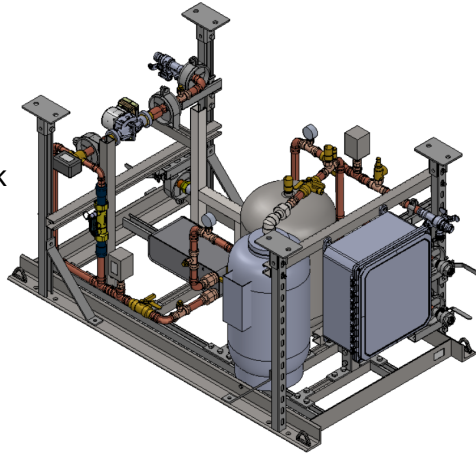


Job Name:

System Reference:

Date:

Pre-fabricated skid solution for QAHV pump/HX component group, including buffer tank and expansion tank with enhanced flow tracking controls and ultra low flow turn-down on potable side.



UNIT OPTION

☒ Standard Model

QAHVCONNECT-1

*NOTE - QAHV Outdoor Unit Sold Separately

WARNING: Sourcing of Items indicated in this submittal packet from other vendors or attempted as equal alternate manufacturers is not permitted and will NOT be warranted.

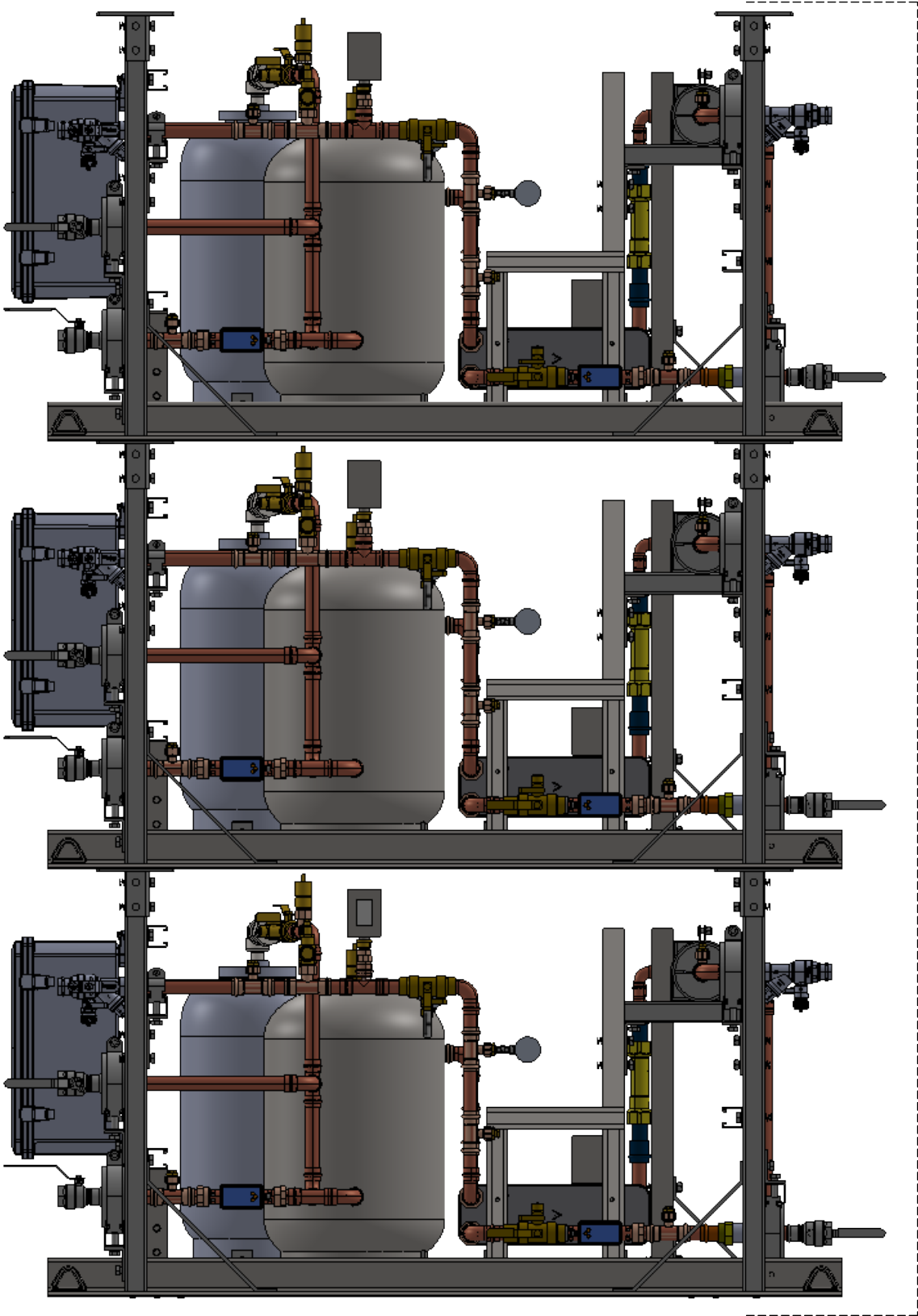
Note: For City Water Temperatures above 72F alternate design considerations are required. Consult with a Mitsubishi representative for further guidance.

Specification		System
Unit Type		QAHVCONNECT-1
Skid Dimensions	Inches	61-1/2" L x 36-7/8" W x 33-1/8" H
Net Weight, Dry Weight	Lbs	760
Construction		Angle Iron Base with Unistrut Cross Members and Stacking Legs
Maximum allowed piping distance from QAHV to Skid (one way) ⁴	Ft	175ft
Heat Exchanger Type (Primary to Potable)		316/316L Stainless Steel Plates, Copper Brazing, 2 Pass, Double Wall Vented, NSF 372
HX Pressure Drop (Rated Point, Secondary Potable Side)	Psig @ GPM	0.51 Psig @ 3.4 GPM
Electrical Power Requirements	Voltage, Phase, Hertz	120V, 1-Phase, 60Hz
Minimum Circuit Ampacity (MCA)	Amps	2.7 Amps
Integral Pump Type (Secondary Side)		Grundfos UPMXL, DC, Stainless Housing, NSF 372
Glycol Allowance (Primary Side - QAHV)	Max % / Type	30% / Polypropylene Only
Pump, Min/Max Flow (as applied) ¹	GPM	0.8 - 8.0
Pump Max Head (@ 8.0 gpm) ²	Ft	31 Ft
Secondary Side Skid External Estimated Head (@ 8.0 gpm) ³	Ft	15 Ft
Pump Max Power (Integrally Powered By Skid)	Watts	120
Buffer Tank Volume (Primary Side, ASME)	Gallons	10
Expansion Tank Volume (Primary Side, Removable Bladder Style)	Gallons	10
Secondary Flow (Potable Side) Flow Modulation		DC Pump Flow Tracking with Adj. Offset w/ 2 Position 3-Way Valve w/ Low Flow Balance
Flow Metering Type / Temp Rating	Type / °F	Ultrasonic / (-4...212 °F)

