Submittal Data

Project: **BAKERY EXPRESS**
Location: **FLORENCE, KY**
Contractor: **JGF HEATING AND COOLING INC**
Date: 5/7/2024

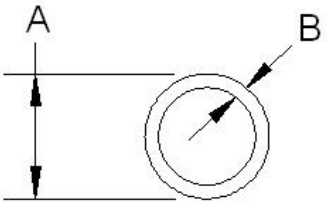
Snow Melt - Major Components						
Mark	Qty	Mnfr	Model	Description	Detail	
TUBING	6	REHAU	136880-400	5/8" X 400' OXYGEN BARRIER TUBING		
MANIFOLD	1	STREAM33	S33MAN6	STAINLESS STEEL MANIFOLD		
FITG	6	STREAM33	S33R2058	5/8" MANIFOLD FITTINGS		
SUPPORT	12	STREAM33	S3334PPBEND	BEND SUPPORTS		
SENSOR	1	TEKMAR	72	SLAB SENSOR		
B1	1	LOCHINVAR	WHB110N	WALL MOUNT MOD/CON BOILER		
ACCESORY	1	EUTRASAF	CN2-300C	CONDENSATE NEUTRALIZER		
ACCESORY	1	LUXPRT	S1-1CT0303	CONCENTRIC VENT		
GF-1	1	AXIOM	DMF-150	GLYCOL FEED UNIT		
AS-1	1	PIROTHER	VJS100	1" AIR SEPARATOR		
ACCESORY	1	WEBSTONE	41672	EXPANSION TANK SERVICE VALVE		
P1	1	GRUNDFOS	A15-55F-LC	ALPHA2 SYSTEM PUMP W/LINE CORD		
ACCESORY	1	GRUNDFOS	96806136	1" SWT ISO-FLANGES		
CONTROL	2	CALEFFI	Z55	3/4" ZONE VALVE		
CONTROL	1	TEKMAR	304V	ZONE CONTROL PANEL		
CONTROL	1	TEKMAR	150	SET POINT CONTROLLER		
GLYCOL	8	NOBLE	NOBURST	40% PRE-MIX PROPYLENE GLYCOL (5-GAL PAIL)		
Calcs & Sketches						
1		Sketches & Diagrams:				

BOILER - PAGE 9
PUMP - PAGE 15

Unlimited Polymer Solutions

PRODUCT SUBMITTAL 102

Product: RAUPEX® O_2 Barrier Pipe, SDR9
Date: 31 January 2017 (supersedes 18 December 2014)



Article No.	Nominal Size in	Average OD A in (mm)	Minimum Wall Thickness B in (mm)	Weight lb/ft (kg/m)	Capacity gal/ft (l/m)	Bend Radius in (mm)
136008	3/8	0.500 (12.70)	0.070 (1.78)	0.05 (0.07)	0.0050 (0.0624)	2.50 (62.5)
136031	1/2	0.625 (15.88)	0.070 (1.78)	0.06 (0.08)	0.0098 (0.1222)	3.25 (82.5)
136880	5/8	0.750 (19.05)	0.083 (2.12)	0.08 (0.11)	0.0134 (0.1671)	3.75 (95.0)
136051	3/4	0.875 (22.22)	0.097 (2.47)	0.10 (0.15)	0.0189 (0.2356)	4.50 (113)
136011	1	1.125 (28.58)	0.125 (3.18)	0.17 (0.26)	0.0316 (0.3939)	5.75 (144)
136283	1 1/4	1.375 (34.92)	0.153 (3.88)	0.25 (0.37)	0.0467 (0.5827)	7.00 (178)
136293	1 1/2	1.625 (41.28)	0.181 (4.59)	0.35 (0.52)	0.0650 (0.8118)	8.25 (210)
136303	2	2.125 (53.98)	0.236 (6.00)	0.60 (0.90)	0.1114 (1.3906)	10.75 (273)

TECHNICAL DESCRIPTION

Specification	English	SI	Standard
Minimum Density	58 lb/ft³	926 kg/m³	ASTM F876
Min. Degree of of Crosslinking	70%	70%	ASTM F876
Max. Thermal Conductivity	2.84 Btu in./(ft²°F hr)	0.41 W/(m°K)	DIN 16892
Coefficient of Linear Expansion	9.33X10-4 in/ft°F @ 68°F 1.33x10-3 in/ft°F @ 212°F	0.14 mm/(m°C) @ 20°C 0.2 mm/(m°C) @ 100°C	Mean @ 20-70°C per DIN 16892
IZOD Impact Res.	No Break	No Break	--
Modulus of Elasticity	87,000-130,500 psi @ 68°F 43,500-58,000 psi @ 176°F	600-900 N/mm² @ 20°C 300-400 N/mm² @ 80°C	Minimum @ 20°C per DIN 16892

Specification	English	SI	Standard
Tensile Strength	4194-4355 psi @ 68°F 2610-2900 psi @ 176°F per ASTM D638	26-30 N/mm² @ 20°C 18-20 N/mm² @ 80°C per ASTM D638	--
Roughness	e=0.00028 in	e=0.007 mm	--
O_2 Permeability	--	<=0.32 mg/m²/day @ 40°C	DIN 4726
Max. Short-term Exposure	150 psig @ 210°F (48 hr)	1035 kPa @ 99°C (48 hr)	ASTM F876
UV Resistance	See TB218		ASTM F2657

FUNCTIONAL DESCRIPTION

RAUPEX O_2 barrier pipe is manufactured using REHAU's high-pressure peroxide method for crosslinked polyethylene (PEXa). RAUPEX pipe meets or exceeds the requirements of ASTM F876, F877, NSF 61, CSA B137.5 and PPI TR-3. This PEXa pipe is SDR9, red in color, and is specifically designed for use with the EVERLOC+® compression-sleeve system certified to ASTM F877. See *Technical Bulletin TB261* for other compatible PEX fitting systems. RAUPEX O_2 barrier pipe has a co-extruded oxygen diffusion barrier that exceeds the strict requirements of DIN 4726. RAUPEX pipe is manufactured by REHAU using a quality management system which has been certified to the latest version of ISO 9001.

RAUPEX O_2 barrier piping is ideal for use in radiant heating/cooling, snow and ice melting, soil conditioning, geothermal ground loop heat exchange, energy transfer and outdoor wood boiler applications. RAUPEX O_2 barrier pipe is used as carrier pipe in REHAU INSULPEX® flexible, pre-insulated PEXa piping with closed-cell foam bonded insulation for buried energy transfer piping. RAUPEX O_2 barrier pipe is not to be directly buried.

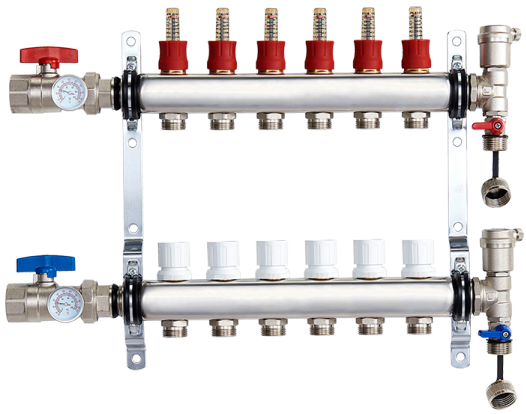
LONG TERM STRENGTH

The maximum temperature and pressure ratings of the RAUPEX pipe are in accordance to ASTM F876, CSA B137.5 and PPI TR-3. The designer shall determine the actual conditions and apply the appropriate and additional design factors as required for any particular project. The temperature and pressure ratings apply to the application of RAUPEX pipe for conveying heating and cooling water at the 2.0 safety factor on allowable working pressure according to ASTM and CSA. According to the REHAU *PEXa Limited Warranty*, the RAUPEX pipe warranty period of 25 years is for operating conditions at or below 180°F (82.2°C) in permitted applications when the handling, use, installation and maintenance continually complies with all REHAU technical guidelines.

RAUPEX SDR9	
maximum pressures and temperatures	design factors
160 psi @ 73.4°F (1055 kPa @ 23°C)	0.50 (per ASTM F876, CSA B137.5)
100 psi @ 180°F (690 kPa @ 82.2°C)	0.50 (per ASTM F876, CSA B137.5)
80 psi @ 200°F (550 kPa @ 93.3°C)*	0.50 (per ASTM F876, CSA B137.5)

* REHAU defines Elevated Temperature Applications as those with operating conditions greater than 180°F (82.2°C). When REHAU PEXa pipes are planned to be operated in Elevated Temperature Applications, contact REHAU Engineering to verify your project conditions comply with the REHAU *PEXa Limited Warranty* in accordance to REHAU *Technical Bulletin TB230 Elevated Temperature Applications.*

Stainless Steel HeatingManifold



SUBMITTAL SHEET

PROJECT INFORMATION

Job Name:

Location:

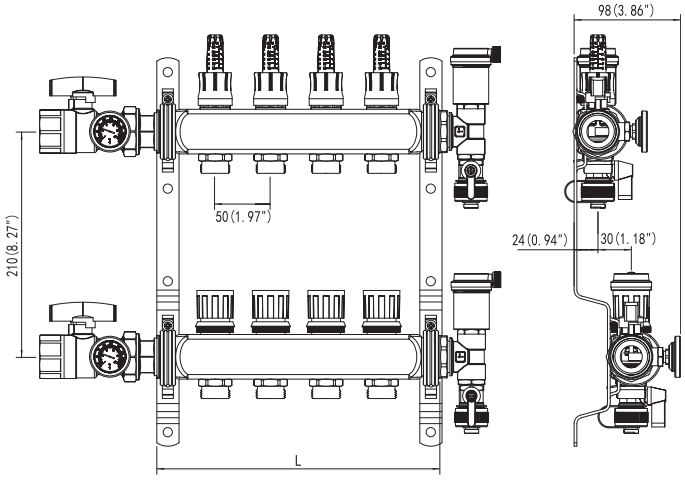
Engineer:

Contractor:

P.O. Number:

Representative:

Model	Inlet/Outlet Connection	Loop	Length in. (L)	ID No.
S33MAN2	1″ FIP	2	6-1/8″	.3539864
S33MAN3	1″ FIP	3	8-1/16″	.3539865
S33MAN4	1″ FIP	4	10-1/16″	.3539866
S33MAN5	1″ FIP	5	12″	.3539867
S33MAN6	1″ FIP	6	14″	.3539868
S33MAN7	1″ FIP	7	15-15/16″	.3539869
S33MAN8	1″ FIP	8	17-15/16″	.3539870
S33MAN9	1″ FIP	9	19-7/8″	.3539871
S33MAN10	1″ FIP	10	21-7/8″	.3539872
S33MAN11	1″ FIP	11	23-13/16″	.3539873
S33MAN12	1″ FIP	12	25-13/16″	.3539874



FEATURES

- Manifold Body 304 Stainless Steel
- Nickel coated brass port connection
- EPDM sealing ring
- Flow Meter

PERFORMANCE

- Max. Working Pressure: 145 psi
- Cont. Working Pressure: 32°F - 158°F
- Max. Instantaneous Working Temperature (Max. 10 min/day): 212°F
- Max Differential Pressure: 14.5 psi

FLOW

- Indication Scale - 0.5 ~5L/min, Tolerance ± 10%
- Kvs - 1.1

WORKING MEDIA

- Water
- 50% water and 50% propylene glycol

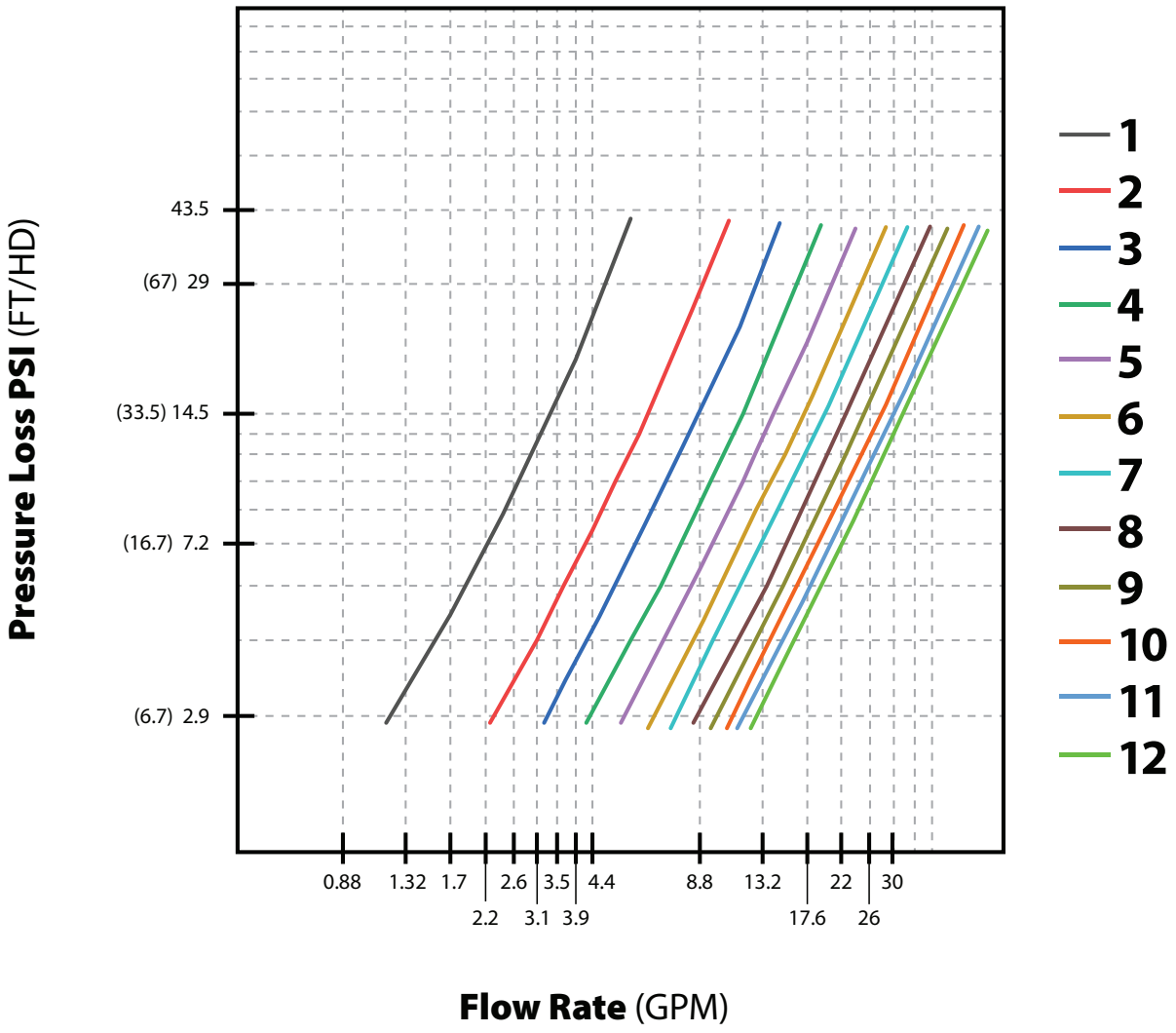
APPROVALS

- ASTM F877
- CSA B137.5.

