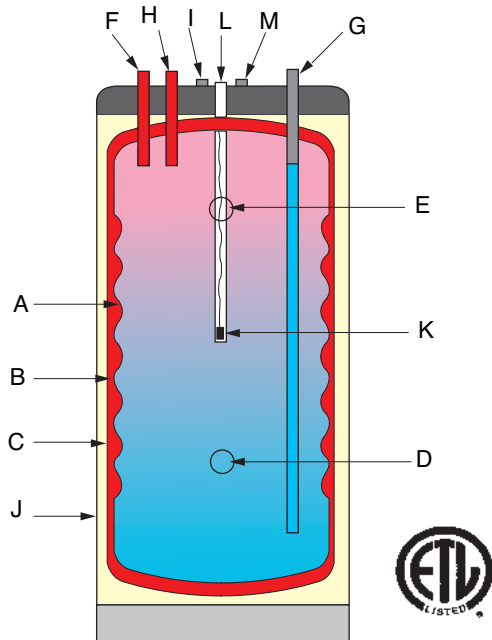
Stainless Steel Indirect Fired Water Heaters

- » Exclusive "Tank-in-Tank" Technology
- » Abundant Domestic Hot Water at the Lowest Possible Cost
- » A Limited Residential Lifetime Warranty
- » 2" of Polyurethane Foam Insulation
- » Self Cleaning/Self Descaling Heat Exchanger
- » Lowest Pressure Drop in the Industry
- » 7 Sizes to Choose From

"Tank-in-Tank" Technology

Construction Specifications

SMART Series



- A. Inner stainless steel tank
- B. Outer steel tank
- C. 2" Polyurethane insulation
- D. Boiler water connection
- E. Boiler water connection
- F. Hot water outlet
- G. Cold water inlet
- H. Auxiliary connection
- I. Thermostat control
- J. Plastic jacket
- K. Thermostat remote sensing bulb
- L. Air vent connection
- M. Electrical wiring plug

Smart Series is tested in accordance with the standard (ANSI/UL-174) (CAN/CSA-C22.2 NO. 110-M90) and is certified by ETL.

Superior Design "Tank-in-Tank" Technology

Superior Heat Exchange Surface Area

The domestic storage tank is constructed of stainless steel and is surrounded by boiler water in the outer tank, resulting in a full "wrap around" heat exchanger.

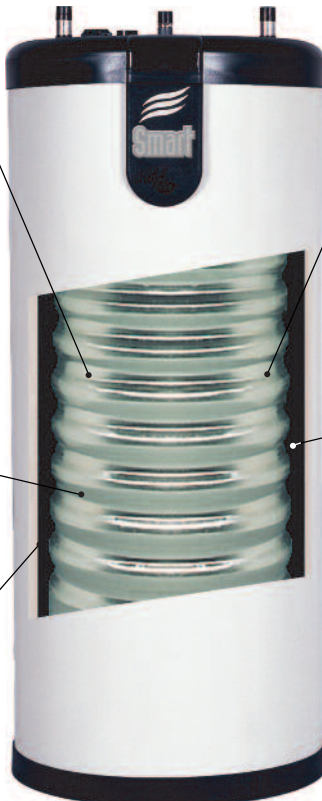
It's superior heat exchange surface (typically 1.5 to 2.5 times larger than a traditional coil) produces a larger volume of hot water in a short period of time. Thanks to this fast recovery, the storage capacity can be reduced, resulting in a reduced thermal loss.

Stainless Steel Tank Construction

The inner domestic storage tank is constructed of durable, corrosion resistant stainless steel.

Optimal Insulation

SMART Series, is insulated with 2" of injected polyurethane foam, resulting in a stand by heat loss of less than 1°/Hr.



Self Cleaning / Self - descaling

The inner, domestic tank is suspended within the outer tank so it is free to expand and contract as the pressure varies during hot water draws. Moreover, its corrugations amplify the movement and prevents the lime build up on the heat exchanger; thus maintaining its performance during the SMART Series life span.

Anti-Bacteria Growth / Maintenance Free

The "Tank-in-Tank" design allows us to store domestic water at higher temperatures preventing bacteria growth. Additionally, constructed of high quality stainless steel, SMART Series does not require a protective anode.