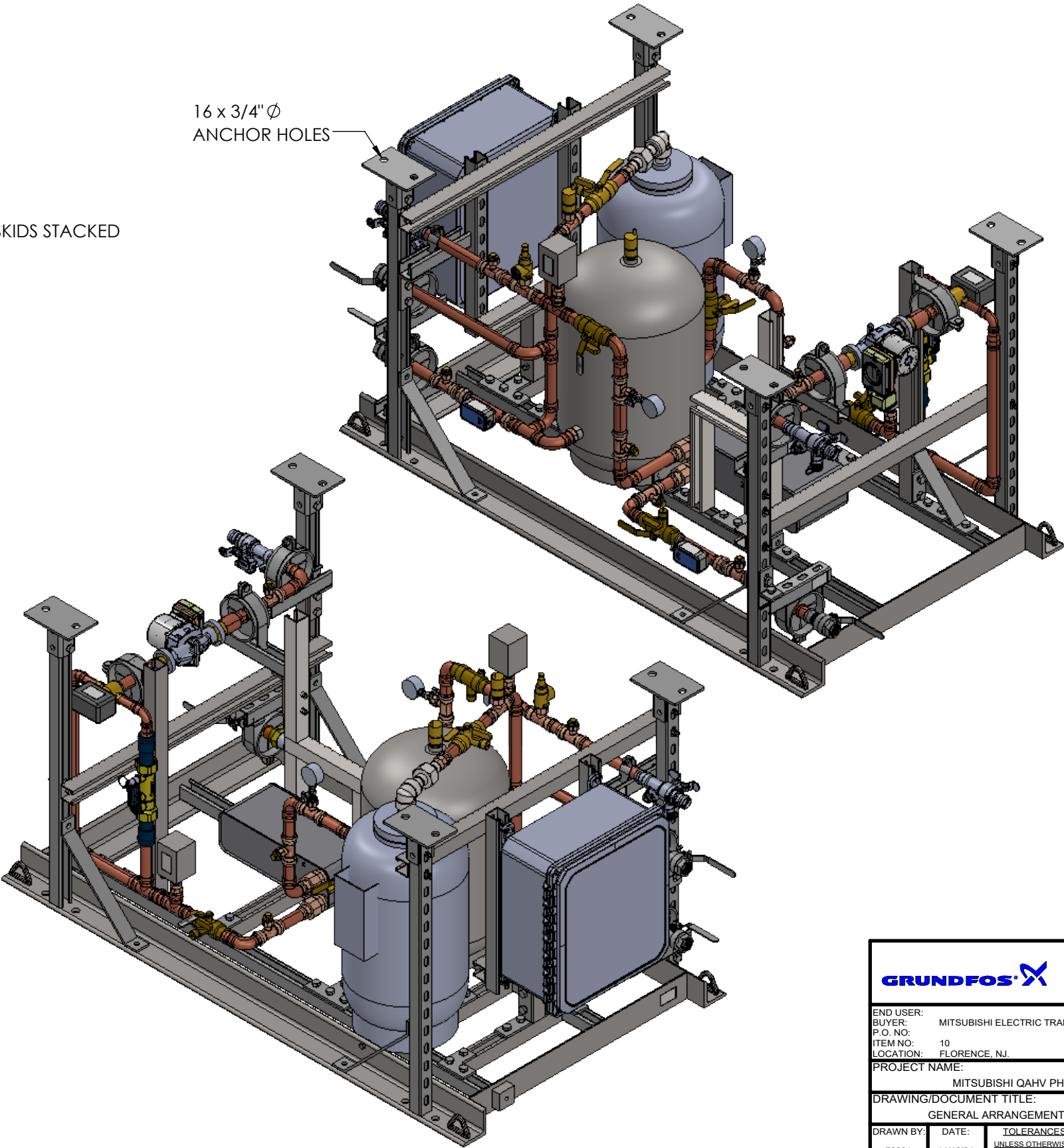
Specification Unit Type	System QAHVCONNECT-1
Insulation (piping and components)	Field Provided
Controls (Integral)	Pre-Programmed DDC w/ 2.8" Backlit-color LCD
Control Protocol - SKID to Tank Temp Panel, Supervisor Panel, and Adv. IO Panel	BACnet IP
Controls Protocol - SKID to QAHV	MODBUS RTU (RS-485)

Notes:

1. Pump flow will vary with storage tank recovery and ambient conditions - values represent min charge flow rates under cold ambient de-rated conditions up to maximum charge values near end of storage tank charge cycle.
2. Pump head is approximate and based on max tank charge flow per skid of 8 gpm. Flow will be lower during majority of most tank charge cycles. Analysis of external losses must be made by designer of record for potable side when applying skid to stay below max head capability of the pump.
3. Estimated skid external (potable side) head available after estimated pressure loss from all skid internal secondary side components (including strainer, check valves, ball valves, 3 way two position valve, HX, etc..)
4. QAHV max external pressure is 10psig - losses must be evaluated by engineer of record based on pipe size selected and actual pipe routing to ensure external loss between QAHV and skid does not exceed this limit, this must include losses for field installed air separators, piping specialties, strainers, and pressure drop of skid HX, including considerations of glycol effects if present on primary side.