RECOMMENDED ACCESSORIES

Model	Description	Product ID
S33R2012	R20 ½″ Manifold Connector	.3539875
S33R2058	R20 5/8″ Manifold Connector	.3539876
S33R2034	R20 ¾″ Manifold Connector	.3539877
S33ACT4	Thermal Actuator Valve 4-Wire	.3539878

Stainless Steel HeatingManifold

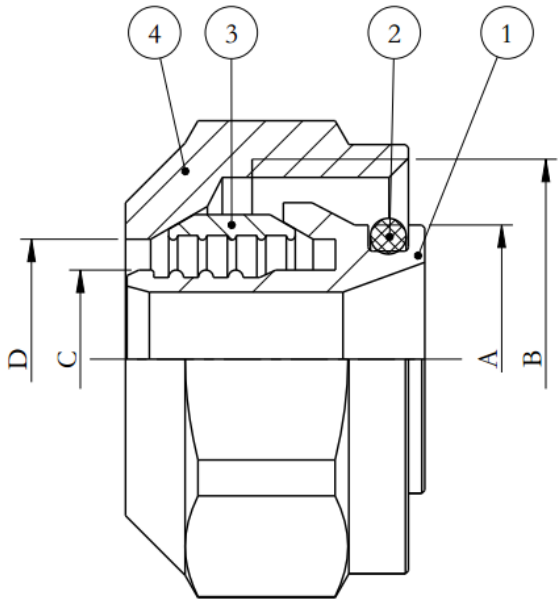


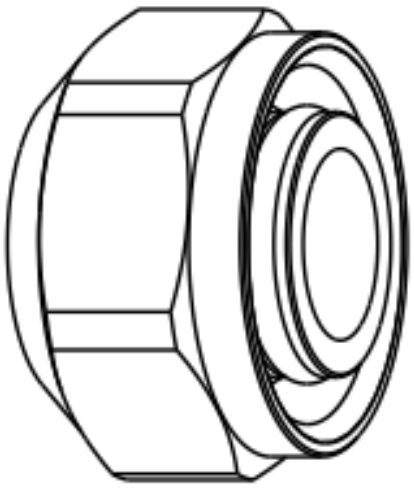
Outlets	Cv
1	0.6
2	1.1
3	1.5
4	2.0
5	2.5
6	3.0
7	3.4
8	4.0
9	4.5
10	4.9
11	5.3
12	5.7

Stainless Steel Manifold Connector

Model	Size (in.)	A (mm)	B (G thread)	C (mm)	D (mm)	Product ID
S33R2012	1/2	18	3/4	11.96	16.1	.3539875
S33R2058	5/8	18	3/4	14.46	19.2	.3539876
S33R2034	3/4	18	3/4	16.9	22.4	.3539877

	MATERIAL SPECIFICATIONS	
1	**Insert**	Nickeled Brass
2	**O ring**	EPDM
3	**COMPRESSION RING**	Nickeled Brass
4	**Nut**	Nickeled Brass





PEX
Bend Support

SUBMITTAL SHEET

PROJECT INFORMATION

Job Name:

Location:

Engineer:

Contractor:

P.O. Number:

Representative:

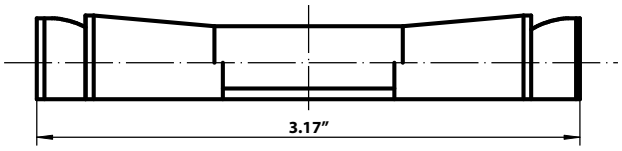
Model	ID	Size
S3334PPBEND	.3532903	3/4″

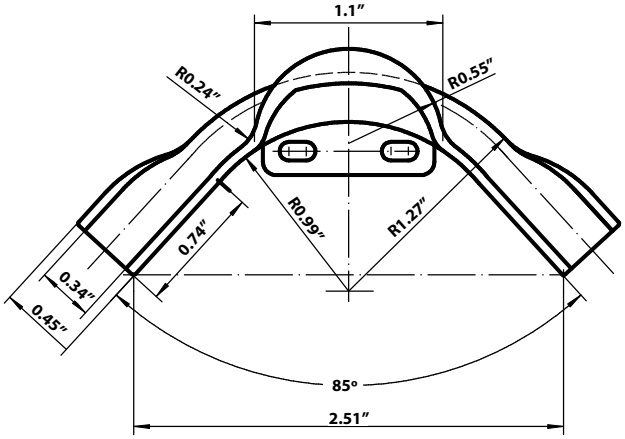
MODELS

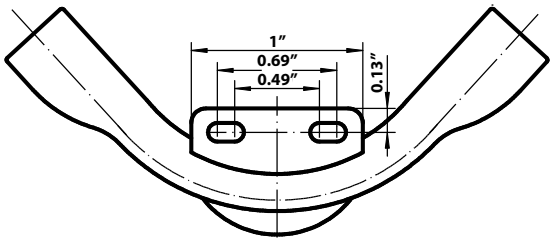
☐ S3334PPBEND

FEATURES

- Plastic
- Compatible with all PEX tubing







tekmar® Submittal
Slab Sensor 072

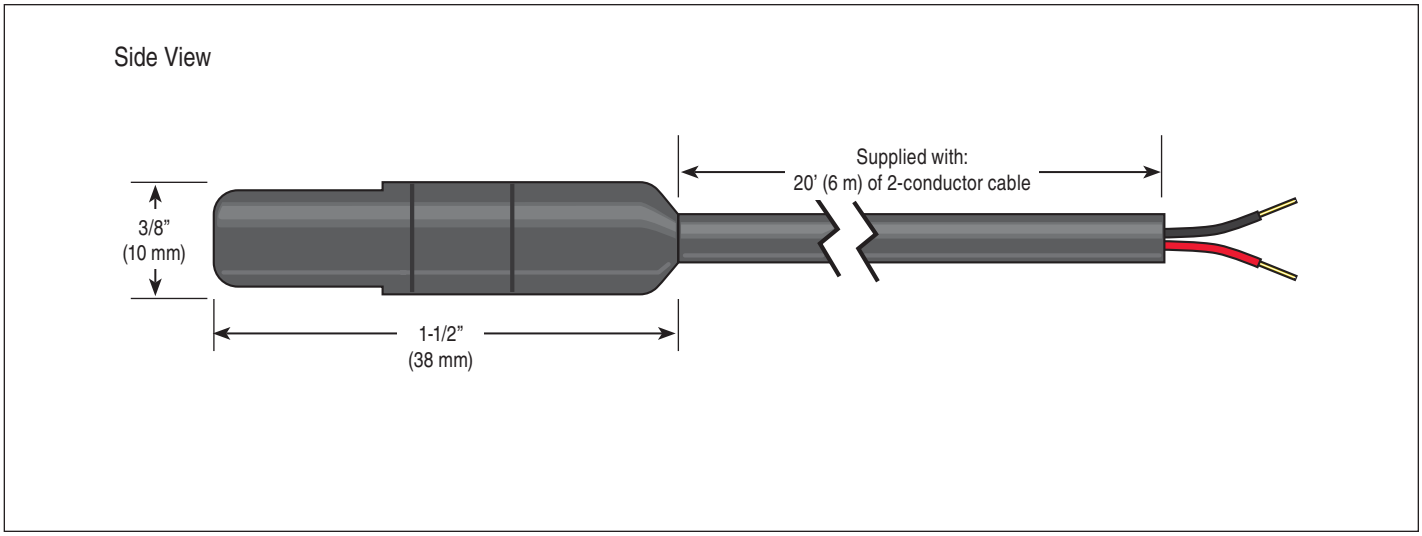
Accessories

072_C
10/12

Replaces: 01/11

Job _____ Designer _____ Contact _____

The Slab Sensor 072 is designed to measure temperature under outside snow melting slabs. It has a high density polyethylene (HDPE) sleeve which is designed for use in conduits, soils, or concrete, as it is suitable for direct burial. This product is supplied with 20 ft (6 m) of 2 conductor cable.



Specifications

Slab Sensor 072	
Literature	072_D
Packaged weight	0.4 lb (180 g)
Sensor Material	HDPE sleeve, 20' (6 m) HDPE jacketed wire
Dimensions	3/8" OD x 1 1/2" (10 OD x 38 mm)
Approvals	CSA C US
Operating range	-60 to 140°F (-51 to 60°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892
Warranty	Limited 3 Year (See 072_D for full warranty)

Energy Saving Features

- 10K thermistor
- Water resistant
- 20 ft cable

Temperature vs. Resistance

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-40°	-40°	336,479	68°	20°	12,493	176°	80°	1,255	284°	140°	235
-31°	-35°	242,681	77°	25°	10,000	185°	85°	1,070	293°	145°	208
-22°	-30°	176,974	86°	30°	8,057	194°	90°	915	302°	150°	186
-13°	-25°	130,421	95°	35°	6,531	203°	95°	786	311°	155°	166
-4°	-20°	97,081	104°	40°	5,326	212°	100°	678	320°	160°	148
5°	-15°	72,957	113°	45°	4,368	221°	105°	587	329°	165.°	133
14°	-10°	55,329	122°	50°	3,602	230°	110°	510	338°	170°	119
23°	-5°	42,327	131°	55°	2,986	239°	115°	445	347°	175°	107
32°	0°	32,650	140°	60°	2,488	248°	120°	389	356°	180°	97
41°	5°	25,392	149°	65°	2,083	257°	125°	341	365°	185°	87
50°	10°	19,901	158°	70°	1,752	266°	130°	301	374°	190°	79
59°	15°	15,712	167°	75°	1,480	275°	135°	265	383°	195°	72

SPECIAL REQUIREMENTS

N / A

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIGHT
FIRE TUBE BOILER

Submittal Sheet **KHBWHB-Sub-01**

KNIGHT FIRE TUBE BOILERS - FLOOR AND WALL MOUNT MODELS

Job Name: BAKERY EXPRESS

Location:

Engineer:

Agent/Wholesaler:

Contractor:

Type Gas:

Model #: WHB-110N

Equipment Tag(s):

JOB NOTES:

Smart System Features

- **Smart System Digital Operating Control**
  Multi-Color Graphic LCD Display w/Navigation Dial, Soft Keys and Loch-N-Link USB programming
- **Three Boiler Setpoint Temperature Inputs**
  Plus Domestic Hot Water Prioritization
- **Built-in Cascading Sequencer for up to 8 Boilers, with Cascade Redundancy**
  Multiple Size Boiler Cascade
  Lead Lag
  Efficiency Optimization
  Front End Loading Capability
- **Outdoor Reset Control with Outdoor Air Sensor**
  Programmable for Three Reset Temperature Inputs
- **Programmable System Efficiency Optimizers**
  SH Night Setback
  DHW Night Setback
  Anti-Cycling
  Outdoor Air Reset Curve
  Ramp Delay
  Modulation Factor Control
  Boost Temperature & Time
- **Four Pump Control**
  System Pump with Parameter for Continuous Operation
  Boiler Pump with Variable Speed Control
  Domestic Hot Water Pump
  Domestic Hot Water Recirculation
- **Domestic Hot Water Prioritization**
  DHW tank piped with priority in the boiler loop
  DHW tank piped as a zone in the system with the pumps controlled by the SMART SYSTEM
  DHW Modulation Limiting
  Separately Adjustable Space Heat/DHW Switching Times
- **Building Management System Integration**
  0-10 VDC Input to Control Modulation or Setpoint
  0-10 VDC Modulation Rate Output
  0-10 VDC Input to Enable/Disable Call for Heat
  0-10 VDC BMS External Control Contact
  0-10 VDC Boiler Rate Output Contacts
  0-10 VDC Variable Speed System Pump Signal Input
  0-10 VDC Signal to Control Variable Speed Boiler Pump
  Modbus Contacts
- **Access to BMS Settings through Graphic LCD Display**
- **High-Voltage Terminal Strip**
  120 VAC / 60 Hertz / 1 Phase Power Supply
  Three Sets of Pump Contacts
- **Low-Voltage Terminal Strip**
  DHW Recirculation Pump Start/Stop
  24 VAC Device Relay
  Configurable Proving Contacts
  Flow Switch Contacts
  Alarm on Any Failure Contacts
  Runtime Contacts
  DHW Thermostat Contacts
  3 Space Heat Thermostat Contacts
  System Sensor Contacts
  DHW Tank Sensor Contacts
  Outdoor Air Sensor Contacts
  Cascade Contacts
- **Time Clock**
- **Data Logging**
  Hours Running, Space Heating
  Hours Running, Domestic Hot Water
  Ignition Attempts
  Last 10 Lockouts
- **Maintenance Reminder**
  Custom Maintenance Reminder with Contractor Contact Information
  Installer Ability to De-activate Service Reminder
- **Low-Water Flow Safety Control & Indication**
- **Password Security**
- **Customizable Freeze Protection Parameters**

Standard Features

- **95% DOE AFUE Efficiency (55-285)**
- **Modulating Burner with up to 10:1 Turndown****
  Direct Spark Ignition
  Low NOx Operation
- **ASME Stainless Steel Heat Exchanger**
  30 PSI ASME Relief Valve
- **Top and bottom water connections (MNPT, WHB 55-285 Only)**
- **Vertical & Horizontal Direct Vent**
  PVC, CPVC, Polypropylene or SS Venting up to 100 ft.
- **Universal Vent Adapter**
  Built-in Combustion Analyzer Port
- **SMART SYSTEM™ Control**
- **Condensate Trap**
- **ECM Variable Speed Boiler Circulating Pump**
- **110V Convenience Outlet**
- **High Altitude Models Available**
- **Other Features**
  Automatic Reset High Limit
  Adjustable High Limit w/Manual Reset
  Zero Clearances to Combustible Materials
  15-Year Limited Warranty (See Warranty for Details)
  5-Year Limited Parts Warranty

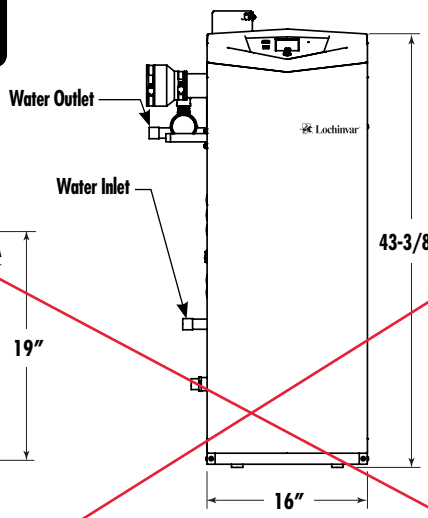
Optional Equipment

- ☐ CON·X·US Remote Connectivity
- ☐ Modbus Communication
- ☐ BACnet MSTP
- ☐ Flow Switch
- ☐ Low-Water Cutoff w/Manual Reset & Test
- ☐ Alarm Bell
- ☑ Concentric Vent Kit
- ☐ Condensate Neutralization Kit
- ☐ BMS Gateway to LON or BACnet IP
- ☐ Multi-Temperature Loop Control
- ☐ Sidewall Vent Termination
- ☐ Wireless Outdoor Sensor
- ☐ LP Gas Conversion Kit
- **Firing Codes**
- ☐ M9 Standard Construction