Product Specifications

Model No.	Dimension	Height	Boiler/Supply Return	Domestic Inlet/Outlet	3rd Domestic Connection*	Domestic Capacity (gal.)	Heating Water Capacity (gal.)	Heat Surface (sq. ft.)	Empty Weight (lbs)
Smart 30	22" dia.	38"	1"	3/4"	3/4"	28	5	13	115
Smart 40	22" dia.	46"	1"	3/4"	3/4"	36	6	16	135
Smart 50	22" dia.	57"	1 1/4"	3/4"	3/4"	46	8	20	165
Smart 60	22" dia.	66"	1 1/4"	3/4"	3/4"	56	8	24	190
Smart 80	26" dia.	61"	1 1/2"	1 1/2"	1 1/2"	70	14	28	271
Smart 100	26" dia.	78"	1 1/2"	1 1/2"	1 1/2"	95	25	36	362
Smart 120	32" dia.	72"	2"	1 1/2"	1 1/2"	119	43	42	479

(*) This fitting can be used as a return connection if circulated domestic water is required or can be used as a connection for the T&P Relief Valve.

Performance

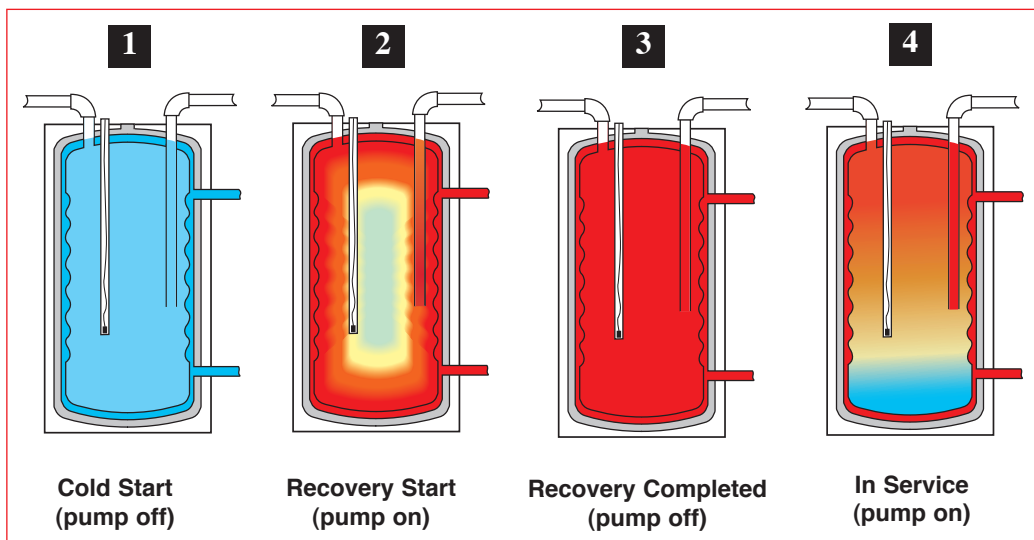
Model No.	Boiler Output Btu/hr	1st Hour Recovery (gal.)	Continuous Flow (gal.)	Peak/Flow Gal/10 min.
Smart 30	87,000	140	115	40
Smart 40	112,000	180	150	50
Smart 50	140,000	220	185	65
Smart 60	270,000	410	360	100
Smart 80	300,000	460	400	125
Smart 100	337,000	525	450	150
Smart 120	420,000	650	560	190

Conditions:

- 200° boiler water supply
- 90° temperature rise

How it Works

Smart Series operating cycle



When the thermostat in the inner tank calls for heat, the boiler and circulator start. Boiler water is circulated around the outer tank and heats the domestic water in the inner tank. After transferring its heat, boiler water is returned to the boiler to be re-heated. When the thermostat in the inner tank reaches its pre-set mark, the boiler and circulator shut off.