MAX. 3 SKIDS STACKED

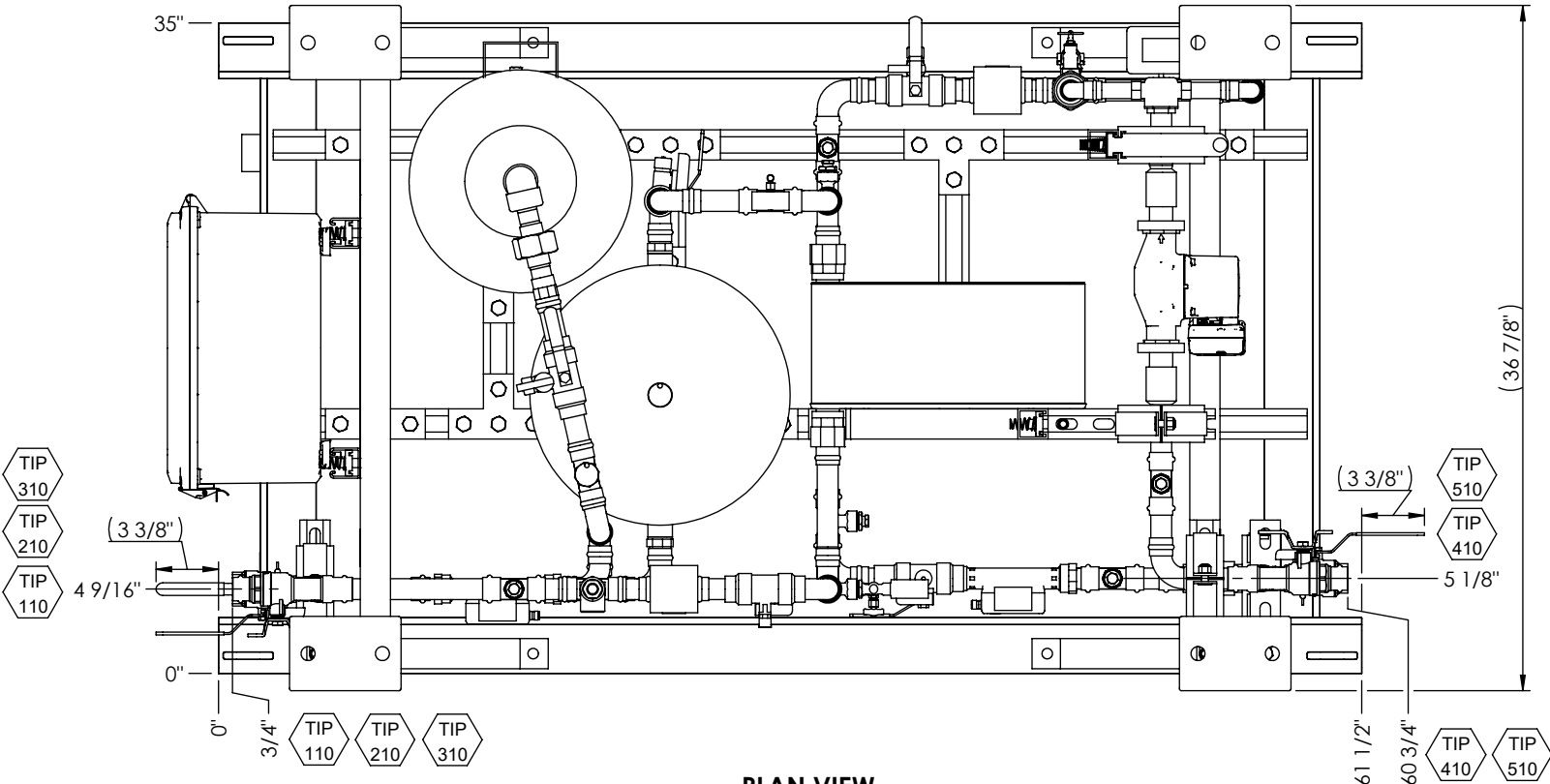


16 x 3/4" Ø
ANCHOR HOLES

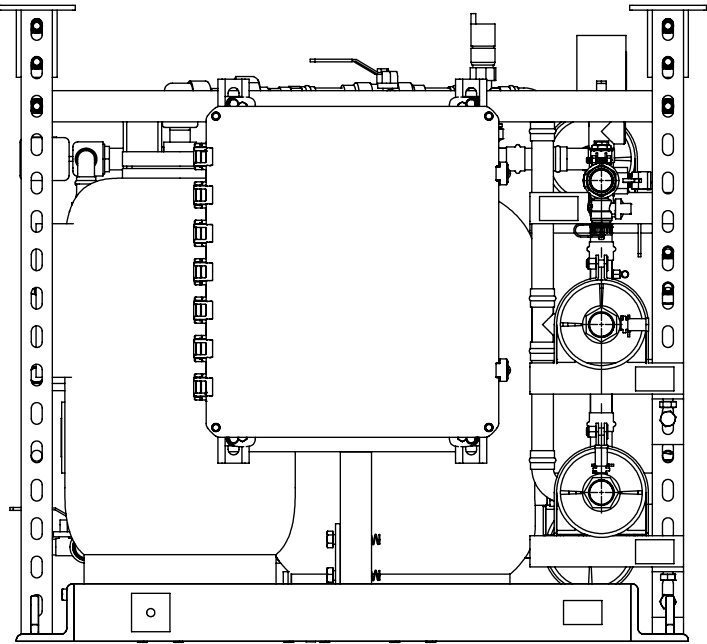
- GENERAL NOTES:
- 1. ALL DIMENSIONS ARE IN INCHES.
 - 2. PACKAGE SUPPORTS ARE DESIGNED TO SUPPORT GPS PIPING ONLY. SUITABLE BRACING MUST BE ADDED TO SUPPORT CUSTOMER PIPING.
 - 3. GROUNDING LUGS TO BE PROVIDED (FB 2" X 2" X 1" W/ 1/2" HOLE).
 - 4. SOME ITEMS NOT SHOWN FOR CLARITY.
 - 5. SKID TO BE ANCHORED USING ANCHORS PROVIDED AND INSTALLED AT SITE (BY OTHERS).
 - 6. COMPONENTS SUBJECT TO CHANGE BASED ON AVAILABILITY AT TIME OF ORDER.
 - 7. ESTIMATED TOTAL DRY WEIGHT IS APPROX. 760LB.

02	105007		7/24/2025	REVISED PER METUS NOTES FOR SKIDS 3-11
01	79991		4/25/2025	REVISED PER COMMENTS
00	79991		03/03/25	RELEASED FOR FABRICATION
REV	BY	APR	DATE	DESCRIPTION
REVISION HISTORY				

GRUNDFOS		ISO 9001 Certified	
902 Koomey Road Brookshire, TX 77423 Ph: 281-994-2700			
END USER: MITSUBISHI ELECTRIC TRANE HVAC			
BUYER: MITSUBISHI ELECTRIC TRANE HVAC			
P.O. NO: 10			
ITEM NO: 10			
LOCATION: FLORENCE, NJ.			
PROJECT NAME: MITSUBISHI QAHV PHASE II			
DRAWING/DOCUMENT TITLE: GENERAL ARRANGEMENT DRAWING			
DRAWN BY: 79991	DATE: 11/12/24	TOLERANCES UNLESS OTHERWISE NOTED FRACTIONAL +/- 1/4"	PROPRIETARY DATA
APPROVED:	DATE:		
SHEET NO: 1 OF 2	SCALE: NTS	This drawing is the property of Grundfos, and is not to be reproduced or employed for any manufacturing purposes except upon the explicit instruction of Grundfos.	
PROJECT NUMBER: 93282943-200			
DRAWING NUMBER: 93282943-200			REV. 02

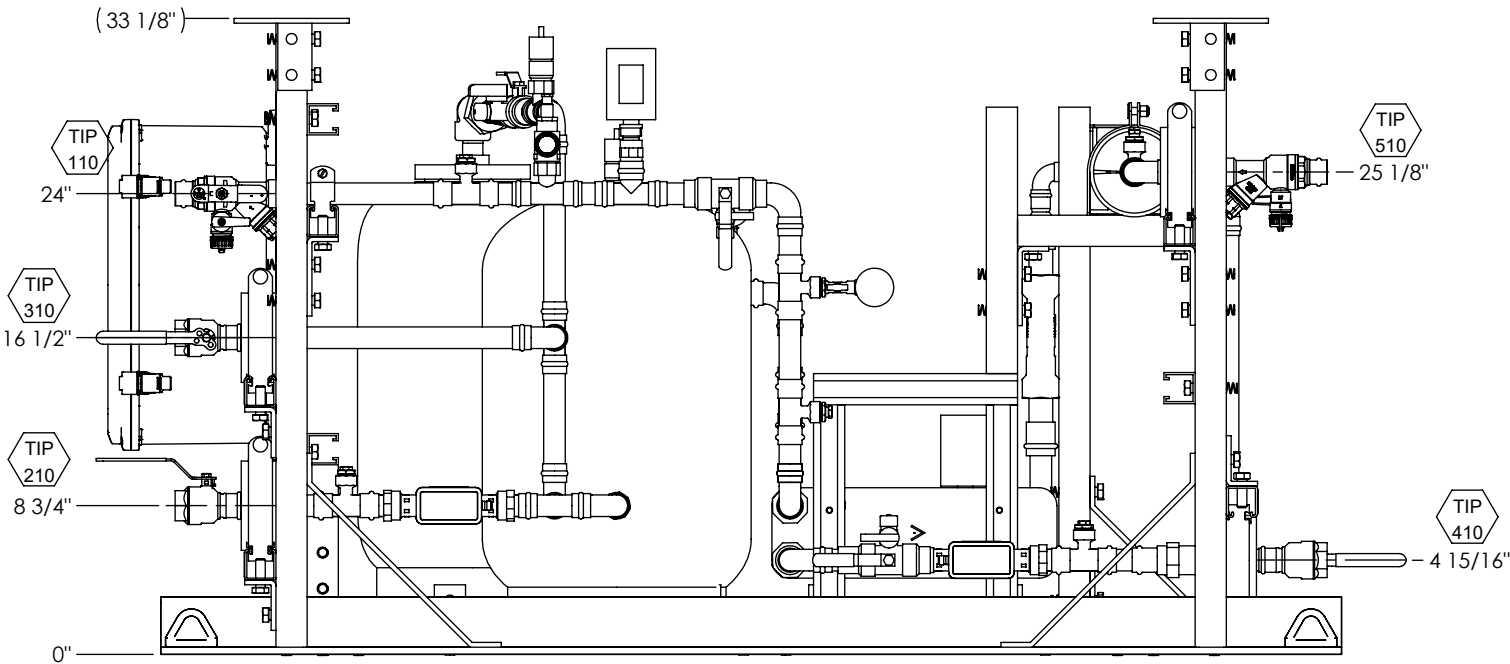


PLAN VIEW

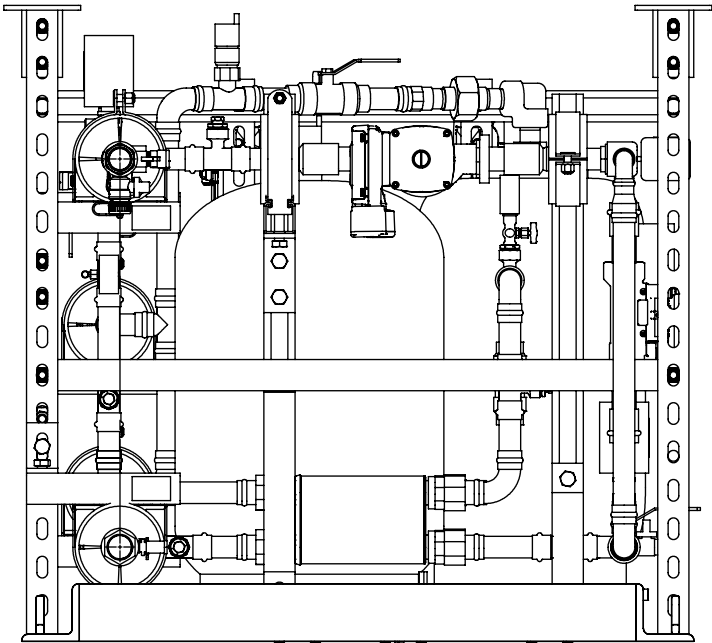


LEFT SIDE VIEW

CUST NO	GES NO.	SIZE	MATERIAL	TYPE	DESCRIPTION
	110	1"	BRASS	PRESS	FROM HEAT PUMP
	210	1"	BRONZE	FNPT	TO HEAT PUMP
	310	1"	BRONZE	FNPT	FILL WATER LINE
	410	1"	BRONZE	FNPT	TO STORAGE TANKS
	510	1"	BRASS	PRESS	FROM STORAGE TANKS