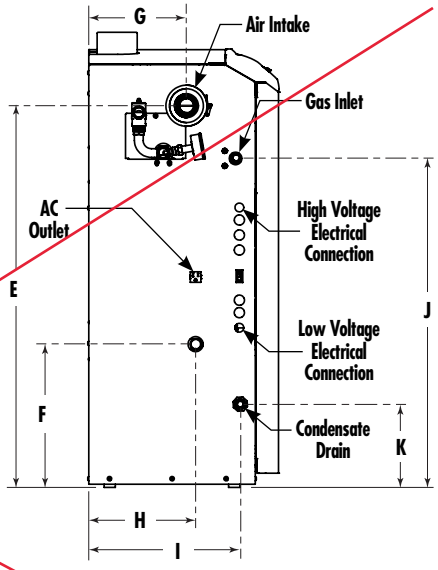
***5:1 on WHB399*

KNIGHT®
FIRE TUBE BOILER

FRONT



LEFT SIDE



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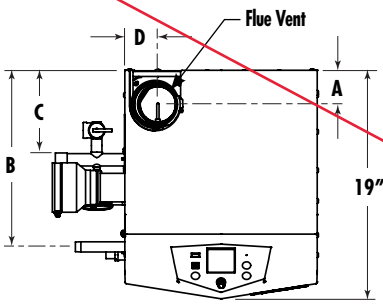


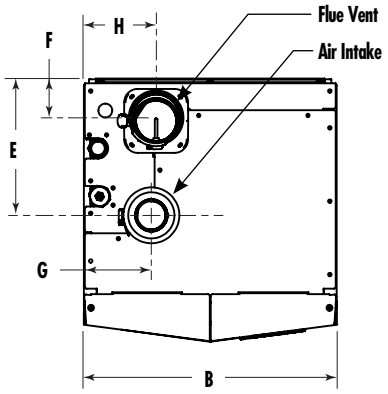
FLOOR MOUNT

AHRI CERTIFIED

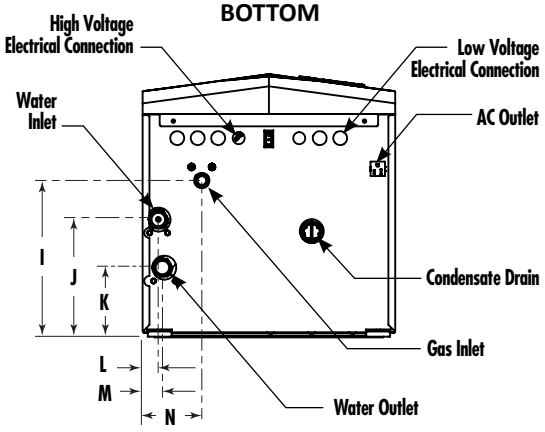
	Model Number	Input MBH Min	Input MBH Max	AFUE%	Heating Capacity MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Weight (lbs.)
○	KHB055N	8.3	55	95	51	44	3-1/2″	13-1/4″	6″	2-3/4″	37-2/3″	13-1/2″	8-1/3″	10-1/2″	15″	32-1/2″	8-1/3″	1/2″	1″	2″	2″	160
○	KHB085N	8.5	85	95	79	69	3-1/2″	13-1/4″	6″	2-3/4″	37-2/3″	13-1/2″	8-1/3″	10-1/2″	15″	32-1/2″	8-1/3″	1/2″	1″	2″	2″	165
○	KHB110N	11	110	95	102	89	2-3/4″	14-3/4″	7-1/2″	2-3/4″	38″	14-1/3″	9-3/4″	10-1/2″	15″	33″	8-1/3″	1/2″	1″	3″	3″	170
○	KHB155N	15.5	155	95	144	125	2-3/4″	14-3/4″	7-1/2″	2-1/2″	38″	14-1/3″	9-3/4″	10-1/2″	15″	33″	8-1/3″	1/2″	1″	3″	3″	175
○	KHB199N	19.9	199.9	95	185	161	3″	15-1/2″	7-1/2″	2-1/2″	38-1/3″	14-1/3″	10-1/2″	11-1/2″	15″	33″	8-1/3″	1/2″	1-1/4″	3″	3″	195
○	KHB285N	28.5	285	95	264	229	3″	15-1/2″	7-1/2″	2-1/2″	38-1/3″	14-1/3″	10-1/2″	11-1/2″	15″	33″	8-1/3″	1/2″	1-1/4″	3″	3″	205

• Information subject to change without notice. Change "N" to "L" for LP gas models. • The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.
• Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. • The ratings have been determined under the provisions governing forced draft burners.

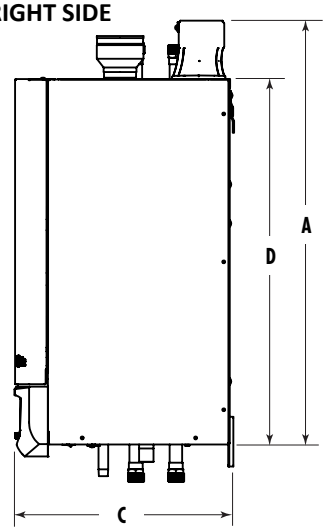
TOP



BOTTOM



RIGHT SIDE



WALL MOUNT

AHRI CERTIFIED

	Model Number	Input Max. MBH	Input Min. MBH	AFUE %	Heating Capacity MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
○	WHB055N	55	8.3	95	51	44	40″	18-3/4″	16″	31-1/8″	8-1/2″	3-3/4″	4-1/2″	6-1/2″	7-1/4″	8-7/8″	3-1/2″	1-1/2″	1-1/2″	6″	1/2″	1″	2″	2″	139
○	WHB085N	85	8.5	95	79	69	39-3/4″	18-3/4″	16″	31-1/8″	8-1/2″	3-3/4″	4-1/2″	6-1/2″	7-1/4″	8-7/8″	3-1/2″	1-1/2″	1-1/2″	6″	1/2″	1″	2″	2″	142
✓	WHB110N	110	11	95	102	89	41-1/4″	18-3/4″	19″	31-1/8″	10″	2-3/4″	5″	5-1/4″	11-1/2″	8-1/2″	5″	1″	1″	4-1/2″	1/2″	1″	3″	3″	159
○	WHB155N	155	15.5	95	144	125	41-1/4″	18-3/4″	19-1/8″	31-1/8″	10″	2-3/4″	5″	5-1/4″	11-1/2″	8-1/2″	5″	1″	1″	4-1/2″	1/2″	1″	3″	3″	166
○	WHB199N	199.9	19.9	95	185	161	41-1/4″	18-3/4″	19-1/8″	31-1/8″	10-1/2″	3″	5-1/4″	6″	11″	9-1/2″	6-1/4″	1-1/2″	1-1/2″	4-1/2″	1/2″	1-1/4″	3″	3″	175
○	WHB285N	285	28.5	95	264	229	41-3/4″	18-3/4″	21-1/8″	31-1/8″	15″	3″	3-3/4″	5-1/4″	12-1/4″	11″	6-1/4″	1-1/2″	1-1/2″	6-1/2″	1/2″	1-1/4″	3″	3″	184
○	WHB399N	399	80	94.4*	377#	328	43-1/4″	25-1/4″	21-7/8″	34″	3-1/2″	4-1/4″	22-1/2″	3-7/8″	8-7/8″	12-1/2″	9-1/4″	2″	2″	21-1/2″	3/4″	1-1/2″	4″	4″	213

* Thermal Efficiency%
# Gross Output MBH
**10:1 Turndown ratio and top and bottom water connections are not included on WHB399. WHB399 operates with a 5:1 turndown.

• Information subject to change without notice. Change "N" to "L" for LP gas models. • The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. • Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. • The ratings have been determined under the provisions governing forced draft burners.

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
P: 615.889.8900 / F: 615.547.1000
Lochinvar.com

AHRI MEMBER · LOW NOx · CSA CERTIFIED · DESIGN CERTIFIED · ASME H

6/18—Printed in U.S.A.

Lochinvar
HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIGHT® FIRE TUBE BOILER PRODUCT SUMMARY
(WHB) 55,000 - 399,999 BTU/HR

	WHB055	WHB085	WHB110	WHB155	WHB199	WHB285	WHB399
WATER							
GALLON CAPACITY	2.3	2.2	3.2	3.2	5.0	4.9	6.5
HEATING SURFACE (SQ. FT.)	5.92	8.33	10.00	14.07	15.66	21.60	36.58
WATER CONNECTIONS	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/2"
20°F ΔT WATER FLOW (GPM)	5	8	10	15	19	27	38
HEAD LOSS (FT. OF HD.)	0.27	0.94	1.53	3.50	1.13	2.42	1.42
35°F ΔT WATER FLOW (GPM)	3	5	6	9	11	16	22
HEAD LOSS (FT. OF HD.)	0.10	0.37	0.55	1.45	0.38	0.85	0.48
MAX. WORKING PRESSURE (PSI)	80	80	80	80	80	80	80
# OF RELIEF VALVES	1	1	1	1	1	1	1
RELIEF VALVE SIZE	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
RELIEF VALVE RATING (MBH)	535	535	535	535	535	535	535
RELIEF VALVE PRESSURE RATING (PSI)	30	30	30	30	30	30	30
GAS							
INLET CONNECTION	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"
MAX. INLET PRESSURE, NAT	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, NAT	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.
MAX. INLET PRESSURE, LP	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, LP	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.
BTU/HR INPUT	55,000	85,000	110,000	155,000	199,999	285,000	399,999
BTU/HR OUTPUT (HIGH FIRE)	52,250	80,750	104,500	147,250	189,999	270,750	379,999
BTU/HR OUTPUT (LOW FIRE)	7,790	8,075	10,450	14,725	18,999	27,075	76,000
ELECTRICAL							
VOLTAGE/HEATER	120	120	120	120	120	120	120
VOLTAGE/CONTROL	24	24	24	24	24	24	24
FLA	1.8	2.1	2.1	2.2	3.3	3.6	4
MCA	2.3	2.7	2.7	2.8	4.2	4.5	4.5
DIMENSIONS							
HEIGHT	33-1/4"	33-1/4"	33-1/4"	33-1/4"	33-1/4"	33-1/4"	35-1/2"
WIDTH	18-1/2"	18-1/2"	18-1/2"	18-1/2"	18-1/2"	18-1/2"	25"
DEPTH	16"	16"	19"	19"	19"	19"	21-3/4"
SERVICE CLEARANCES							
FRONT	24"	24"	24"	24"	24"	24"	24"
BOTTOM	24"	24"	24"	24"	24"	24"	24"
RIGHT SIDE	0"	0"	0"	0"	0"	0"	0"
LEFT SIDE	12"	12"	12"	12"	12"	12"	12"
TOP	24"	24"	24"	24"	24"	24"	24"
DIRECT VENTING							
SIZE	2"	2"	3"	3"	3"	3"	4"
VENT CATEGORY	IV	IV	IV	IV	IV	IV	IV
VENT MATERIAL	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP

Lochinvar, LLC • 300 Maddox Simpson Pkwy • Lebanon, TN 37090 • 615-889-8900 / Fax: 615-547-1000
www.Lochinvar.com

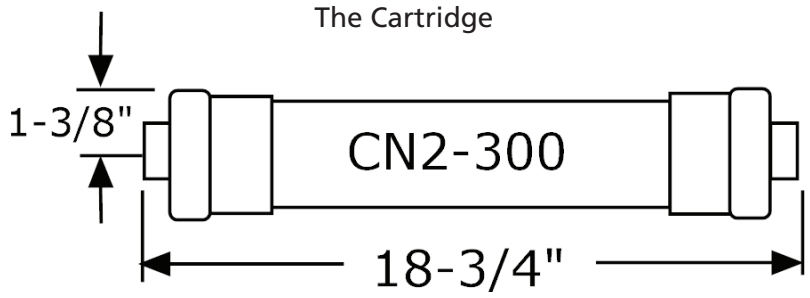
06/18-Printed in U.S.A.

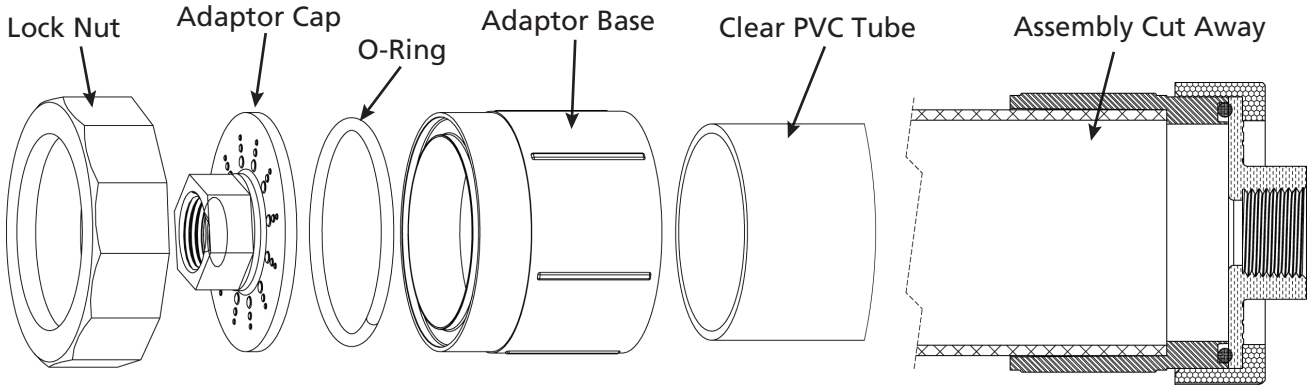
Neutra-Safe®
CONDENSATE NEUTRALIZERS

SUBMITTAL DATA: ALL CN2-300 MODELS

JOB: _____ **ENGINEER:** _____ **CONTRACTOR:** _____ **REP:** _____

DESCRIPTION	PART #	INCLUDED
300 MBH Tube Model	CN2-300C	(2) 1/2" MNPT x 3/4 " PVC Adaptors (2) Snap in Brackets Media
300 MBH Recharge Kit	30RCK	(2) Replacement O-Rings Media





DMF150 'PRESSURE PAL'
DIGITAL MINI SYSTEM FEEDER

*The industry leader for pressurizing closed-loop hydronic systems introduces the newest 'PRESSURE PAL' to the Axiom Product Family. The **DMF150** utilizes a digital pressure control (0-45 psig) with electronic alert contacts. The tank design incorporates a wall bracket connection that comes standard in the box. Front fill point makes fluid handling a simple process.*

FEATURES and BENEFITS

- *17 litre (4.6 US gallon) tank for storage and mixing*
- *All features shown on **user friendly digital display screen***
- ***0-45psig** Pressure Setpoint with adjustable dead band*
- *N.O./N.C. Alert contacts and LED light enabled when low level, low pressure, or high-pressure condition*
- *Integrated Easy Connect Wall Mount Bracket comes with the unit*
- ***Tilted 5" easy fill access on front of tank***
- *UL listed Power supply plugs into any standard 115 VAC outlet*
- *Diaphragm pump can run dry without damage*
- *No direct connection to potable water supply eliminates need for backflow prevention*
- *Make-up fluid stored in the feeder tank can be pre-treated to meet appliance manufacturers specifications*
- *Fluid level switch shuts the pump off and enables alarm contacts if the storage tank level gets too low*
- *Diverter valve allows easy purging of air on initial start-up, and manual mixing of solution*
- *Fluid drained for service can easily be put back into the system*
- *Prevents major floods*
- *Provides leak detection*

Modern Design, Simple Control, Reliable Quality

TOLL FREE: (877) 651-1815 PHONE: (306) 651-1815 EMAIL: info@axiomind.com

www.axiomind.com

AXIOM INDUSTRIES LIMITED

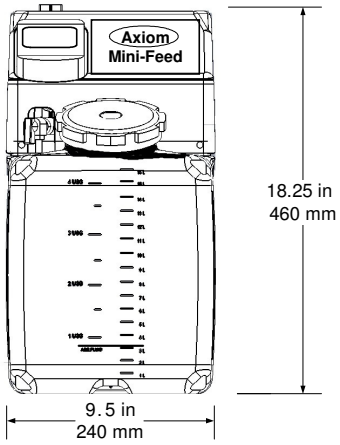
DMF150 HYDRONIC SYSTEM FEEDER TECHNICAL INFORMATION

WEIGHT – 4.5 kg, 10 lbs.