Energy Efficiency

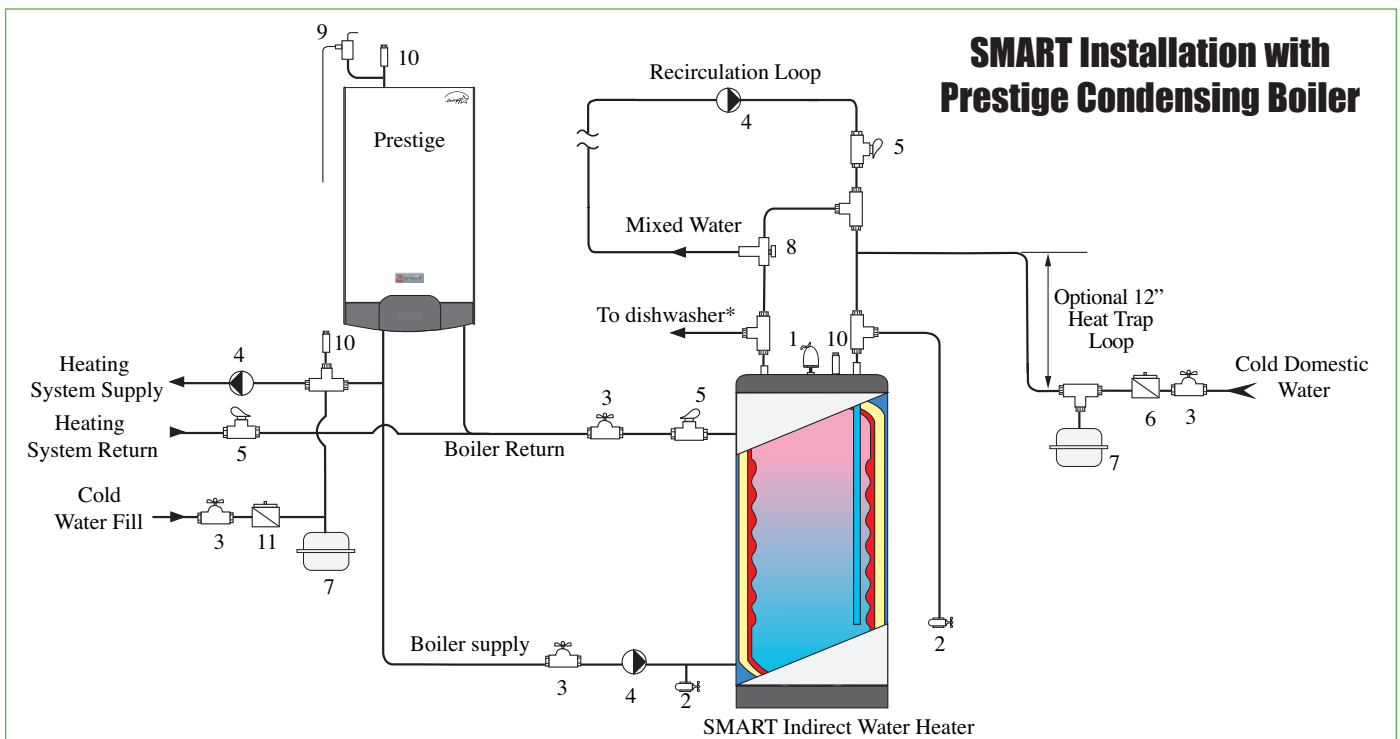
The Stainless Steel Indirect Fired Water Heater is heated by the hot water from your boiler. As your home is being heated, your domestic hot water is being heated at the same time, thereby, consuming less fuel and conserving energy. Combine this with a recovery rate that is up to **three times faster** than conventional gas or electric water heaters, and The SMART Series Indirect Fired Water Heater heats more hot water with less fuel for the energy conscious consumer.

Long Term Dependability

The average life span of a SMART Series Indirect Fired Water Heater exceeds 20 years! That is two or three times the average life of a conventional gas, oil or electric water heater.



Installation



(*) Optional devices may be required by local codes.

- | | | |
|--|---|--------------------------|
| 1. Temperature & Pressure Relief Valve | 5. Flow Check Valve | 9. Pressure Relief Valve |
| 2. Drain | 6. Backflow preventer or pressure reducing valve(*) | 10. Air Vent |
| 3. Shut-off Valves | 7. Expansion Tank | 11. Automatic Fill Valve |
| 4. Circulator | 8. Mixing Valve | |



One Triangle Lane • Blackwood NJ 08012

p 856.228.8881 f 856.228.3584 www.triangletube.com



Spirovent® Junior Microbubble™ Eliminator

Job Name:	Park Forest - Jackson, MI
Engineer:	
Contractor:	William E Walter, Inc.
Representative:	Performance Engineering Group, Inc.