FRONT VIEW

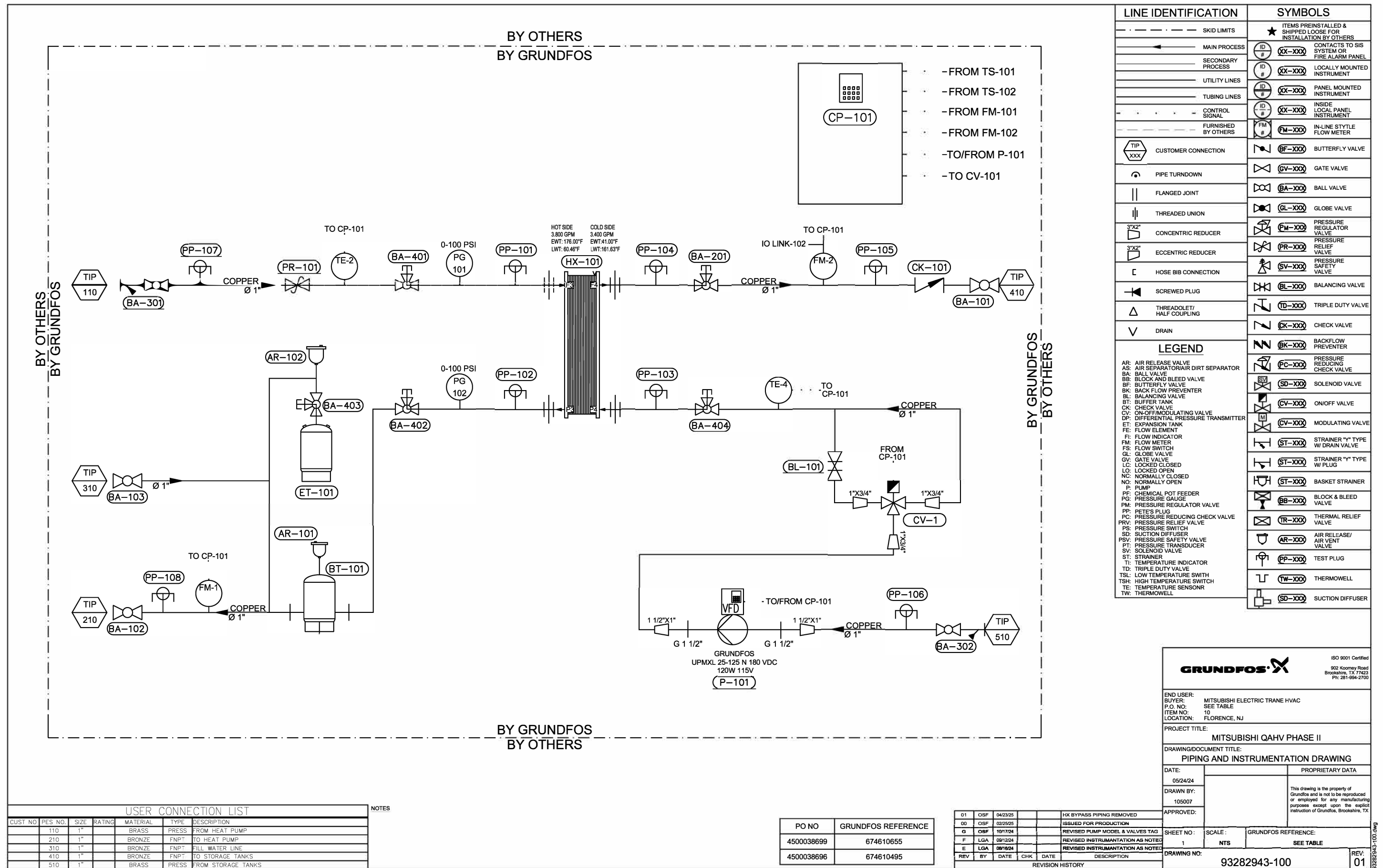


RIGHT SIDE VIEW

CUSTOMER INCOMING POWER		
VOLT	PHASE	Hz
115	1	60

GRUNDFOS		ISO 9001 Certified	
902 Koorney Road Brookshire, TX 77423 Ph: 281-994-2700			
END USER: MITSUBISHI ELECTRIC TRANE HVAC			
BUYER: MITSUBISHI ELECTRIC TRANE HVAC			
P.O. NO: 10			
ITEM NO: 10			
LOCATION: FLORENCE, NJ.			
PROJECT NAME: MITSUBISHI QAHV PHASE II			
DRAWING/DOCUMENT TITLE: GENERAL ARRANGEMENT DRAWING			
DRAWN BY: 79991	DATE: 11/12/24	TOLERANCES UNLESS OTHERWISE NOTED FRACTIONAL +/- 1/4"	PROPRIETARY DATA This drawing is the property of Grundfos, and is not to be reproduced or employed for any manufacturing purposes except upon the explicit instruction of Grundfos.
APPROVED:	DATE:		
SHEET NO: 2 OF 2	SCALE: NTS		
PROJECT NUMBER:			
DRAWING NUMBER: 93282943-200			REV. 02

93282943-200



Overview

The skid control panel operates the necessary field devices to implement a QAHV heat pump module for domestic hot water supply applications. Each QAHV module is integrated with a dedicated intermediate skid, which commands the water heating and circulation processes. The intermediate skid is equipped with a double-walled plate type heat exchanger for efficient heat transfer between primary and secondary loops. It includes temperature and flow sensors for both inlet and outlet conditions, ensuring optimal monitoring and performance. The skid features a circulator pump and flow control valve for the secondary loop, facilitating water circulation through the heat exchanger and into the storage tanks.

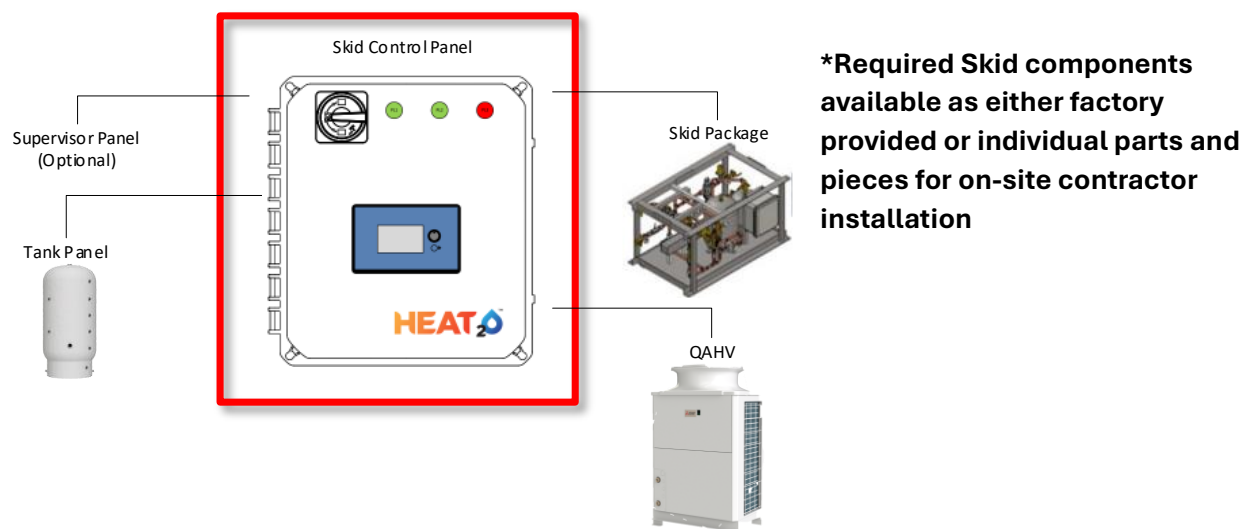
The system is designed to segment the water heating circuit into primary and secondary loops, with the QAHV module serving as the heating source for the primary loop. Primary loop control is maintained by the QAHV's internal controls, activated by a signal from the intermediate skid control panel. Communication with the QAHV module is achieved via Modbus, using the Procon A1M adapter connected to the module's CN105 port. Control of the secondary loop's flow and

temperature is handled by a programmable DDC controller, CDIY-303-QAHV-SKID, to ensure optimal temperature regulation and thermal storage.