ELECTRICAL
Fused Power supply adapter (UL listed)115/60/1 to 24 VDC
Rated 50 watts AC
LED Power Light

PUMP PERFORMANCE

3.78 l/m (1.0 gpm) @ free flow
Self-priming up to 1.2 m (4 feet)



Depth - 11.00 in 280 mm
Clearances – Right/Left/Top Side - 2 in (50mm)
Weight When Full 50 lbs/23 kg.
Discharge 1/2" FNPT

SPECIFICATION

Hydronic system feeder shall be AXIOM INDUSTRIES LTD. Model DMF150. System shall include 17 litre (4.5 U.S. gallon) storage/mixing tank with molded-in level gauge, 125 mm (5") fill/access opening and cover; pump suction hose with inlet strainer; pressure pump with fuse protection; low fluid level pump cut-out float switch; manual diverter valve for purging air and agitating contents of storage tank; digital pressure switch adjustable from 0 kPa (0 psig) to 310 kPa (45 psig) cut-out pressure; factory cut-out pressure set to 115 kPa (18psig); digital pressure display, visual alarm on low level, low level alarm comes with remote dry contacts; wall mounting bracket. Unit to be c/w UL listed and fused power supply adapter with LED power indicator light, 100-240VAC/50-60Hz/1 to 24 VDC, supplied loose for field installation.

Feeder shall be compatible with glycol solutions of up to 50% concentration. Pump shall be capable of running dry without damage. Unit shall be completely assembled.

ACCESSORIES

☐ **RIA10-1-SAA** – Low level Alarm Panel c/w Remote Monitoring Dry Contacts and Selectable Audible Alarm

LIMITED WARRANTY

The DMF150 is warranted against defects in materials and workmanship for one year.

Project _____ Location _____

Consultant _____ Contractor _____

Unit Tag _____ Sales Agent _____

SPIROTHERM®

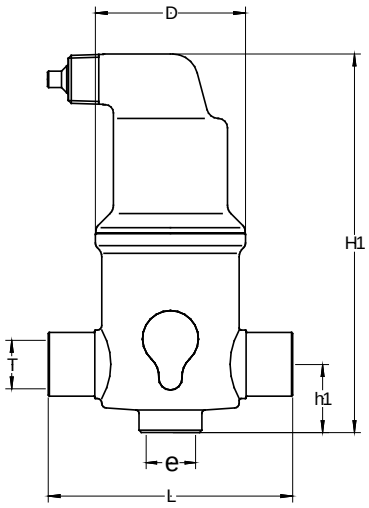
Submittal Data

VJS-1D

Spirovent® Junior Microbubble™ Eliminator
(with Sweat Connections)

Job Name:
Engineer:
Contractor:
Representative:

Tag	Model	Flow	Size	Location



Specifications:

Shell	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:

T	(Pipe Size)	¾”	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)	4.1	4.5	4.5	4.7	6.9
e	(inches)	½	½	½	½	½
Weight		3.0	3.2	3.5	4.5	8.5
Rec. Flow	(gpm)	6	10	15	30	40
Model No.	VJS-	075TM	100TM	125TM	150TM	200TM

(dimensions for reference only)

THIS SPACE FOR DESIGNER/ENGINEER APPROVAL		
Job/Customer _____	Date _____	Contractor _____
Model Specified _____	Qty _____	Approved By _____
Designer/Engineer _____	Date _____	Contractor's PO# _____
Submitted by _____	Date _____	Other _____

41672

Full Port Forged Brass Ball Valves w/ Hi-Flow Hose Drain 1/2" FIP x MIP x FIP x HOSE 600 WOG ISO 9001

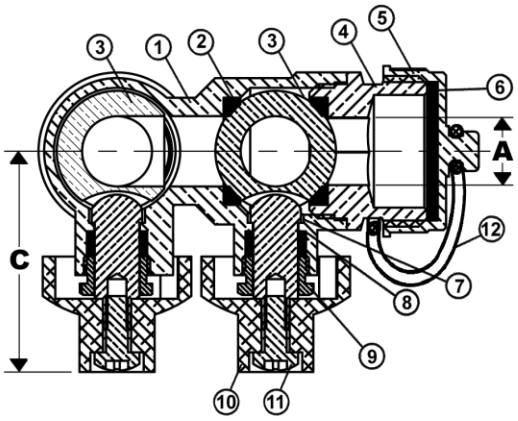
PRO-PAL SERIES®

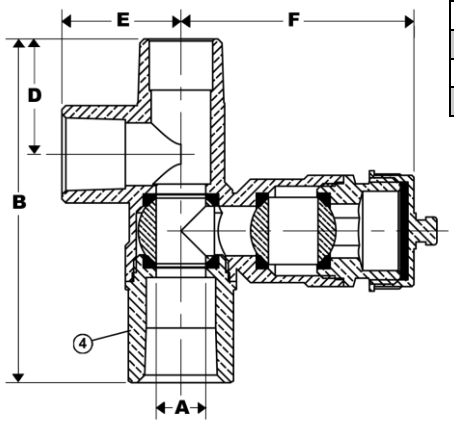
EXPANSION TANK PRO SERVICE VALVE

ITEM#	SIZE	CTN	CASE	A	B	C	D	E	F
41672	1/2"	1	30	1/2	3 3/8	1 9/16	1 1/8	1 3/16	2 5/16

NO.	DESCRIPTION	MATERIAL
1	BODY	BRASS
2	SEAT	PTFE
3	BALL	BRASS HCP
4	END CAP	BRASS
5	CAP	BRASS
6	WASHER	EPDM
7	STEM	BRASS
8	STEM SEAL	PTFE
9	PACKING GLAND	BRASS
10	HANDLE	ENAMEL COATED ALUMINUM
11	HANDLE SCREW	BRASS
12	STRAP	EPDM

TEMP °F	PSI
100	600
150	490
200	470
250	439
300	411
350	294
366	N/A





Specifications: Designed for residential or light commercial use with water or oil. This approved Webstone valve allows for isolation and draining of an expansion tank in a closed loop hydronic heating system. It is actuated by a blowout proof stem and features an adjustable packing gland. Threaded ends comply with ANSI B1.20.1.

Webstone VALVE INNOVATION

Quality and Commitment Since 1954

www.webstonevalves.com P: (800) 225-9529 F: (800) 336-5133

Hydronic Expansion Tanks

S33-HTX15 .3499215

Volume (gal)	Max. Acceptance Volume	Height	Diameter	System Conn.	Wt. (lbs)
2.1	1	12-1/2″	8″	1/2″ MNPT	5-1/2

S33-HTX30 .3499216

Volume (gal)	Max. Acceptance Volume	Height	Diameter	System Conn.	Wt. (lbs)
4.5	2-1/2	15″	11″	1/2″ MNPT	10

S33-HTX60 .3499220

Volume (gal)	Max. Acceptance Volume	Height	Diameter	System Conn.	Wt. (lbs)
6.0	3	7-1/4″	11-1/2″	1/2″ MNPT	11-1/2

S33-HTX90 .3499222

Volume (gal)	Max. Acceptance Volume	Height	Diameter	System Conn.	Wt. (lbs)
15	6	20-3/4″	16″	3/4″ MNPT	28

SUBMITTAL SHEET

PROJECT INFORMATION

Job Name:

Location:

Unit Tag Number:

Engineer:

Contractor:

P.O. Number:

Representative:

Submitted By: Date:

Approved By: Date:

MODELS

☐ S33-HTX-15 ☐ S33-HTX-30

☐ S33-HTX-60 ☐ S33-HTX-90

DESCRIPTION

Stream33® Hydronic Expansion Tanks tanks are diaphragm type hydropneumatic tanks designed for pressure control of residential and commercial hydronic heating systems. A pre-charged air chamber allows for system water expansion. The air charge is controlled via a charging valve located on the top or bottom of the tank. **Note: These tanks are not to be used on open or potable (domestic) water systems.**

FEATURES

- 5 year warranty

MAXIMUM OPERATING SPECIFICATIONS

- Temperature rating: 240° F maximum

- Pressure rating: 100 PSI maximum

- Adjustable Factory preset pressure: 12 PSI

MATERIAL SPECIFICATIONS	
Shell	Drawn Steel
Coating	Epoxy
Diaphragm	Butyl Rubber

SCHEDULE

Model	Tagging Information	Qty
S33-HTX-15		
S33-HTX-30		
S33-HTX-60		
S33-HTX-90		

GRUNDFOS

S D

PRO ECT		UNIT TAG		UANTITY	
		TYPE OF SERVICE			
REPRESENTATIVE		SUBMITTED BY		DATE	
ENGINEER		APPROVED BY		DATE	
CONTRACTOR		ORDER NO.		DATE	

ALPHA 15-55F/LC

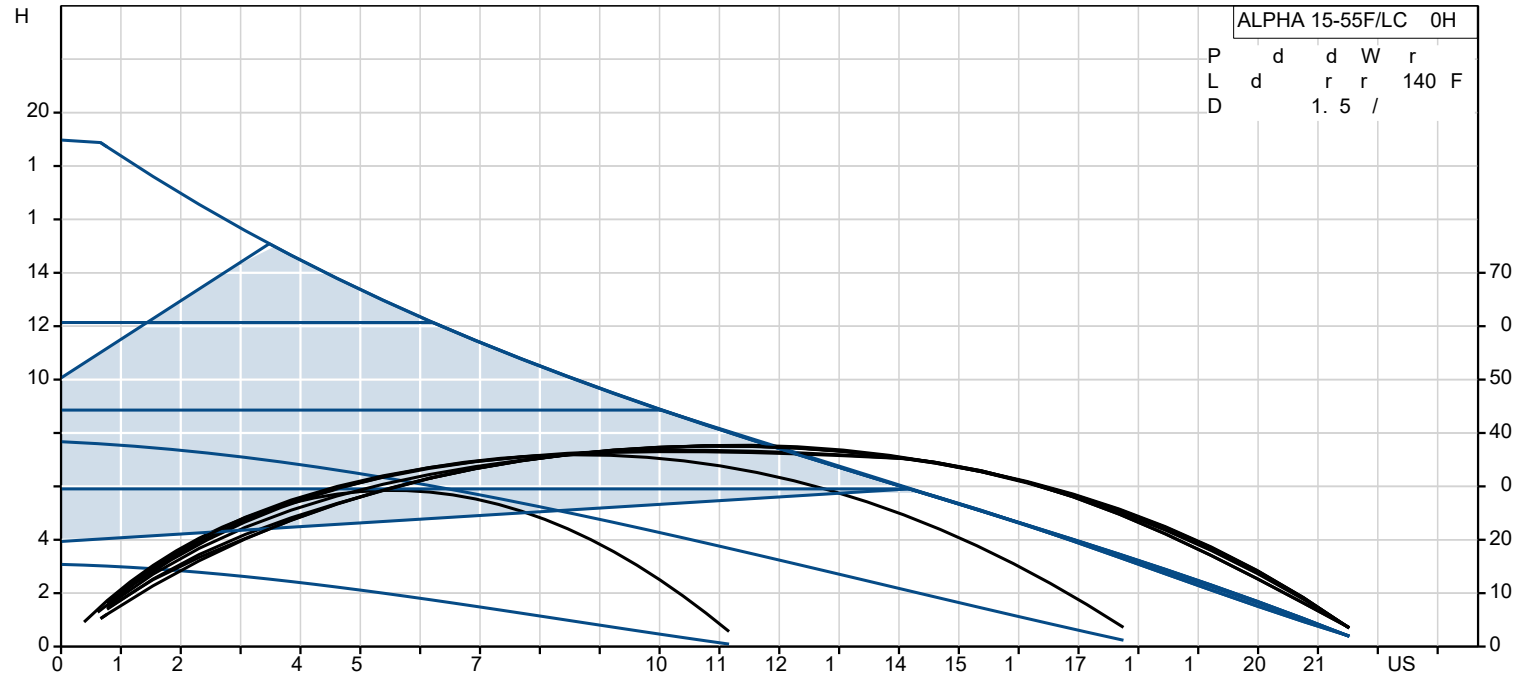
E r r d r r r d d

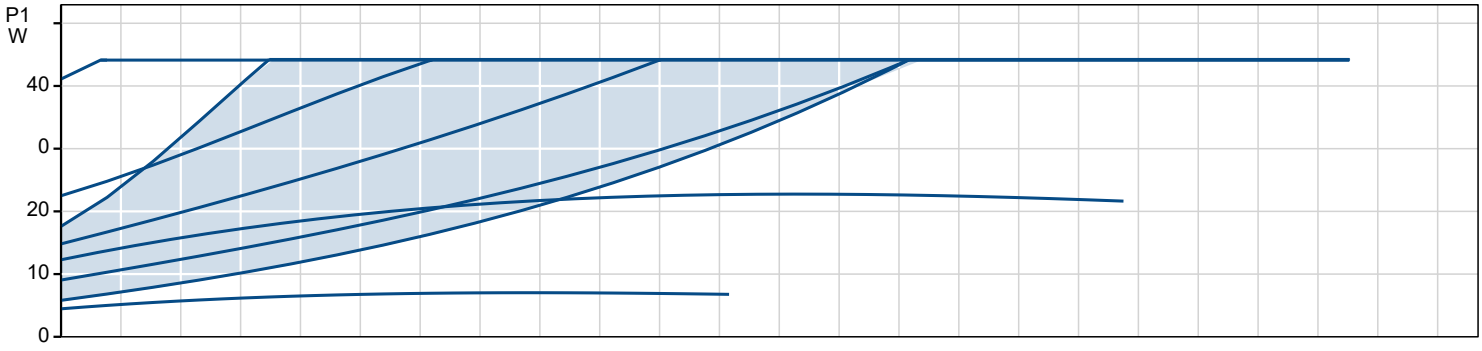
Pr d d r r r d

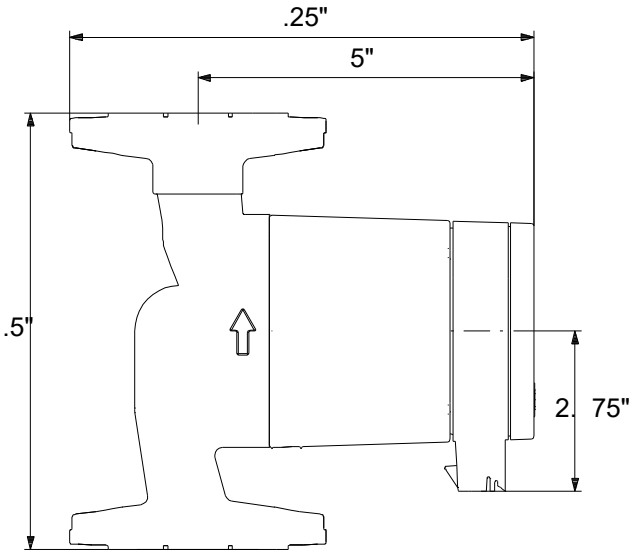
Conditions of Service	
F	
H d	
E	
L d	W r
T r r	140 F
NPSH r r d	
V	
S Gr	0. 5