Tag	Model	Flow	Size	Location

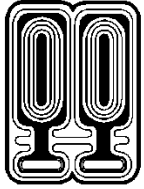
Specifications:

Body	Brass
Vent Head	Brass
Float	Non-Ferrous
Seal	Viton
O Ring	Viton
Coalescing Medium	Copper
Max. Working Pressure	150 psig
Max. Operating Temperature	270°F

Notes:

d (Pipe Size NPT)	3/4"	1"	1 1/4"	1 1/2"	2"
D (inches)	2.6	2.6	2.6	2.6	4.0
H1 (inches)	6.0	7.0	7.8	9.1	10.8
h1 (inches)	0.8	1.4	1.5	1.6	2.3
L (inches)	3.4	3.5	3.5	3.5	5.2
e (inches)	1/2	1/2	1/2	1/2	1/2
Weight (lbs)	3.0	3.5	4.0	4.5	8.5
Rec. Flow (gpm)	6	10	15	30	40
Model No.	VJR-075TM	100TM	125TM	150TM	200TM

(Dimensions for reference only)



SINCE 1908
wessels
 company

SUBMITTAL

TTA-SERIES

THERMAL EXPANSION TANKS

Models: TTA-5 thru TTA-210

Submittal Sheet No. B-1003C

Date: 4/16

Job Name	<u>Park Forest</u>	Submitted By	_____	Date	_____
Location	<u>Jackson, MI</u>	Approved By	_____	Date	_____
Engineer	_____	Order No.	_____	Date	_____
Contractor	<u>William E Walter, Inc.</u>	Notes	_____		
Sales Rep.	<u>Performance Engineering Group, Inc.</u>	_____			

Description

Wessels TTA series are ASME fixed bladder type pre-charged thermal expansion tanks for commercial and industrial potable hot water applications. They are designed to be installed between a backflow preventor and a hot water heater to accept the expanded volume of hot water keeping the system pressure below the relief valve setting. The water is contained in a butyl bladder.

Construction

Shell: Carbon Steel
 Bladder: Heavy-duty Butyl (FDA Approved)
 System Connection: Stainless Steel