Up to six storage tanks are included in the system, functioning as thermal energy storage, much like a rechargeable battery. Temperature monitoring for the tanks is conducted by up to six immersion-type temperature sensors, which report to the tank temperature control panel. This panel communicates with both the tank controller and supervisory control panels over an IP-based local area network, ensuring seamless integration and control of the entire system.

Features

- 1-to-1 QAHV module control
- Decoupled primary heating and secondary storage
- Automatic minimum and maximum water storage temperature control and efficient flow regulation
- Mobile application startup and commissioning
- Panel status and alarm indicators



	Part Name	Part #	Qty	Description
Skid	Panel	QAHV-ISC	1	Intermediate Skid Panel for QAHV
*Included	*Controller	CDIY-303-QAHV-SKID	1	Intermediate Skid Controller for QAHV
	*Procon	PAC-UKPRC001-CN-1	1	QAHV-Modbus communication interface

Power Supply Input:

AC Power Supply:

Rated Voltage: 120VAC (50/60 Hz)

Nominal Current: 9 A

DC Power Supply

Input Voltage: 100VAC-240VAC

Nominal Output Voltage: 24VDC

Output Current: 3.8 A

CDIY-303-QAHV-SKID Power Specifications:

Voltage Range: 24VAC/DC; $\pm 15\%$;
Class 2

Nominal Power Consumption: 18VA;
all external loads excluded, no USB
peripherals

Full Load Power Consumption: 36VA;
external 24VAC loads excluded

Frequency Range: 50 to 60Hz

Overcurrent Protection: Field
replaceable fuse

Fuse Type: 2A, fast-acting, 5x20mm

Communications:

Ethernet Connection Speed: 10/100 Mbps

Cable Type: Cat 5e, 8 conductor twisted pair
(unshielded)

Addressing: IPv4 or Hostname

BACnet Profile: BACnet Building Controller
(BBC) BACnet Listing BTL (B-BC)

BACnet Interconnectivity: BBMD forwarding
capabilities BACnet/SC routing

BACnet Transport Layer: IP, BACnet/SC
(Node)

Web Server Protocol: HTML5

Web Server Application Interface: REST API

Wireless Adapter: Optional, USB Port
Connection

Wi-Fi Communication Protocol: IEEE
802.11b/g/n

Wi-Fi Network Types: Access Point

Mechanical:

External Dimensions: 13.64 x 11.64 x 6.58 in

UV Resistant: Yes

Weight: 20 lbs

Environmental:

Operating Temperature: 32 to 104°F (0 to
40°C)

Storage Temperature: -22 to 149°F (-30 to
65°C),

Relative Humidity: 0 to 90% non-condensing

Ingress Protection Rating: IP54

Standards and Regulations

UL916 Energy management equipment

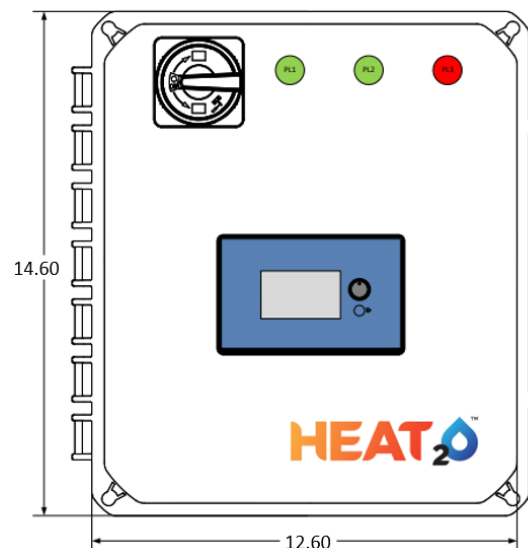
FCC Title 47 Part 15 Subpart B:2018 Class A

Compliance with FCC rules part 15, subpart
B, class B

Enclosure UL: E352997

Flame Rating: UL94 5VA

Dimensions (inches)



Equipment Data Sheets

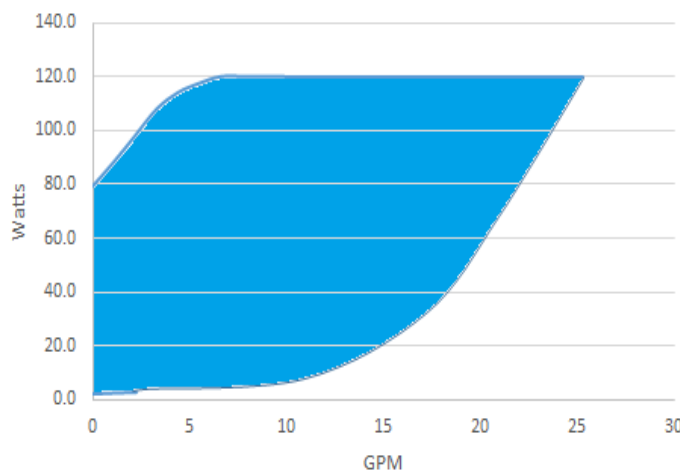
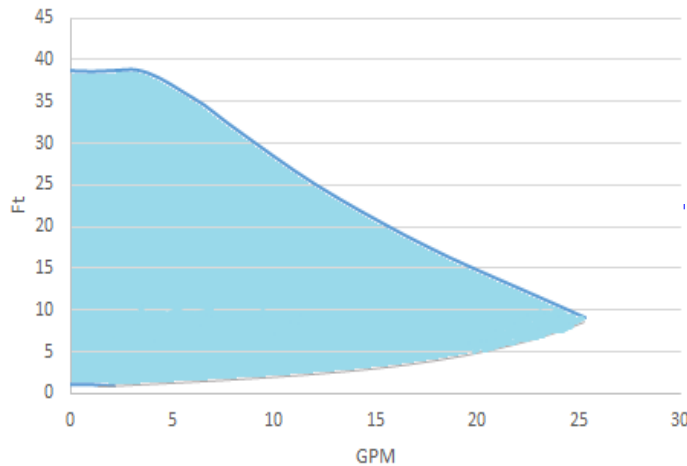


The UPM Family

The UPM pump family are speed-controlled, high-efficiency circulators with electronically commutated motor (ECM) with permanent-magnet rotor and frequency converter. The UPM family includes the UPMML / UPML / UPMXL with a power range from 70W to 180W. Available control options include PWM, 0-10VDC and AUTO.

~~UPMXL 25-124 165F VDC 120W 115V~~

25-125 N 180 VDC US 115V MSB



Flow range:	0-25 gpm
Head range:	0-39 feet
Max. liquid temp:	203°F (95°C)
Min. liquid temp:	14°F (-10°C)
Max. system pressure:	150 psi
Max. ambient temp:	131°F (55°C)
Supply voltage:	1x115V +/- 10%
	50/60Hz
Max. power:	120W
Min. power:	3W
Max. current:	1.7A
Min. current:	0.05A
Energy efficiency index:	0.23
Motor protection:	Electrical
ECM Motor	Permanent Magnet
Enclosure:	Indoor use only
	IP X2D

Agency approval:



Model:

GFJOD

Control signal:

0-10V

Internal check valve:

Included

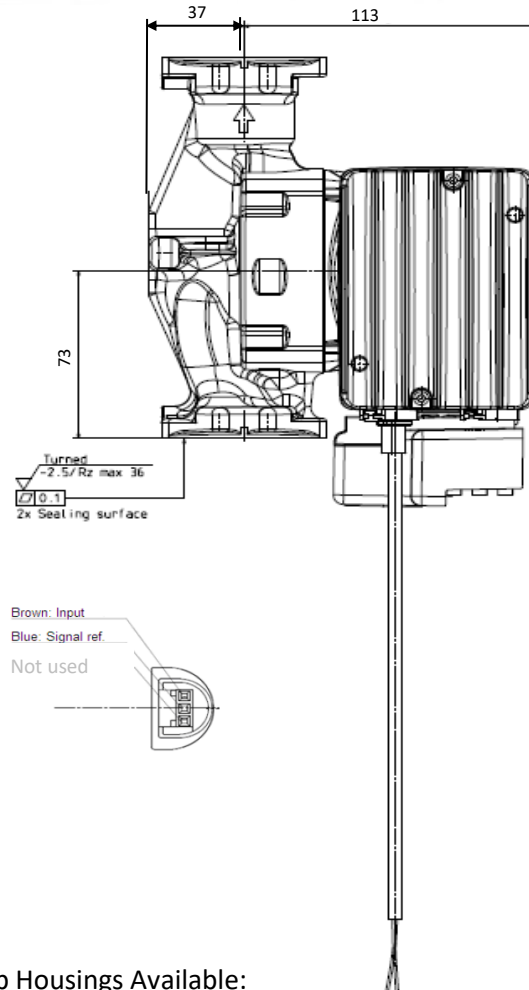
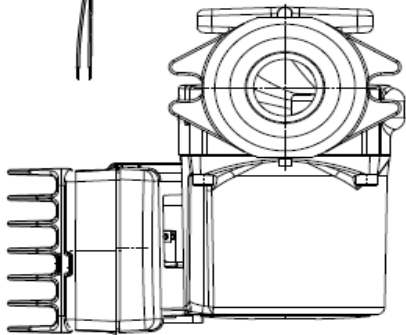
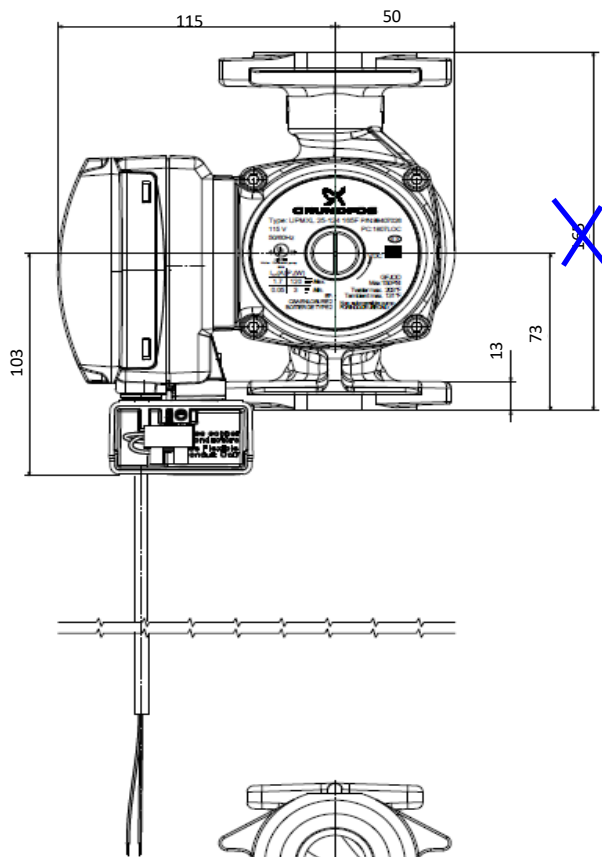
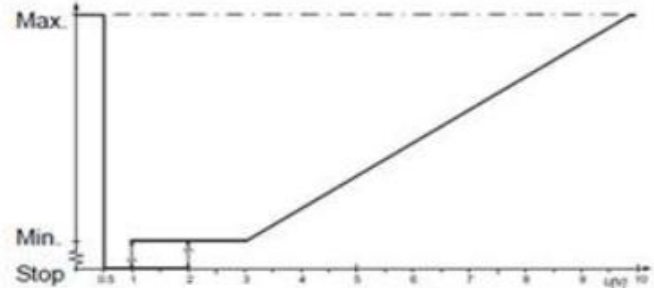
BE > THINK > INNOVATE >



UPMXL ~~25-125 N 180 VDC US 115V MSB~~

Control signal vs. rotor speed

U[V]	Pump status
$U \leq 0.5$	Max speed
$0.5 < U \leq 1$	Stand by (STOP)
$1 < U \leq 2$	Hysteresis
$2 < U \leq 3$	Min speed
$3 < U \leq 10$	Speed between Min & Max



Other Pump Housings Available:
 1-1/2" x 130 Union Cast Iron
 1-1/2" x 180 Union Cast Iron
 2" x 180 Union Cast Iron
 1-1/2" x 180 Union Stainless Steel

BE > THINK > INNOVATE >

Engineering Specifications

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____

Series FV-4M1 Automatic Air Vent Valves

Sizes: 1/8" – 1"

Series FV-4M1 Automatic Air Vent Valves provide automatic air venting for hot or cold water distribution systems. These vents purge air that may be in the water system.

The vent valve utilizes a float to actuate the valve plug which is located at the top of the valve. Once the air is displaced and the system pressure is sustained, the valve plug seals and prevents any water from escaping from the system.

The float vent can also operate as an anti-vacuum device since it will permit air to enter the system when it must be drained. It can also be installed to permit the separation and dispersal of air while fluid is actually circulating in the system.

Features

- Body and cover are brass construction
- Air vent with silicone rubber seal
- Impurities do not usually affect function as maximum float line of water is always lower than the valve seal
- Float is high temperature resistant polyethylene
- Suitable for use with glycol systems
- Can be disassembled for inspection and cleaning

Pressure – Temperature

Minimum working pressure: 1.45psi (10 kPa)

Maximum working pressure: 150psi (10 bar)

Temperature Range: 33°F – 240°F (5°C – 116°C)

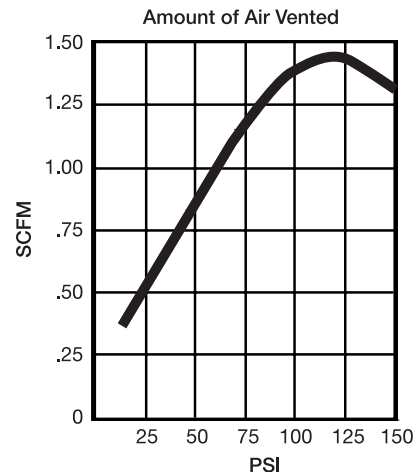
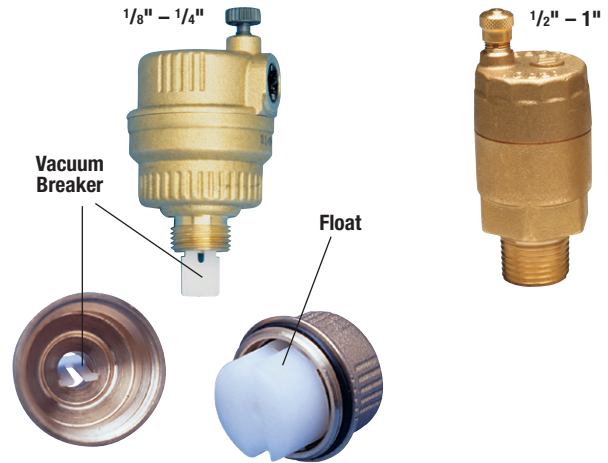
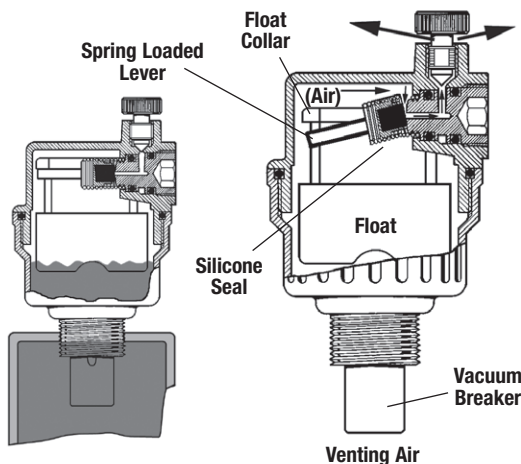


Diagram above shows the quantity of air vented by the "Float Vent" according to the pressure in the system.

Specifications

Air vent shall have brass body & cover and silicone rubber seal. Float shall be constructed of high temperature resistant polyethylene and shall be for use with glycol systems. Air vent shall be Watts Series FV-4M1.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

Installation

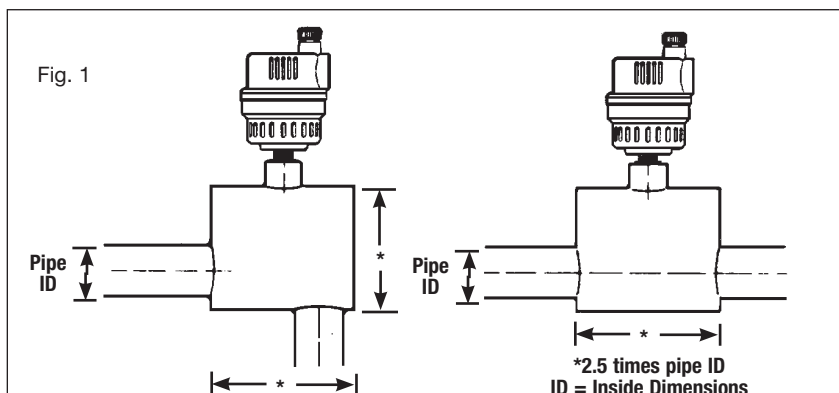


Figure 1 shows the installation of the FV-4M1 for the venting of air while the fluid is circulating in the system. The figure shows the required increase in pipe size in order to obtain proper separation of air from water. Watts Series AS Air Scoop which is designed for efficient separation of air from water in hydronic heating systems can also be installed. See Watts literature S-AS.