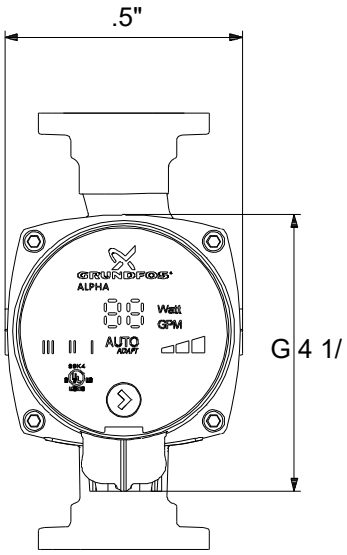
Pump Data	
M r r r	145
L d r r r	5. .. 2 0 F
M r r	104 F
A r	ETL FCC
P	G 1 1/2
Pr d r	5 2

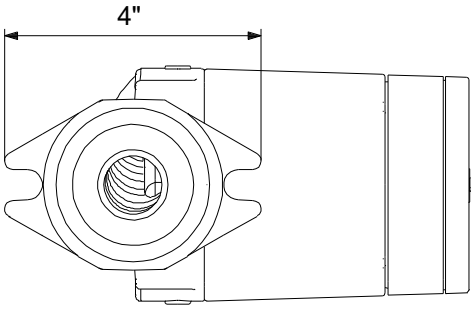
Motor Data	
P1	5 .. 45 W
R d	115 V
M r	0 H
E r	IP42
I	F
M r r	NONE
T r r	ELEC











Materials:

P	C r	
	DIN W.-Nr. GG15	
	ASTM 0 B	
I r	C	PES

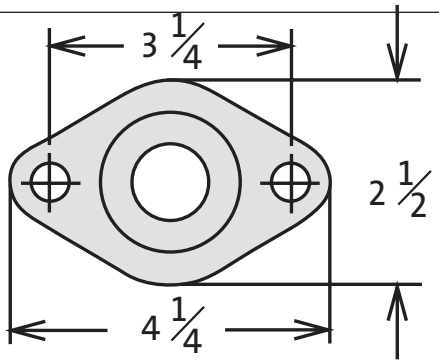
Dielectric Isolation Valve

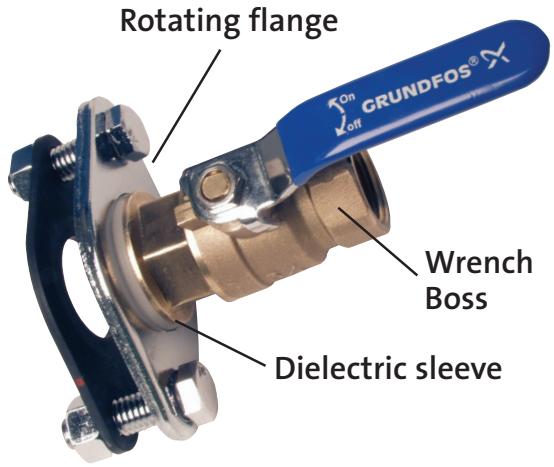
(Patent Pending)

- Eliminate dissimilar metal corrosion
- Quick installation
- All popular sizes & connections available

GRUNDFOS **DIELECTRIC ISOLATION VALVE**

- Full port shut-off ball valve
- Dielectric isolation = no galvanic (disimilar metal) corrosion
- Service pump without draining system
- Swivel flange allows optimum pump mounting postion
- All hardware included

Pump Connection GF15/26 Rotating Flange	Pipe Connection				
	NPT Female [inch]	**Material Number**	**Solder (Sweat) [inch]**	**Material Number**	**Port**
	1/2	591202	1/2	591207	Full
	3/4	591203	3/4	591208	Full
	1	591204	1	591209	Full
	1 1/4	591205	1 1/4	591210	Full
	1 1/2	591206	1 1/2	591211	1 1/4



Materials of Constuction	
Flange	Chrome plated steel
Valve Body	Brass
Valve Ball	Chrome plated brass
Dielectric sleeve	Composite
Bolt	Chrome plated steel
Nut	Chrome plated steel
Gasket	EPDM
Max. temperature	230°F (110°C)
Max. pressure	150 psi

L-ACS-SL-01 11/05 (US)
Subject to alterations

Grundfos Pumps Corporation
17100 W. 118th Terrace
Olathe, KS 66061
Telephone: 913 227 3400
Fax: 913 227 3500

Grundfos Canada, Inc.
2941 Brighton Road
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GRUNDFOS

Z-One™ Zone Valves

Z Series

Submittal Data 02917 NA — Issue Date 10/2011

Application

The Z-one, a two-position spring return zone valve, is used in heating and air-conditioning systems. The Z-one series consist of a Z1 actuator which is easily attached to a Z2 (2-way) or Z3 (3-way) valve body. Z1 actuator is equipped with or without auxiliary switch and is UL Listed for plenum installations. Z1 actuator + Z2 body = Z4 combination and Z1 actuator + Z3 body = Z6 combination.

• US Patent 7,048,251; others pending

Typical Specification

Furnish and install on the plans and describing herein, a Caleffi Z-one zone valve as manufactured by Caleffi. Each zone valve must be designed with forged brass valve body rated at 300 psi, stainless steel valve stem, and seals in EPDM. When an auxiliary switch is specified in the 24V actuator, the zone valve design must include a sealed reed switch. Approved for air plenum and ducts per UL 1995 section 18. Each zone valve shall be Caleffi model Z-one series or approval equal. (See product instructions for specific installation information.)

Technical Data

Valve body material:
- Body: forged brass, (optional lead-free brass-IAPMO R&T certified)
- seat: machined brass
- stem: stainless steel
- two o-ring seals and paddle: EPDM

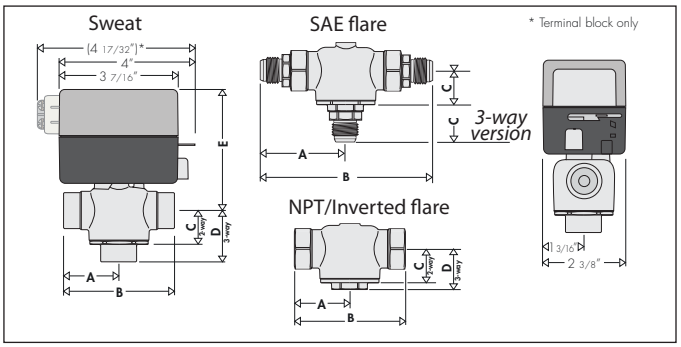
Flow: from 1 to 7.5 Cv
Medium: water and glycol, low pressure steam
Maximum percent of glycol: 50%
Temperature range: 32 to 240°F (0 -115°C)
Max. static pressure: 15 psi (1 bar) steam
300 psi (20 bar)
Connection:
- sweat: 1/2", 3/4", 1" & 1 1/4"
- NPT female: 1/2", 3/4" & 1"
- SAE flare: 1/2"
- inverted flare: 1/2", 3/4" & 1" sweat fittings purchased separately

Actuator material:
- base and cover: polycarbonate
- base plate: aluminum

Motor: -AC voltage: 24V - 120V - 208V - 230V -277V; 50/60 Hz
- Current draw: 24 VAC - 300 mA; 120 VAC; 55 mA; 208 VAC - 30 mA; 230 VAC - 25 mA; 277 VAC - 20 mA
- Terminal block with auxiliary switch: 24 V - class 2 - 5-/60 Hz

Wire lead length: 6" (15 cm), 24 V only 18" (45 cm)
Power requirements: 5 W, 7 VA
Ambient temperature range: 24 V, 120 V: 32 to 104°F
208 V, 230 V, 277 V: 32 to 170°F
Auxiliary switch: 0.0 A min. - 0.4 max., 24 V (24 V actuators)
5.0 A, 250 V (120, 208, 230, 277 V actuator)
Humidity: 95% non-condensing
Full stroke time: - On: <60 seconds
Approvals: UL873, cUL listed & CE
UL 1995 sec. 18: Air plenums & duct

Dimensions

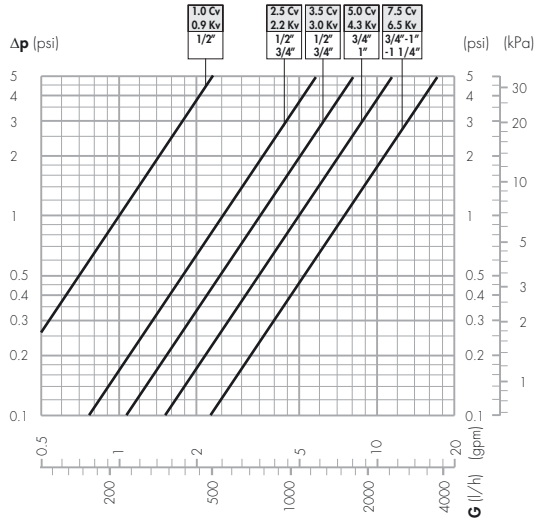


Connections	A	B	C	D	E
1/2" sweat	1 5/16"	2 5/8"	15/16"	1 5/16"	3 1/2"
3/4" sweat	1 3/8"	2 3/4"	15/16"	1 1/2"	3 1/2"
1" sweat	1 11/16"	3 3/8"	15/16"	1 9/16"	3 11/16"
1 1/4" sweat	1 13/16"	3 5/8"	15/16"	1 11/16"	3 11/16"
1/2" N P T	1 7/16"	2 7/8"	15/16"	1 1/4"	3 1/2"
3/4" N P T	1 9/16"	3 1/16"	15/16"	1 1/4"	3 11/16"
1" N P T	1 13/16"	3 5/8"	15/16"	1 11/16"	3 11/16"
Inverted flare	1 3/8"	2 3/4"	15/16"	1 1/4"	3 1/2"
with adapter (NA61241)	1 3/8"	3 1/2"	15/16"	1 1/4"	3 1/2"

	A	B	C	D
2-way 1/2" SAE Flare	2 11/32"	4 11/16"	15/16"	3 1/2"
3-way 1/2" SAE Flare	2 11/32"	4 11/16"	2 1/8"	3 1/2"

Connection size	Flow coefficient	Max. Close-off ΔP
1/2"	1.0 Cv (0.9 Kv)	75 psi (517 kPa)
1/2" - 3/4"	2.5 Cv (2.2 Kv)	50 psi (345 kPa)
1/2" - 3/4"	3.5 Cv (3.0 Kv)	30 psi (207 kPa)
3/4" - 1"	5.0 Cv (4.3 Kv)	25 psi (172 kPa)
3/4" - 1" - 1-1/4"	7.5 Cv (6.5 Kv)	20 psi (138 kPa)

Hydraulic characteristics



Job name _____ Size _____
Job location _____ Quantity _____
Engineer _____ Approval _____
Mechanical contractor _____ Service _____
Contractor's P.O. No. _____ Tag No. _____
Representative _____ Notes _____

Caleffi North America, Inc. 3883 West Milwaukee Road / Milwaukee, WI 53208
Tel: 414.238.2360 / Fax: 414.238.2366 / www.caleffi.us

Z-One™ Zone Valves

Z-Series Low-lead Brass

Submittal Data 02917.1 NA — Issue Date 04/2012

Application

The Z-one, a two-position spring return zone valve, is suitable for use in potable water systems. The Z-one series consist of a Z1 actuator which is easily attached to a Z2 (2-way) or Z3 (3-way) valve body. Z1 actuator is equipped with or without auxiliary switch and UL listed for plenum installations. Z1 actuator + Z2 body = Z4 combination and Z1 actuator + Z3 body = Z6 combination. Also suitable for high boiler feedwater makeup and open system applications.

• US Patent 7,048,251; others pending

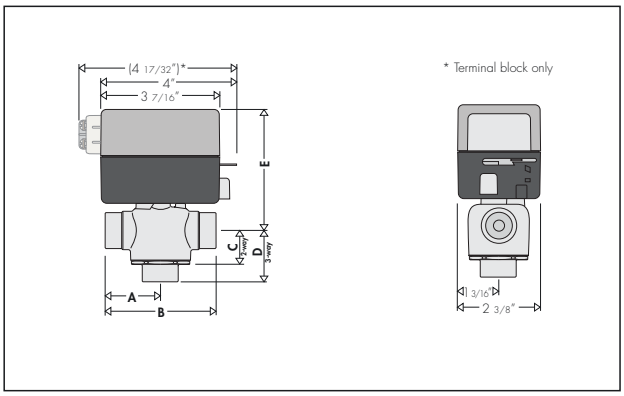
Typical Specification

Furnish and install on the plans and described herein, a Caleffi Z-one zone valve as manufactured by Caleffi. Each zone valve must be designed with forged lead-free brass valve body rated at 300 psi, stainless steel valve stem, and seals in EPDM. When an auxiliary switch is specified in the 24V actuator, the zone valve design must include a sealed reed switch. Approved for air plenums and ducts per UL1995 section 18. Each zone valve shall be Caleffi model Z-one series or approved equal. (See product instructions for specific installation information.)