Performance Limitations

Maximum Design Temperature: 240°F
 Maximum Design Pressure: 150 PSIG*

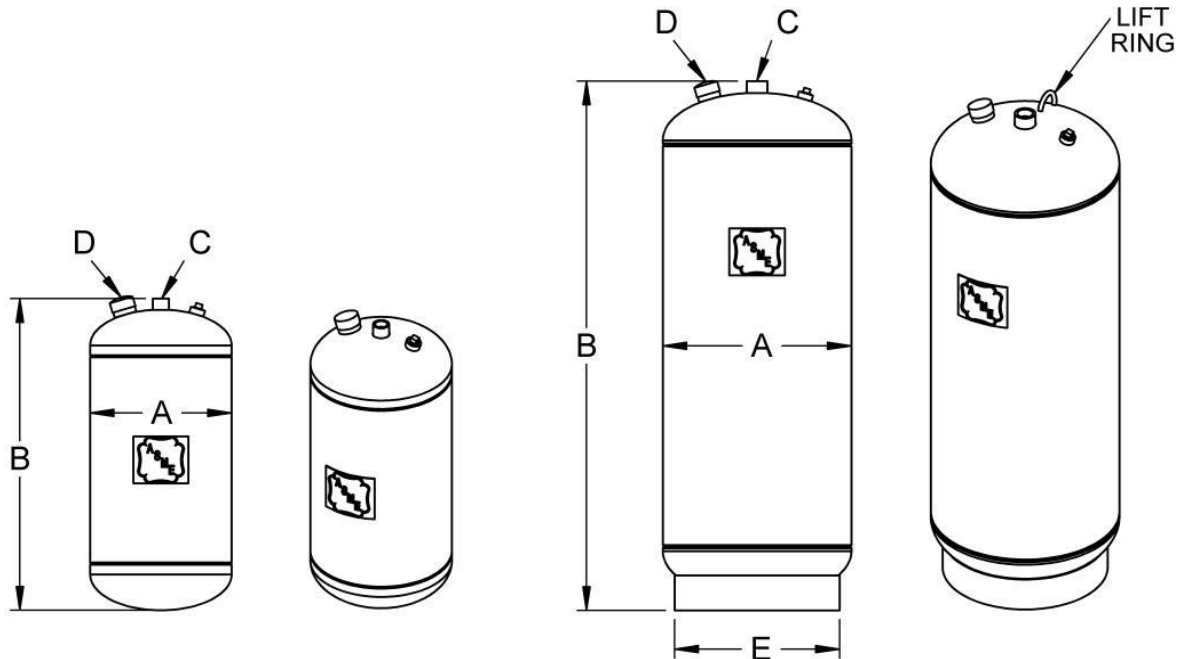
*200 & 250 PSIG available

Model Number	Part Number	Tank Volume (Gallons)	Acceptance Volume (Gallons)	Tagging Information	Quantity
TTA-5	18020005	3.5	2.3		
TTA-12	18020012	5	3.3		
TTA-20	18020020	8	5.3		
TTA-30	18020030	15	10		
TTA-42	18020042	22	14.5		
TTA-60	18020060	26	17.5		
TTA-80	18020080	35	23.5		
TTA-100	18020100	45	30		
TTA-125	18020125	60	40		
TTA-160	18020160	70	47		
TTA-180	18020180	80	53		
TTA-210	18020210	90	60		

Typical Specification

Furnish and install, as shown on plans, a _____ gallon _____" diameter X _____" (high) pre-charged steel thermal expansion tank with a fixed FDA approved heavy-duty butyl diaphragm. The tank shall be equipped with a NPT stainless steel system connection and a 0.302"-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements. The tank must be constructed in accordance with most recent addendum of Section VIII Division 1 of the ASME Boiler and Pressure Vessel Code, and stamped 150 psi working pressure.

Each tank shall be Wessels model number TTA-_____ or approved equal.



TTA-5 & TTA-12


TTA-20 thru TTA-210

Dimensions & Weights

Model Number	Dimensions in Inches					Approx. Ship Weight (lbs)
	A	B	System Connection	Charging Valve	E	
			C	D		
TTA-5	10	14	3/4	0.302" -32NC	-	22
TTA-12	12	14			-	28
TTA-20		20			10	34
TTA-30	16	24	1	0.302" -32NC	14	64
TTA-42		31				88
TTA-60		34				93
TTA-80		45				109
TTA-100	20	39	1 1/2	0.302" -32NC	18	148
TTA-125		50				175
TTA-160	24	47	1 1/2	0.302" -32NC	22	259
TTA-180		50				268
TTA-210		53				283

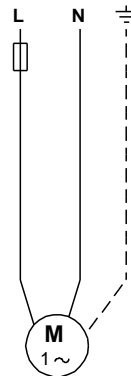
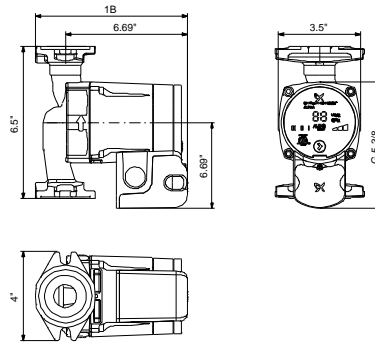
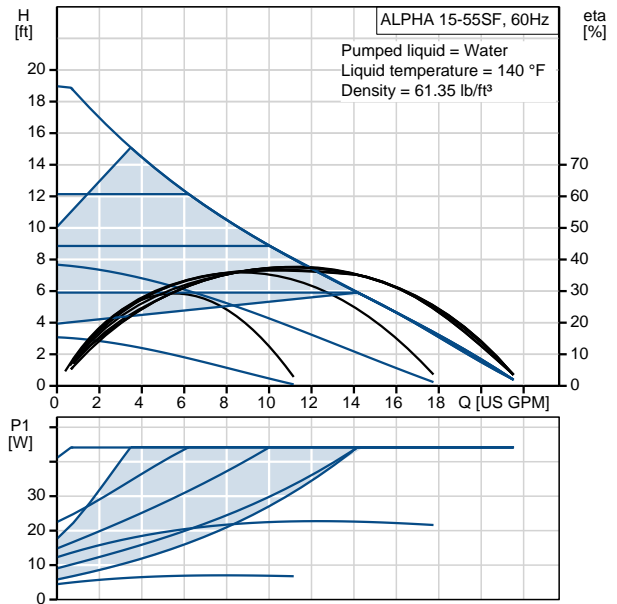
Notes

- Tanks are factory pre-charged at 40 psi and field adjustable.
- California code-sight glass is available upon request.
- Lift ring on models TTA-20 thru TTA-210
- Available with mounting clips.