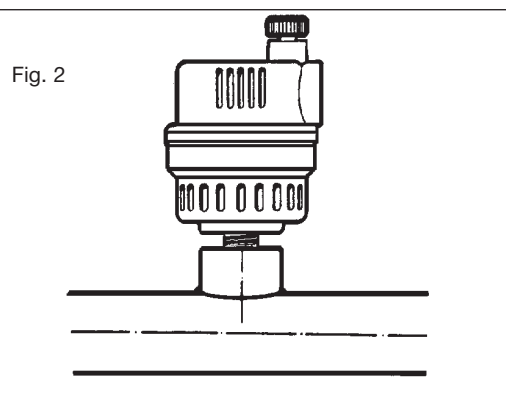


Figure 2 When the FV-4M1 is installed as shown, the air will not be vented while the fluid is circulating in the system, but it can vent when the system is shut off.

The FV-4M1 should be mounted only in a vertical position as its operation is based on the vertical movement of the float (see Fig. 3).

Note: In order to get the best results in venting air from risers, use connecting pipes of at least 1/2" diameter between the "Float Vent" valves and the installation.

Fig. 3

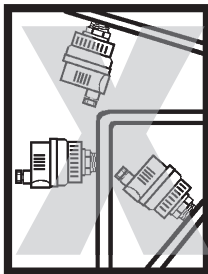
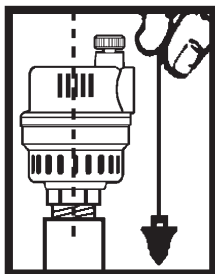
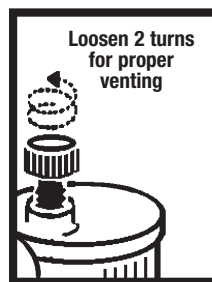


Fig. 4



Maintenance

Corrosive water conditions, and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal components helps assure maximum life and proper function. When the FV-4M1 is disassembled for inspection or cleaning, it is important that when re-assembling to ensure that the spring loaded lever properly engages under the float collar (see reverse side).

Operation: IMPORTANT!

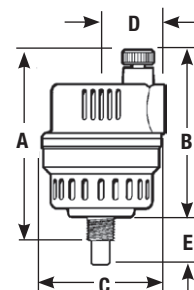
After installing the FV-4M1, back off the small vent cap two turns (see Fig. 4). This is the proper operating setting which will allow air to be vented from the system. It is advisable to leave the cap on to prevent impurities from entering the valve.

Dimensions – Weights

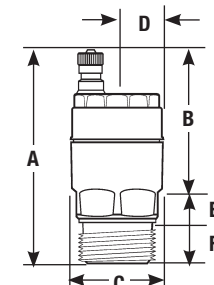
SIZE		DIMENSIONS										WEIGHT	
		A	B	C	D	E	F						
in.	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	
1/8	2 15/16	75	2 5/8	67	1 5/8	41	1 3/16	21	5/16	7.9	.40	.18	
1/4	3 1/8	79	2 5/8	67	1 5/8	41	1 3/16	21	1/8	3.1	.43	.20	
1/2	3 5/16	85	2 11/16	69	1 1/4	32	1 1/16	18	5/8	16	.44	.20	
3/4	3 3/8	85	2 11/16	69	1 1/4	32	1 1/16	18	5/8	16	.45	.20	
1	3 1/2	89	2 11/16	69	1 3/8	35	1 1/16	18	3/4	19.0	.47	.21	



1/8" – 1/4"



1/2" – 1"



On/Off Valve for Drinking Water

1 NPT Female x 1-1/8" Press Connect Female, Lockable



2853N19

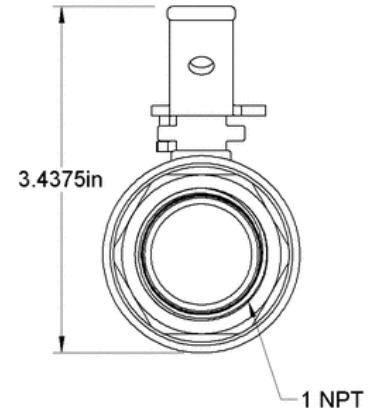
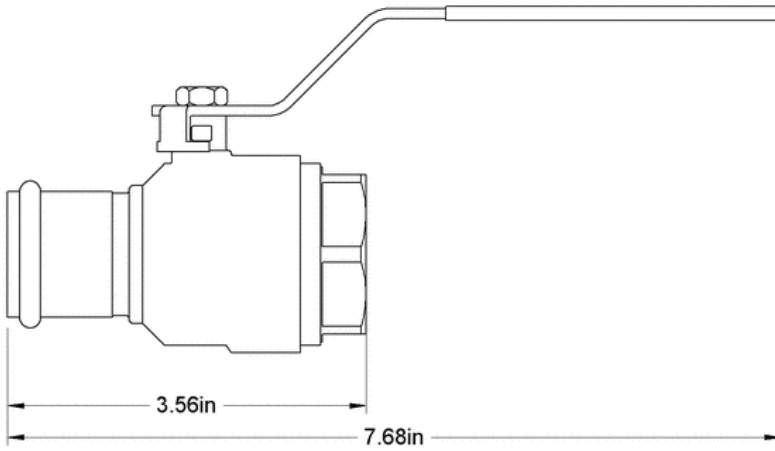
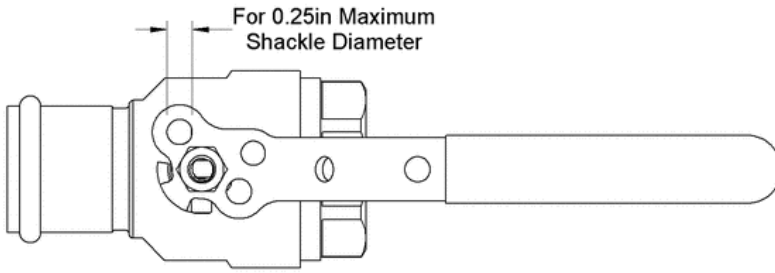
Valve Function	On/Off
Valve Type	Ball
Activation	Manual
Valve Operation	Handle
Handle Style	Lever
Handle Type	Lockable
Fitting Type	Adapter
Connection Type	Pipe x Tube
Connection Style	Threaded x Press Connect
Gender	Female
Pipe Connection Type	Threaded
Thread Type	NPT
Pipe Size	1
Copper Tube Size	1
For Tube OD	1 1/8"
For Copper Tube Type	K, M, L
Flow Coefficient (Cv)	Not Rated
Maximum Pressure	200 psi @ 250° F
Maximum Steam Pressure	200 psi @ 250° F
Temperature Range	0° to 250° F
Vacuum Rating	29.2 in. of Hg
Body Material	Bronze
Ball Material	316 Stainless Steel
Seal Material	EPDM Rubber
Seat Material	PTFE Plastic
Port Type	Full
Shape	Straight
End-to-End Length	3 9/16"
For Maximum Shackle Diameter	1/4"
Overall Height	3 7/16"
Overall Length	7 11/16"
Specifications Met	NSF/ANSI 61
Chemical Resistance (Excellent)	Acetone, Air, Argon, Deionized Water, Drinking Water, Ethanol, Isopropyl Alcohol, Methanol,

	Methyl Ethyl Ketone, Oxygen, Phosphoric Acid (25% Concentration), Steam
For Use With	Water, Air, Argon, Steam, Drinking Water
Warning Message	Chemical compatibility must be determined by the customer based on the conditions in which the product is being used, including the presence of other chemicals, temperature, and consistency.
RoHS	RoHS 3 (2015/863/EU) Compliant
REACH	REACH (EC 1907/2006) (06/14/2023, 235 SVHC) Compliant
DFARS	Specialty Metals COTS-Exempt
Country of Origin	Germany
Schedule B	848180.5090
ECCN	EAR99

For a leak-tight connection that doesn't require heat or soldering, these valves have press-connect fittings that crimp to metal tubing with a [press-connect crimping tool](#) (sold separately). They meet NSF/ANSI Standard 61 for use with drinking water. All are full port, so they do not restrict flow.