Technical Data

Valve body material:	
- body:	lead-free brass (<0.25% lead content)
- seat:	machined brass
- stem:	stainless steel
- two o-ring seals and paddle:	EPDM
Flow:	3.5 Cv & 7.5 Cv
Medium:	water and glycol, low pressure steam
Maximum percent of glycol:	50%
Temperature range:	32 to 240°F (0 – 115°C)
Max. static pressure:	15 psi (1 bar) steam 300 psi (20 bar)
Connection:	
- sweat:	1/2” & 3/4”
Agency approval:	
Lead plumbing law compliance:	(0.25% Max. weighted average lead content)
Lead plumbing law certifed by IAPMO R&T	
Actuator material:	
- base and cover:	polycarbonate
- base plate:	aluminum
Motor:	
- AC voltage:	24 V - 120 V - 208 V - 230 V - 277 V; 50/60 Hz
- Current Draw:	24 VAC- 300 mA; 120 VAC; 55 mA; 208 VAC- 30 mA; 230 VAC- 25 mA; 277 VAC- 20 mA
- Terminal block with auxiliary switch:	24 V - class 2 - 50/60 Hz
Wire lead length:	6” (15 cm), 24 V only 18” (45 cm)
Power requirements:	5 W, 7 VA
Ambient temperature range:	24 V, 120 V: 32 to 104°F 208 V, 230 V, 277 V: 32 to 170°F
Auxiliary switch:	0.0 A min. 0.4 max., 24 V (24V actuators) 5.0 A, 250 V (120, 208, 230, 277 V actuators)
Humidity:	95% non-condensing
Full Stroke Time:	
- On:	<60 seconds
- Off:	6 seconds
Approvals:	UL873, cUL Listed & CE UL 1995 sec. 18: Air plenums & duct

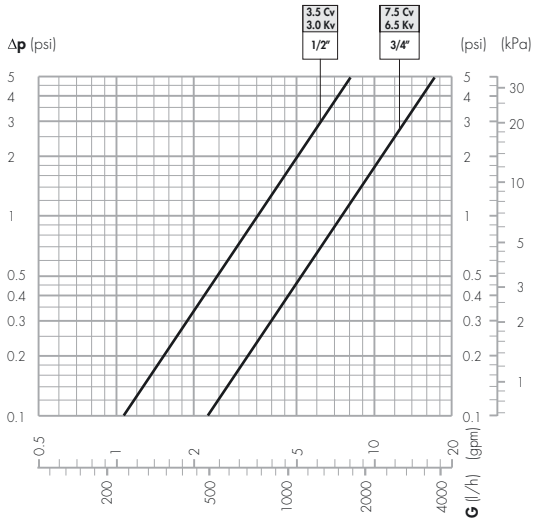
Dimensions



Connections	A	B	C	D	E
1/2" sweat	1 5/16"	2 5/8"	15/16"	1 5/16"	3 1/2"
3/4" sweat	1 3/8"	2 3/4"	15/16"	1 1/2"	3 1/2"

Code Number	Description	Flow Coefficient	Max. Closeoff ΔP
Z207433	2-way 1/2" Sweat	3.5 Cv (3.0 Kv)	30 psi (207 kPa)
Z207537	2-way 3/4" Sweat	7.5 Cv (6.5 Kv)	20 psi (138 kPa)
Z307433	3-way 1/2" Sweat	3.5 Cv (3.0 Kv)	30 psi (207 kPa)
Z307537	3-way 3/4" Sweat	7.5 Cv (6.5 Kv)	20 psi (138 kPa)

Hydraulic characteristics



Job name _____ Size _____

Job location _____ Quantity _____

Engineer _____ Approval _____

Mechanical contractor _____ Service _____

Contractor's P.O. No. _____ Tag No. _____

Representative _____ Notes _____

Caleffi North America, Inc. 3883 West Milwaukee Road / Milwaukee, WI 53208
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Z-one™ zone valves

Z series, Presscon™ assemblies

Submittal Data 02917.4 NA — Issue Date 02/2017

Application

The Z-one, a two-position spring return zone valve, is used in heating and air-conditioning systems. The Z-one Presscon valve assembly series consist of a Z111000 or Z151000 actuator which is assembled to a Z20068x (2-way male union) valve body and Presscon press tailpieces and union nuts. Z1 actuator is approved to UL 873, cUL listed and CE, and UL 1995 section 18 air plenum and ducts rating. US Patent 7,048,251; others pending.

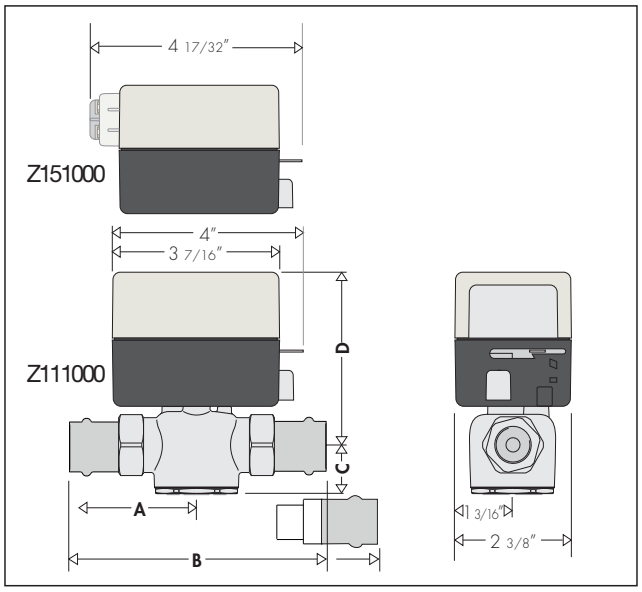
Typical Specification

Furnish and install on the plans and describing herein, a Caleffi Z-one zone valve as manufactured by Caleffi. Each zone valve must be designed with forged brass valve body rated at 300 psi, stainless steel valve stem, and seals in EPDM. The actuator is approved to UL 873, cUL listed and CE, and UL 1995 section 18 air plenum and ducts rating. Each zone valve shall be Caleffi model Z-one series. (See product instructions for specific installation information.)

Technical Data

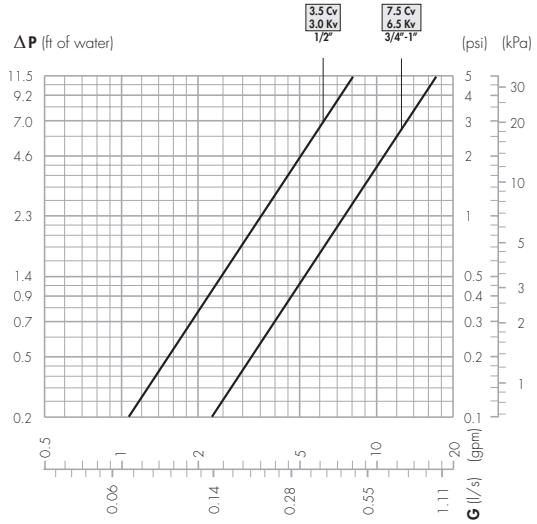
Valve body material:	
- Body:	forged brass
- seat:	machined brass
- stem:	stainless steel
- two o-ring seals and paddle:	EPDM
Flow:	Z44P, Z54P: 3.5 Cv; Z45P, Z55P, Z45PL, Z55PL, Z46P, Z56P: 7.5 Cv
Medium:	water and glycol, low pressure steam
Maximum percent of glycol:	50%
Temperature range:	32 to 240°F (0 -115°C)
Max. static pressure:	15 psi (1 bar) steam 300 psi (20 bar)
Connection:	
- press:	½", ¾" & 1"
Lay length:	size ½ inch: 3 ½" size ¾ inch: 3 ⅝" size ¾ inch (PL)*: 5"
	*one long tailpiece on outlet for extra long lay length for retrofit convenience
	size 1 inch: 4 ⅛"
Actuator return-to-normal position:	Z111000 & Z151000: Normally closed
Actuator material:	
- base and cover:	polycarbonate
- base plate:	aluminum
Motor:	-AC voltage: 24V ; 50/60 Hz
- Current draw:	24 VAC - 300 mA
Power requirements:	5 W, 7 VA
Power connections:	
- Z151000:	Terminal screws with auxiliary switch
- Z111000:	Wire lead length:18" (45 cm)
Actuator ambient temperature range:	24 V: 32 to 125°F (0 to 18°C)
Humidity:	95% non-condensing
Full stroke time:	- On: <60 seconds - Off: 6 seconds
Close-off Pressure:	
	Z44P, Z54P: 30 psi; Z45P, Z55P, Z45PL, Z55PL, Z46P, Z56P: 20 psi
Approvals:	UL873, cUL listed & CE UL 1995 sec. 18: Air plenums & duct
Environmental:	Indoor only

Dimensions



Connections	A	B	C	D
½" press, Z44P, Z54P	2½"	5"	15/16"	3½"
¾" press, Z45P, Z55P	2 13/16"	5 5/8"	15/16"	3½"
¾" press extra long, Z45PL, Z55PL	2 13/16"	7"	15/16"	3½"
1" press, Z46P, Z56P	2 15/16"	5 7/8"	15/16"	3½"

Hydraulic characteristics



Job name		Size	
Job location		Quantity	
Engineer		Approval	
Mechanical contractor		Service	
Contractor's P.O. No.		Tag No.	
Representative		Notes	

Caleffi North America, Inc. 3883 West Milwaukee Road / Milwaukee, WI 53208
Tel: 414.238.2360 / Fax: 414.238.2366 / www.caleffi.com

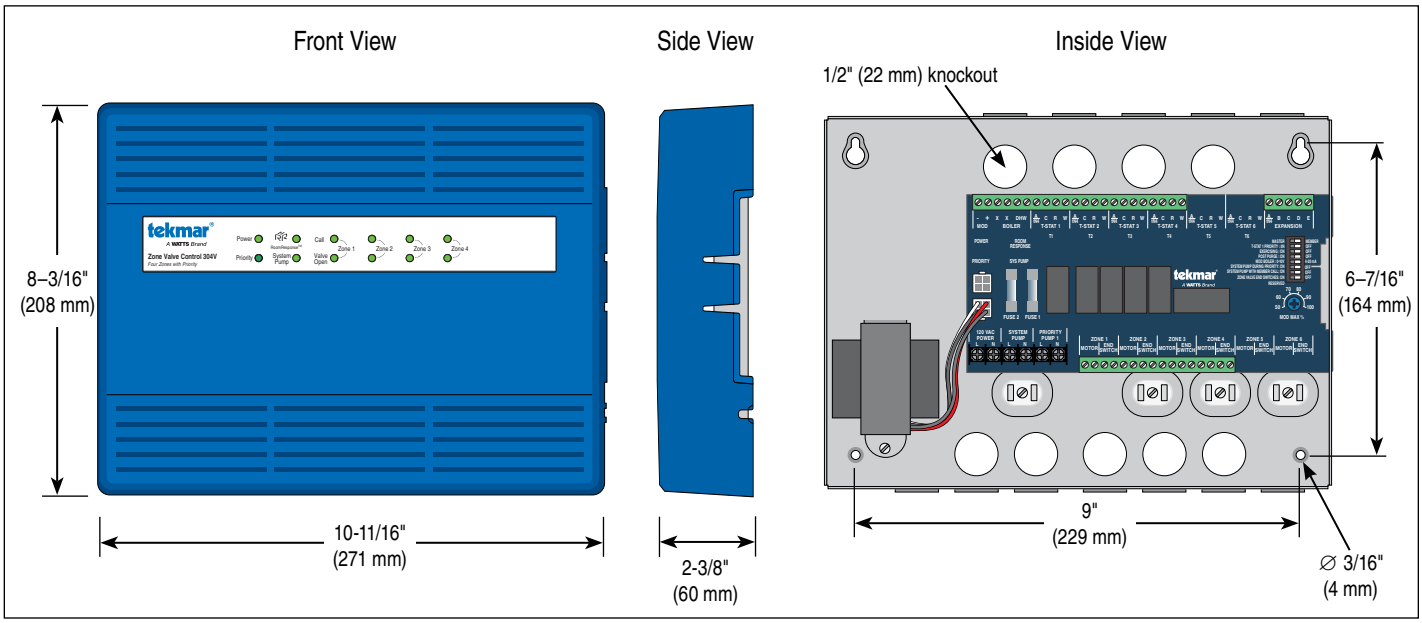
Submittal
Zone Valve Control 304V

Zoning

304V_C
11/16
Replaces: 10/16

Job _____ Designer _____ Contact _____

The Zone Valve Control 304V connects up to four thermostats and operates zone valves to provide heating to a zoned hydronic heating system. The 304V operates a system pump whenever a zone valve opens. Zone 1 can operate either a zone valve or a circulator to provide heat to an indirect domestic hot water tank with optional priority over zones 2 through 4. The 304V includes optional exercising to prevent circulator seizure when not in use, and optional post purge operation of domestic hot water tank to maximize energy savings. The 304V provides a RoomResponse™ signal to modulating-condensing boilers to optimize comfort while improving boiler efficiency.



Specifications

Zone Valve Control 304V *Four Zones with Priority*	
Literature	304V_C, 304V_D, 304V_J
Control	Microprocessor control. This is not a safety (limit) control.
Packaged weight	5.0 lb. (2250 g)
Dimensions	8-3/16" H x 10-11/16" W x 2-3/8" D (208 x 271 x 60 mm)
Enclosure	Cover: ABS plastic, Base: galvanized steel, NEMA type 1
Approvals	CSA C US
Ambient conditions	Indoor use only, 32 to 122°F (0 to 50°C), RH ≤90% non-condensing
Power supply	115 V (ac) ±10%, 60 Hz, 11 A
Transformer	40 VA, expandable to 80 VA with additional transformer M3069 (sold separately)
Control load	7 VA
Fuses	T5 250 V slow blow, two spare fuses included
Zone valve outputs	24 V (ac), 2 A max each, one transformer 33 VA, two transformer 73 VA
Zone valve end switch	24 V (ac)
Pump relays	230 V (ac), 5 A, 1/3 hp
Boiler XX end switch	24 V (ac), 5 A
DHW end switch	24 V (ac), 5 A
Mod boiler output	0-10 V (dc) 500 Ω min load impedance 4-20 mA 1kΩ max load impedance
Warranty	Limited 3 Year (See 304V_D for full warranty)

Features

- RoomResponse™ signal (Patent Pending)
- Compatible with all low voltage thermostats
- Compatible with 2, 3, and 4-wire zone valves
- Unlimited zone expansion
- Zone priority
- Priority override
- Pump exercising
- Post purge
- LED for each zone, priority, end switch and RoomResponse™
- Away signal shared between tekmar thermostats
- Four ground screws
- Top, bottom and back conduit knockouts
- Fuses protect transformers and pumps
- Two spare fuses included
- CSA approved