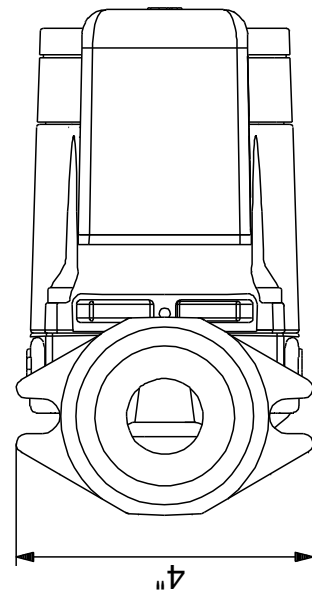
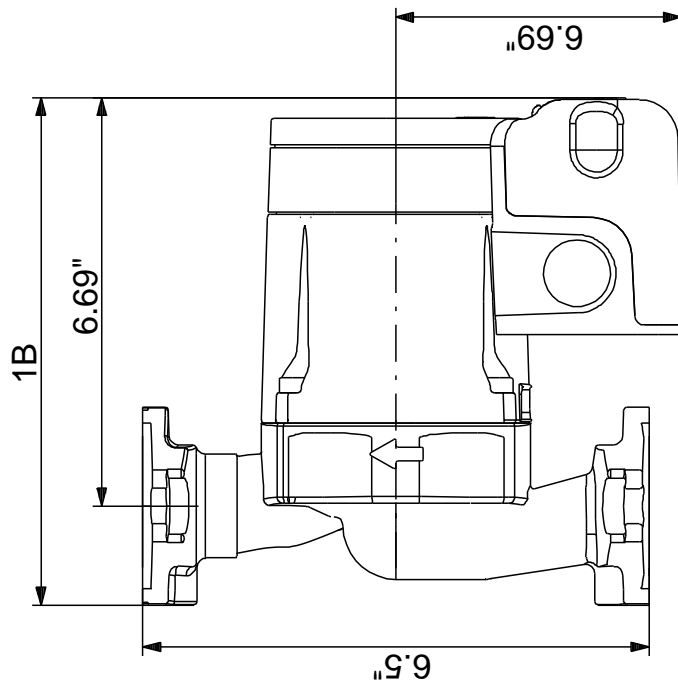
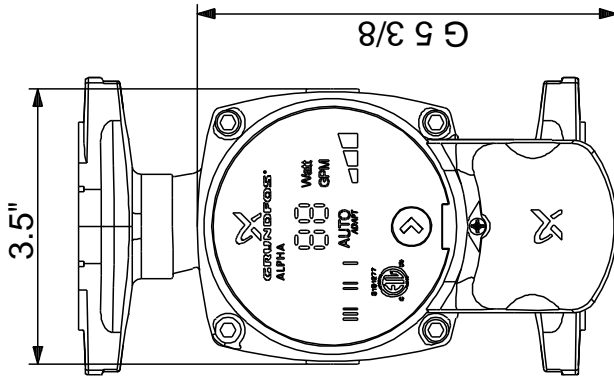
Position	Qty.	Description
	1	<p>ALPHA 15-55SF</p>  <p style="text-align: center;">Note! Product picture may differ from actual product</p> <p>Product No.: 59896879</p> <p>GRUNDFOS ALPHA The next generation of energy efficient circulators.</p> <p>ALPHA is the latest and most innovative member of the Grundfos family of high-quality circulators. By incorporating a permanent magnet motor design, power consumption is now reduced by 50%. ALPHA adapts to the seasonal demands of your system without sacrificing comfort.</p> <p>With ALPHA, you can stop worrying about complicated pump settings. Simply install the pump and leave it in the factory setting, AUTOADAPTTM. ALPHA will automatically analyze the heating system, find the optimum setting and continue to adjust its operation to changes in demand. The result is optimum comfort and minimum energy consumption.</p> <p>AUTOADAPT The factory setting, AUTOADAPT, analyses the heating system and automatically adjusts the pump setting to meet changes in heating demand. Ensuring lowest possible energy consumption, while maintaining maximum comfort levels.</p> <p>Compact design The innovative design makes ALPHA the most compact Grundfos circulator available. With the electronics integrated into the motor housing and standard 2-Bolt flange connection, confined spaces and challenging applications are now possible.</p> <p>Two options for power connections Option 1: 6-foot line cord with three prong plug Option 2: Conduit terminal box with push pin wire connection</p> <p>One-touch operation Intuitive one-touch operation for selecting seven different hydraulic settings. 3 Fixed Speeds 3 Constant Pressure settings AUTOADAPT</p> <p>LED Display The easy-to-read LED display indicating power (Watts) consumption and flow (GPM) estimation.</p> <p>Liquid: Pumped liquid: Water Liquid temperature range: 35.6 .. 230 °F Liquid temp: 140 °F Density: 61.35 lb/ft³</p> <p>Technical:</p>