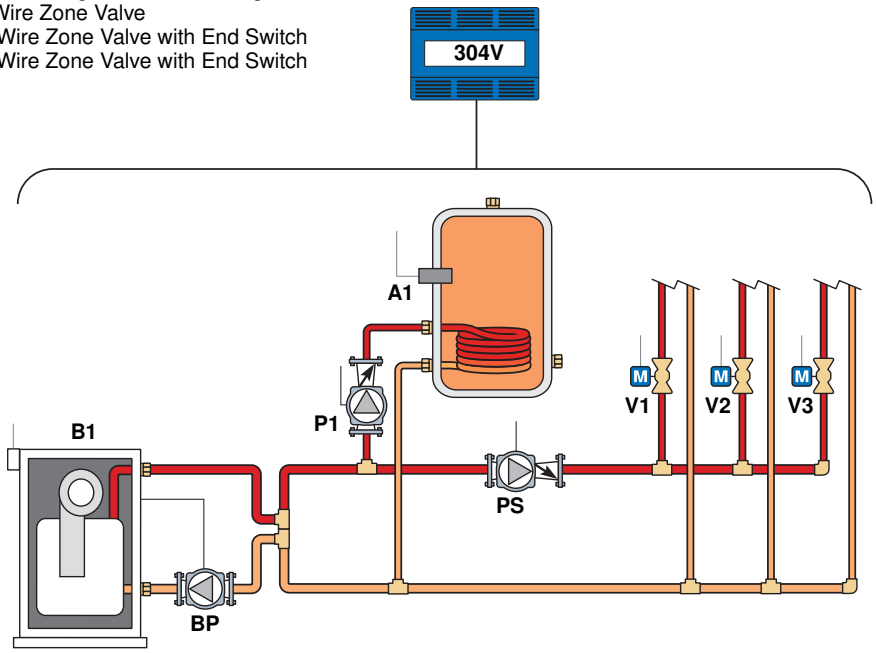
tekmar®
A WATTS Brand

Sample Application Drawing

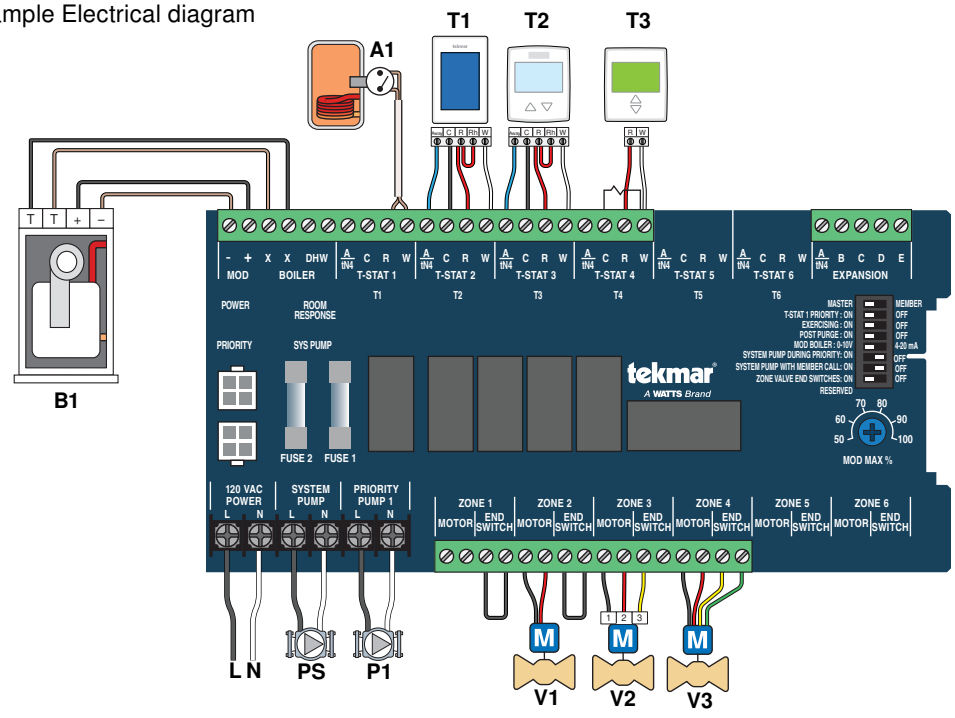
Sample Mechanical diagram

Legend

A1 = DHW Tank Aquastat
B1 = Boiler
BP = Boiler Pump
P1 = Zone 1 DHW Tank Pump
PS = System Pump
T1 = WiFi Thermostat 561 or 562
T2 = Thermostat 518 or 519
T4 = Generic Digital Power-Stealing Thermostat
V1= 2-Wire Zone Valve
V2 = 3-Wire Zone Valve with End Switch
V3 = 4-Wire Zone Valve with End Switch



Sample Electrical diagram



DIP Switches
Master
T-stat 1 Priority = On
Exercising = On
Post Purge = On
Mod Boiler = depends on boiler
System Pump During Priority = Off
System Pump With Member Call = Off
Zone Valve End Switches = On

Notice
End switch jumper required for Zone 1 when using a pump and Zone Valve End Switch DIP = On

Included resistor must be installed when using power stealing thermostats (e.g. Thermostat T3)

⚠ CAUTION

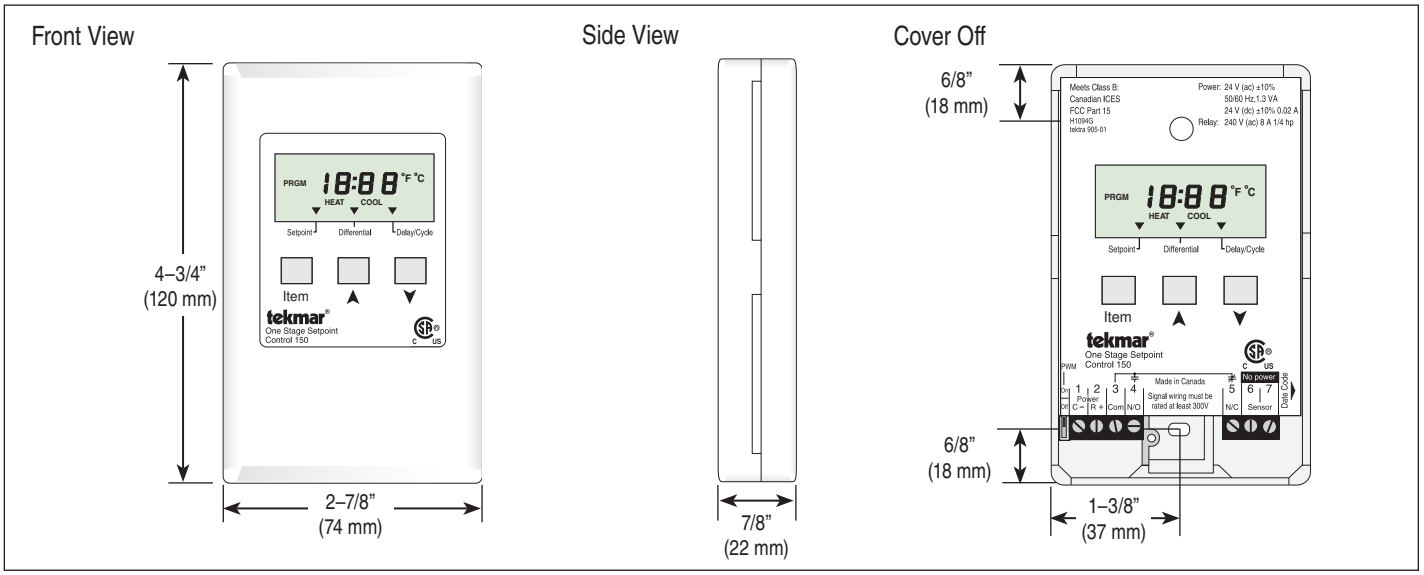
This Submittal is not intended to provide full installation instructions and safety information. In order to avoid property damage or injury, please refer to the complete installation manual and product safety information provided with the product.

tekmar® Submittal
One Stage Setpoint Control 150

C 150
01/11
Setpoint
Replaces: New

Job _____ Designer _____ Contact _____

The One Stage Setpoint Control 150 is designed to operate a single component of a heating or cooling system in order to maintain a set temperature. It can be used in applications ranging from heating a swimming pool to maintaining a constant slab temperature in a commercial car wash bay. This control regulates a constant setpoint water temperature for heating or cooling. The 150 is designed to operate a single relay (rated at 240 V, 8 A) to control a single device such as a boiler, pump, or valve.



Specifications

One Stage Setpoint Control 150	
Literature	D150, A150, D001, D070
Control	Microprocessor control. This is not a safety (limit) control
Packaged weight	1.0 lb. (450 g)
Dimensions	4-3/4" H x 2-7/8" W x 7/8" D (120 x 74 x 22 mm)
Enclosure	White PVC plastic, NEMA type 1
Approvals	CSA C US, meets class B: ICES & FCC Part 15
Ambient conditions	Indoor use only, -20 to 120°F (-30 to 50°C), RH ≤90% Non-condensing
Power supply	24 V (ac) ±10%, 50/60 Hz, 1.3 VA, 24 V (dc) ±10%, 0.02 A
Relay	240 V (ac) 8 A max, 1/4 hp
Sensors	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892
–Included	Universal Sensor 071
–Optional	tekmar type #: 070, 071, 072, 073, 076, 077, 078, 079, 082, 083, 084
Programmed settings	Ten year memory backup
Control accuracy	±0.5°F (±0.3°C) with up to 500 ft. (150 m) of 18 AWG wire to sensors
Temperature display	-85 to 302°F (-65 to 150°C)
Setpoint operation	-40 to 239°F (-40 to 115°C)
Differential (Bang/Bang)	1 to 40°F (1 to 22°C)
Differential (PWM)	3 to 40°F (2 to 22°)
Time delay (Bang/Bang)	0 to 19 min. 50 sec.
Cycle length (PWM)	30 sec. to 19 min. 50 sec.
Operating mode	Heating / Cooling
Temperature display	Fahrenheit / Celsius
Warranty	Limited 3 Year (See D150 for full warranty)

Features

- Heat or Cool Setpoint Control
- Pulse Width Modulation Control
- Digital display
- Normally open AND normally closed relay

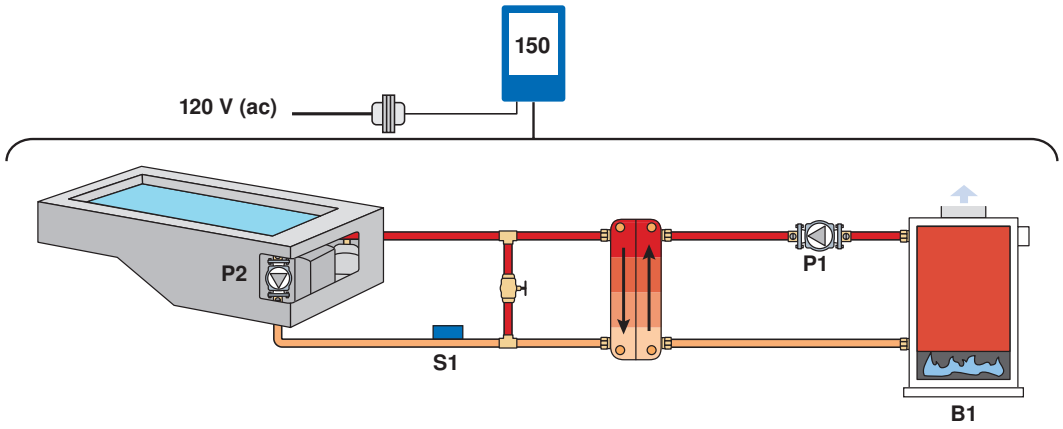
SPECIAL REQUIREMENTS

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

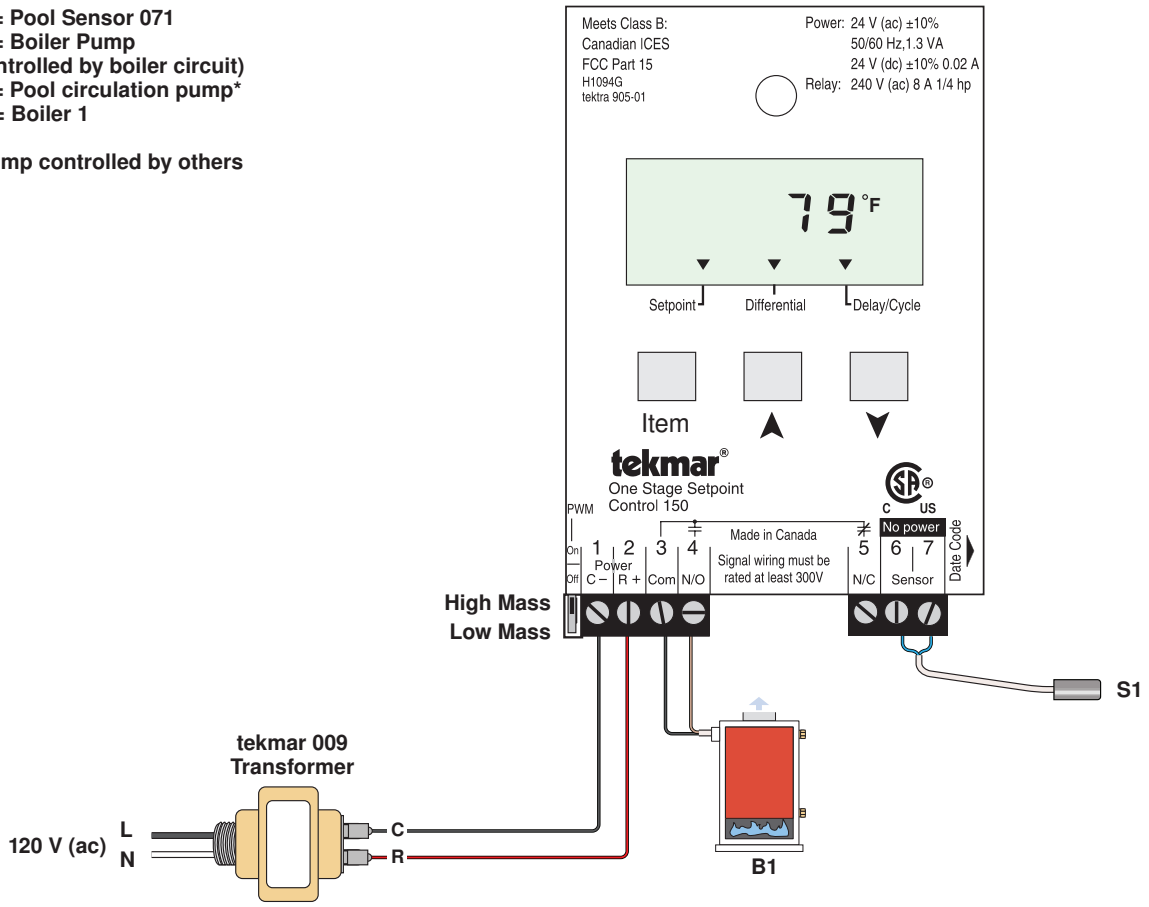


Sample Electrical diagram

Legend:

S1 = Pool Sensor 071
P1 = Boiler Pump
(Controlled by boiler circuit)
P2 = Pool circulation pump*
B1 = Boiler 1

*** Pump controlled by others**



All specifications are subject to change without notice.
Printed in Canada. C 150 - 01/11.

NOBURST®

NOBURST Antifreeze & Heat Transfer Fluid

Factory Pre-mixed Freeze Protection for Water-based Heating and Cooling Systems

NOBURST non-toxic* antifreeze solutions are to be used in place of water and other water-like fluids in systems where freezing may either cause damage or interfere with the functioning of systems or equipment and/or toxicity to humans or animals is a concern.[1]

Noble Company
Simple Solutions... Proven Performance

A division of
FEDERAL PROCESS CORPORATION

AMERICAN COMPANY AMERICAN PRODUCTS

VIEW PRODUCT DETAILS AND DIAGRAMS ONLINE

NOBURST ANTIFREEZE AND HEAT TRANSFER FLUID

NOBURST non-toxic antifreeze solutions are factory pre-mixed freeze protection for water-based heating and cooling systems to be used in place of water and other water-like fluids in systems where freezing may either cause damage or interfere with the functioning of systems or equipment, and/or toxicity to humans or animals is a concern.

NOBURST family of products consists of ALL-NEW **NOBURST RTU40 40% PG**, **RTU35 35% PG**, and **RTU30 30% PG**, plus **NOBURST -100**, **Super NOBURST**, **NOBURST HD**, and **NOBURST AL**.

AVAILABLE SIZES

- 5-gallon pails
- 30-gallon drums
- 55-gallon drums
- 275 or 330-gallon totes
- 5,000-gallon tank truck

AVAILABILITY

Noburst Ready to Use mixes are available throughout the U.S. through wholesale distributors. Please contact Noble Company for your local representative and wholesaler.

CUSTOM BLENDS

Custom formulations are available for lower concentrations of glycerine.Please contact Noble Company for more information.

INGREDIENTS

Active: Propylene Glycol and Dipotassium Phosphate

Other: Viscosity Reduction Agent, Food-Grade Dye, Deionized Water

NEW! NOBURST READY TO USE

Water quality concerns are no longer limited to our drinking water. Whether it's well or municipal water with high total hardness, boiler equipment manufacturers are now more cautious than ever. When mixing propylene glycol on-site, poor water quality can lead to long-term damage to heating systems. Noble Company is addressing those concerns and is pleased to introduce a new line of ready-to-use antifreeze that eliminates these water quality concerns.

Designed to be introduced directly into systems with no on-site dilution, NOBURST RTU products are factory premixed with deionized water ensuring no mineral content or hardness levels and the elimination of chlorides, which are second only to oxygen as a leading cause of heating system corrosion. NOBURST RTU blends are available in 30, 35, and 40% propylene glycol concentrations with no minimum order quantity. **DO NOT DILUTE.**

NOBURST® RTU40 40% PG

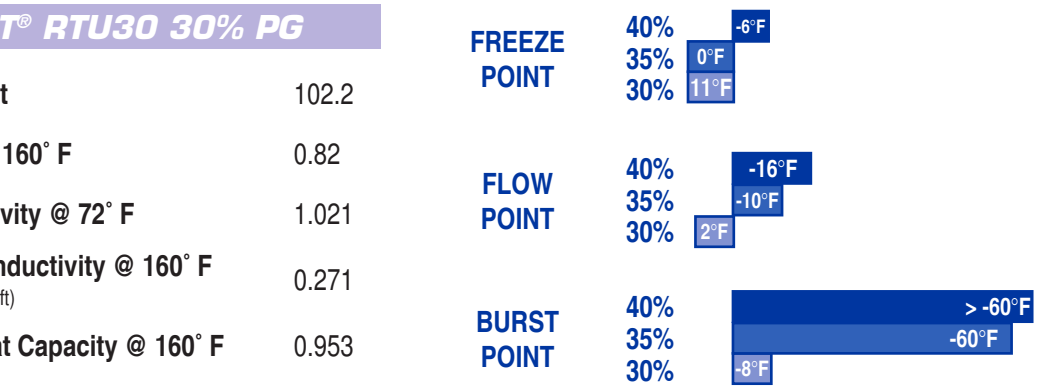
Boiling Point	103.9
Viscosity @ 160˚ F	1.04
Specific Gravity @ 72˚ F	1.027
Thermal Conductivity @ 160˚ F (BTU/HR-Ft(2)/(F/ft)	0.24
Specific Heat Capacity @ 160˚ F	0.925

NOBURST® RTU 35 35% PG

Boiling Point	102.8
Viscosity @ 160˚ F	0.93
Specific Gravity @ 72˚ F	1.024
Thermal Conductivity @ 160˚ F (BTU/HR-Ft(2)/(F/ft)	0.255
Specific Heat Capacity @ 160˚ F	0.939

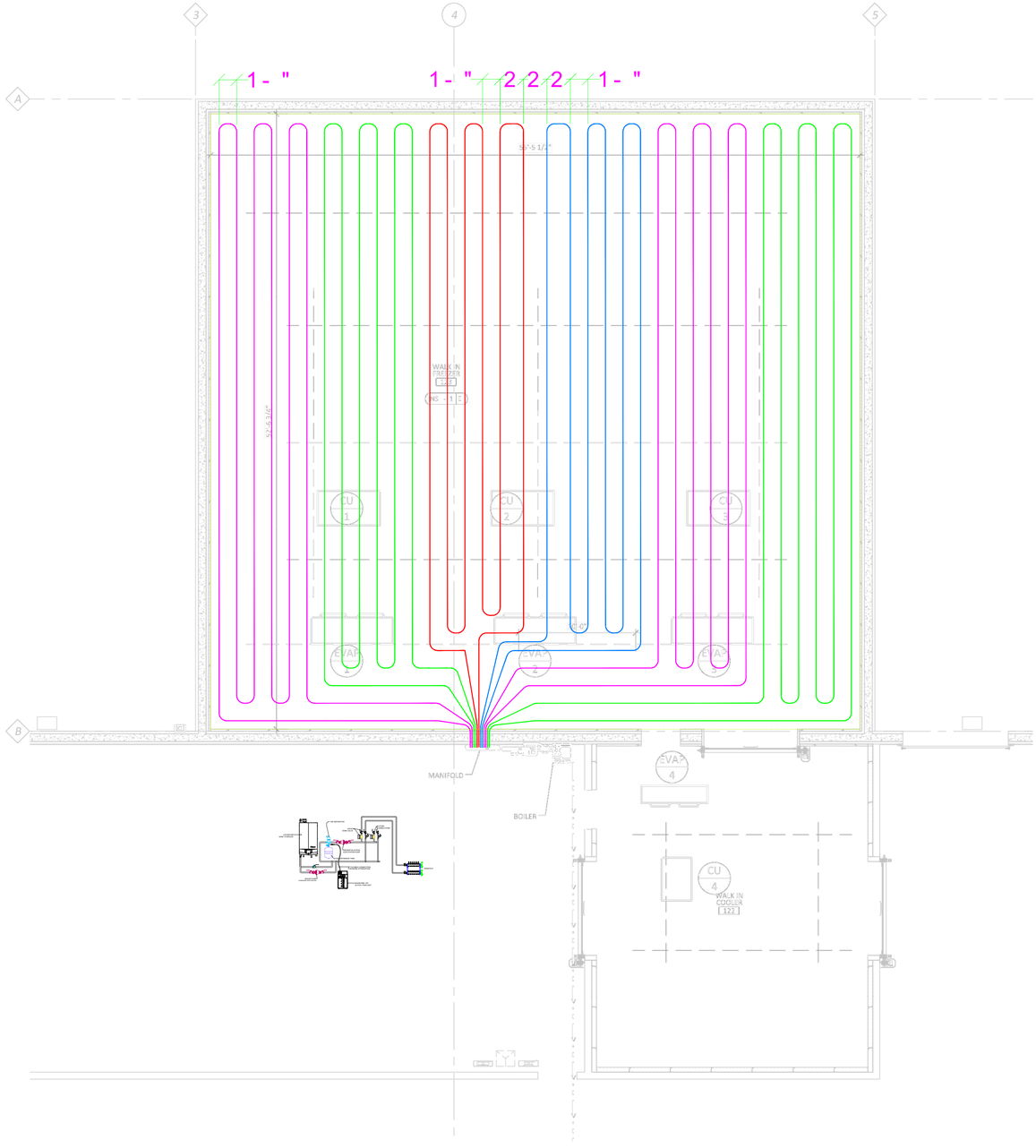
NOBURST® RTU30 30% PG

Boiling Point	102.2
Viscosity @ 160˚ F	0.82
Specific Gravity @ 72˚ F	1.021
Thermal Conductivity @ 160˚ F (BTU/HR-Ft(2)/(F/ft)	0.271
Specific Heat Capacity @ 160˚ F	0.953



SYSTEM PROTECTION

Freeze Point is the temperature where the first ice crystal forms in the fluid. Burst point is the temperature where the fluid is solid, expanding, and bursting the vessel. *Specific gravity measured at 72°F. **Viscosity, specific heat capacity, and thermal conductivity are measured at 160°F.



ENLARGED COOLER FREEZER MECH. PLAN

SCALE: 3/16" = 1'-0"

1 M-211

GDOT DESIGN
10020 Aurora-Hudson Rd
Streetsboro, Ohio 44241
PH: (330) 528-3500
FX: (330) 528-0028
www.gdotdesign.com

Drawn By	DBT
Checked By	DBT
Project Number	23-00-548

NOTICE

DATES AND REVISIONS

12-15-2023
FOUNDATION PERMIT

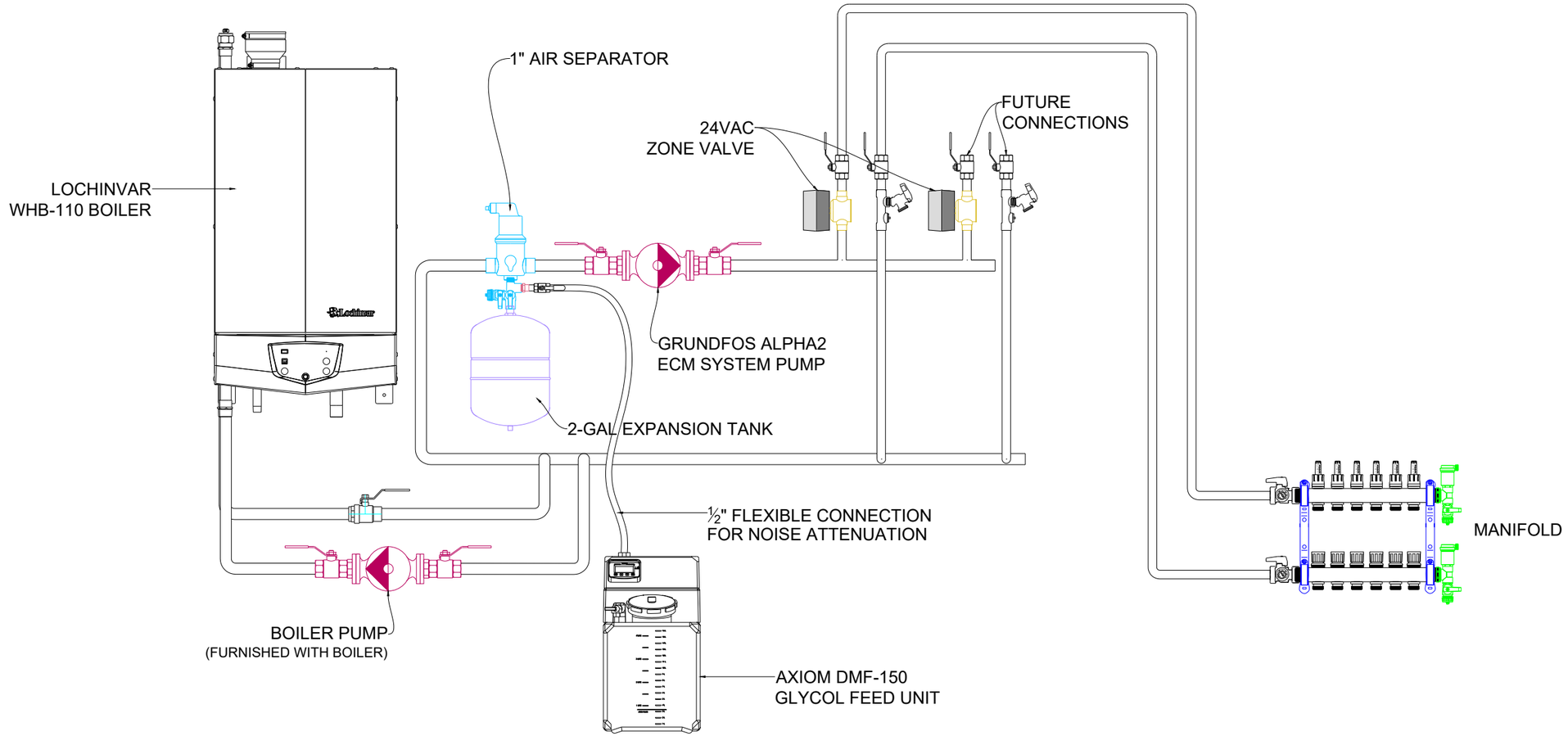
GEIS COMPANIES

10020 Aurora-Hudson Rd
Streetsboro, Ohio 44241
PH: (330) 528-3500
FX: (330) 528-0008
www.geisco.net

BAKERY EXPRESS
8000 DIXON DRIVE
BOONE COUNTY
FLORENCE, KENTUCKY

ENLARGED COOLER FREEZER MECH. PLAN

M-211



FAMOUS SUPPLY

General Notes

No.	Revision/Issue	Date

Firm Name and Address

Famous Supply
125 East 20th St.
Lorain, OH 44052

Project Name and Address

BAKERY
EXPRESS

Sheet Size: 11x17

Sheet: M

Date: 5/7/24

Scale: N.T.S.

FNAME

REVDATE

USER

Radiant Design Summary - Manifold View

Project #: 011224
Date: Jan 12, 2024
Prepared For: FAMOUS SUPPLY

Project Summary

Project #:	011224	**Total Flowrate:**	3.5 USGPM
Project Name:	BAKERY EXPRESS	**Maximum Head Loss:**	6.2 ft(H2O)
Project Location:	PERMAFROST FLORENCE, KY	**Total Loops:**	6
		Total Manifolds:	1
Design Data Location:		**Total Zones:**	1
	Cincinnati,	**Min. Tubing Required:**	1980 ft
Outdoor Temperature:	Ohio	**Total Load:**	33,048 Btu/hr
Wind Speed:	12 °F	**Total Radiant Load:**	29,150 Btu/hr
	19 mph	**Total Supplemental Load:**	0 Btu/hr
Total Area:			
Heated Area:	2,915 ft²		
Construction Quality:	2,915 ft²		
RFH Glycol Level:	Average		
Design Temp. Drop:	40% Glycol		
Radiant Tubing Volume:	20 °F		
Volume Water:	27.7 gallons(US)		
Volume Glycol:	16.6 gallons(US)		
	11.1 gallons(US)		

Units: Flowrate = USGPM; Head Loss = ft(H2O); Cover Rv = °F·ft²·hr/Btu; Length = ft; Area = ft²; Unit Heat = Btu/hr/ft²; Spacing = in; Temperature = °F

Radiant Design Summary - Manifold View

Project #: 011224
Date: Jan 12, 2024
Prepared For: FAMOUS SUPPLY

Radiant Design Data

Manifold 1

Water Temperature:	63.9 °F	**Flow Rate:**	3.5 USGPM
Zone Control:	Circulator	**Head Loss:**	4.9 ft(H2O)
Control Method:	None/Other	**Head Loss S/R:**	1.3 ft(H2O)
Total Loops:	6	**S/R Tube Length (One way):**	20 ft
		S/R Tube Type:	Copper 3/4"

Room	Zone #	Attach Method	Tube Type	Loop #	Area	Unit Heat	Tube Spacing	Leader Length	Loop Length	Flow Rate	Head Loss	Valve Turns	Cover Rv	Surface Temp.	Req. Water Temp.	Design Temp. Drop
FREEZER - Floor	1	Embedded	hePEX 5/8"	1	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20
FREEZER - Floor	1	Embedded	hePEX 5/8"	2	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20
FREEZER - Floor	1	Embedded	hePEX 5/8"	3	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20
FREEZER - Floor	1	Embedded	hePEX 5/8"	4	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20
FREEZER - Floor	1	Embedded	hePEX 5/8"	5	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20
FREEZER - Floor	1	Embedded	hePEX 5/8"	6	486	10.0	18	3	330	0.6	4.3	n/a	0.5	45	63.9	20

Units: Flowrate = USGPM; Head Loss = ft(H2O); Cover Rv = °F·ft²·hr/Btu; Length = ft; Area = ft²; Unit Heat = Btu/hr/ft²; Spacing = in; Temperature = °F