Position	Qty.	Description
		<p>TF class: 110</p> <p>Approvals on nameplate: ETL, FCC</p> <p>Materials:</p> <p>Pump housing: Stainless steel DIN W.-Nr. 14308 ASTM CF8</p> <p>Impeller: Composite, PES</p> <p>Installation:</p> <p>Range of ambient temperature: 32 .. 104 °F</p> <p>Maximum operating pressure: 145 psi</p> <p>Pipe connection: G 1 1/2</p> <p>Pressure stage: PN 10</p> <p>Port-to-port length: 6 1/2 in</p> <p>Electrical data:</p> <p>Power input - P1: 5 .. 45 W</p> <p>Mains frequency: 60 Hz</p> <p>Rated voltage: 1 x 115 V</p> <p>Maximum current consumption: 0.1 .. 0.65 A</p> <p>Enclosure class (IEC 34-5): IP42</p> <p>Insulation class (IEC 85): F</p> <p>Others:</p> <p>Gross weight: 7.5 lb</p>


Description	Value
General information:	
Product name:	ALPHA 15-55SF
Product No:	59896879
EAN number:	5710620164390
Price:	On request
Technical:	
Head max:	18.05 ft
TF class:	110
Approvals on nameplate:	ETL, FCC
Materials:	
Pump housing:	Stainless steel DIN W.-Nr. 14308 ASTM CF8
Impeller:	Composite, PES
Installation:	
Range of ambient temperature:	32 .. 104 °F
Maximum operating pressure:	145 psi
Pipe connection:	G 1 1/2
Pressure stage:	PN 10
Port-to-port length:	6 1/2 in
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	35.6 .. 230 °F
Liquid temp:	140 °F
Density:	61.35 lb/ft ³
Electrical data:	
Power input - P1:	5 .. 45 W
Mains frequency:	60 Hz
Rated voltage:	1 x 115 V
Maximum current consumption:	0.1 .. 0.65 A
Enclosure class (IEC 34-5):	IP42
Insulation class (IEC 85):	F
Motor protec:	NONE
Thermal protec:	ELEC
Controls:	
Pos term box:	6H
Others:	
Gross weight:	7.5 lb
Sales region:	USA



59896879 ALPHA 15-55SF 60 Hz



Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Position	Qty.	Description																																																		
	1	<p data-bbox="322 161 478 192">UPS 43-100 F</p>  <p data-bbox="711 595 1193 622" style="text-align: center;">Note! Product picture may differ from actual product</p> <p data-bbox="322 627 587 654">Product No.: 95906636</p> <p data-bbox="322 658 845 743">The pump is of the canned rotor type, i.e. pump and motor form an integral unit without shaft seal and with only two gaskets for sealing.</p> <p data-bbox="322 748 852 775">The bearings are lubricated by the pumped liquid.</p> <p data-bbox="322 779 730 806">The pump has 3-step speed selector.</p> <p data-bbox="322 810 654 837">The pump is characterized by:</p> <ul data-bbox="357 842 903 981" style="list-style-type: none"> * Ceramic shaft and radial bearings. * Carbon axial bearing. * Stainless steel rotor can and bearing plate. * Corrosion-resistant impeller, Composite, PES. * Cast iron pump housing. <p data-bbox="322 1012 654 1039">The motor is a 1-phase motor.</p> <p data-bbox="322 1043 782 1070">No additional motor protection is required.</p> <p data-bbox="322 1102 405 1128">Liquid:</p> <table data-bbox="322 1133 817 1249"> <tr> <td>Pumped liquid:</td> <td>Water</td> </tr> <tr> <td>Liquid temperature range:</td> <td>0 .. 110 °C</td> </tr> <tr> <td>Liquid temp:</td> <td>60 °C</td> </tr> <tr> <td>Density:</td> <td>983.2 kg/m³</td> </tr> </table> <p data-bbox="322 1281 443 1308">Technical:</p> <table data-bbox="322 1312 794 1339"> <tr> <td>Approvals on nameplate:</td> <td>ETL, CSA</td> </tr> </table> <p data-bbox="322 1370 437 1397">Materials:</p> <table data-bbox="322 1402 868 1487"> <tr> <td>Pump housing:</td> <td>Cast iron</td> </tr> <tr> <td></td> <td>EN-GJL-200</td> </tr> <tr> <td>Impeller:</td> <td>Composite, PES</td> </tr> </table> <p data-bbox="322 1518 459 1545">Installation:</p> <table data-bbox="322 1550 849 1787"> <tr> <td>Maximum ambient temperature:</td> <td>40 °C</td> </tr> <tr> <td>Amb. max at 80 dgr C liquid:</td> <td>80 °C</td> </tr> <tr> <td>Maximum operating pressure:</td> <td>10 bar</td> </tr> <tr> <td>Flange standard:</td> <td>USA Oval</td> </tr> <tr> <td>Type of connection:</td> <td>C.I. Flange</td> </tr> <tr> <td>Pipe connection:</td> <td>2 - Bolt Flange</td> </tr> <tr> <td>Pressure stage:</td> <td>10</td> </tr> <tr> <td>Port-to-port length:</td> <td>215 mm</td> </tr> </table> <p data-bbox="322 1818 497 1845">Electrical data:</p> <table data-bbox="322 1850 791 2107"> <tr> <td>C run:</td> <td>40 µF</td> </tr> <tr> <td>Power input in speed 1:</td> <td>265 W</td> </tr> <tr> <td>Power input in speed 2:</td> <td>335 W</td> </tr> <tr> <td>Max. power input:</td> <td>370 W</td> </tr> <tr> <td>Rated power - P2:</td> <td>0.25 kW</td> </tr> <tr> <td>Mains frequency:</td> <td>60 Hz</td> </tr> <tr> <td>Rated voltage:</td> <td>1 x 115 V</td> </tr> <tr> <td>Current in speed 1:</td> <td>2.5 A</td> </tr> <tr> <td>Current in speed 2:</td> <td>3.1 A</td> </tr> </table>	Pumped liquid:	Water	Liquid temperature range:	0 .. 110 °C	Liquid temp:	60 °C	Density:	983.2 kg/m ³	Approvals on nameplate:	ETL, CSA	Pump housing:	Cast iron		EN-GJL-200	Impeller:	Composite, PES	Maximum ambient temperature:	40 °C	Amb. max at 80 dgr C liquid:	80 °C	Maximum operating pressure:	10 bar	Flange standard:	USA Oval	Type of connection:	C.I. Flange	Pipe connection:	2 - Bolt Flange	Pressure stage:	10	Port-to-port length:	215 mm	C run:	40 µF	Power input in speed 1:	265 W	Power input in speed 2:	335 W	Max. power input:	370 W	Rated power - P2:	0.25 kW	Mains frequency:	60 Hz	Rated voltage:	1 x 115 V	Current in speed 1:	2.5 A	Current in speed 2:	3.1 A
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Position	Qty.	Description
		Current in speed 3: 3.5 A Capacitor size - run: 40 µF/180 V Number of poles: 2 Insulation class (IEC 85): H Others: Gross weight: 8.38 kg