Valves with a lockable handle can be fixed in place using a padlock (not included).

Copper tube size is the accepted designation of the copper tubing industry, not the actual tube OD.



Copper Tube Size: 1
 For Tube OD: 1.125in
 For Copper Tube Type: K, M, L

McMASTER-CARR 
<http://www.mcmaster.com>
 © 2024 McMaster-Carr Supply Company
Information in this drawing is provided for reference only.

PART
 NUMBER **2853N19**
 On/Off Valve for
 Drinking Water

The information in this 3-D model is provided for reference only.

H-x043W Series

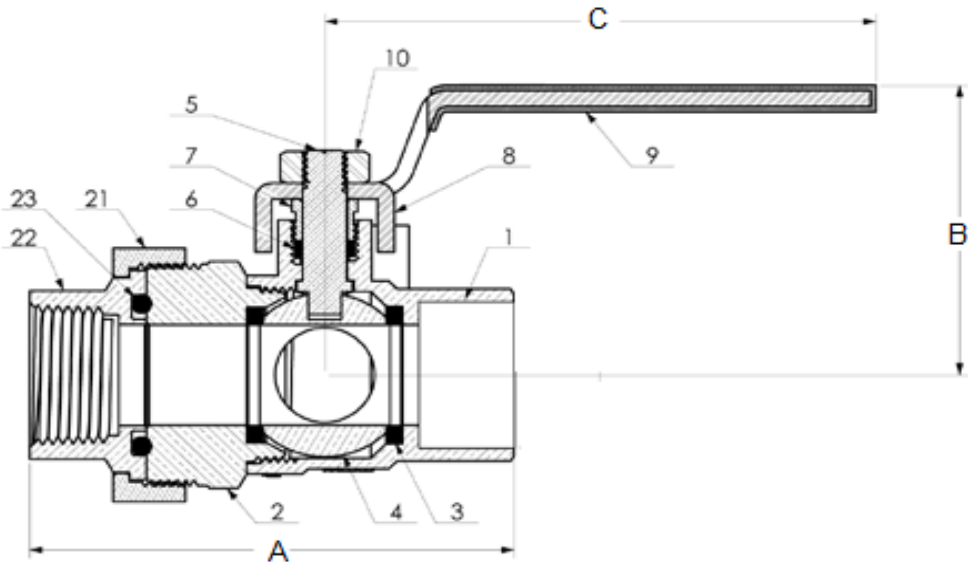
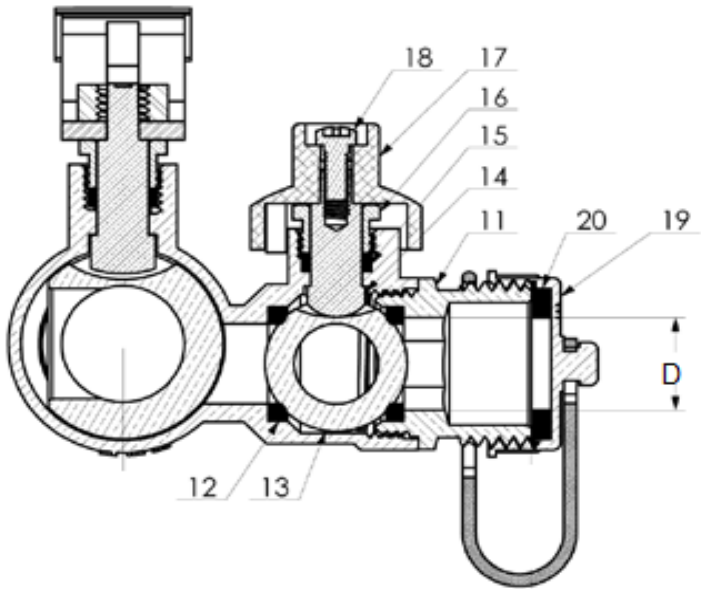
Pro-Pal Union Ball Drain
Full Port Forged Brass Ball Valve
w/ Single Union End,
Hi-Flow Hose Drain,
Reversible Handle
& Adjustable Packing Glands

Certifications

Certified to NSF/ANSI 61 & 372
Lead-Free



NO.	DESCRIPTION	MATERIAL
1	BODY	Lead Free DZR Brass
2	CAP	Lead Free DZR Brass
3	SEAT	PTFE
4	BALL	BRASS HCP
5	STEM	BRASS
6	PACKING	PTFE
7	PACKING GLAND	BRASS
8	HANDLE	STEEL CP
9	HANDLE JACKET	VINYL
10	HANDLE NUT	STAINLESS STEEL
11	CAP	BRASS
12	SEAT	PTFE
13	BALL	BRASS HCP
14	STEM	BRASS
15	PACKING	PTFE
16	PACKING GLAND	BRASS
17	HANDLE	ALUMINUM
18	HANDLE SCREW	BRASS
19	CAP & STRAP	BRASS w/ PVC STRAP
20	GASKET	EPDM
21	UNION NUT	BRASS
22	UNION FITTING	Lead Free DZR Brass
23	O-Ring	EPDM



Designed for residential, commercial or industrial use. This approved Webstone valve is actuated by a blowout proof stem. Threaded ends comply with ANSI B1.20.1*Certified to NSF/ANSI 14.

ITEM#	Connection Type	SIZE (in)	Pressure Rating	Max Temp	A	B	C	D
* H-10432W	FIP Union x ASTM F1807 PEX	1/2	250 PSI CWP Max	200°F Max	3.43	2.50	3.50	0.50
* H-10433W	FIP Union x ASTM F1807 PEX	3/4	250 PSI CWP Max	200°F Max	3.63	2.50	3.50	0.50
* H-10434W	FIP Union x ASTM F1807 PEX	1	250 PSI CWP Max	200°F Max	4.22	2.75	4.63	0.50
* H-10435W	FIP Union x ASTM F1807 PEX	1 1/4	250 PSI CWP Max	200°F Max	4.62	3.00	4.50	0.75
* H-10436W	FIP Union x ASTM F1807 PEX	1 1/2	250 PSI CWP Max	200°F Max	5.65	3.63	5.63	0.75
* H-10437W	FIP Union x ASTM F1807 PEX	2	250 PSI CWP Max	200°F Max	6.39	4.00	5.63	0.75
* H-30432W	FIP Union x ASTM F1960 PEX	1/2	250 PSI CWP Max	200°F Max	3.46	2.50	3.50	0.50
* H-30433W	FIP Union x ASTM F1960 PEX	3/4	250 PSI CWP Max	200°F Max	3.88	2.50	3.50	0.50
* H-30434W	FIP Union x ASTM F1960 PEX	1	250 PSI CWP Max	200°F Max	4.57	2.75	4.63	0.50
* H-30435W	FIP Union x ASTM F1960 PEX	1 1/4	250 PSI CWP Max	200°F Max	5.10	3.00	4.50	0.75
* H-30436W	FIP Union x ASTM F1960 PEX	1 1/2	250 PSI CWP Max	200°F Max	6.19	3.63	5.63	0.75
* H-30437W	FIP Union x ASTM F1960 PEX	2	250 PSI CWP Max	200°F Max	6.94	4.00	5.63	0.75
H-40433W	FIP Union x FIP	3/4	600 PSI CWP Max	350°F Max	3.25	2.06	4.00	0.50
H-40434W	FIP Union x FIP	1	600 PSI CWP Max	350°F Max	4.00	2.63	4.06	0.50
H-40435W	FIP Union x FIP	1 1/4	600 PSI CWP Max	350°F Max	4.31	3.00	4.31	0.75
H-40436W	FIP Union x FIP	1 1/2	600 PSI CWP Max	350°F Max	5.19	3.50	5.19	0.75
H-50433W	FIP Union x SWT	3/4	600 PSI CWP Max	250°F Max	3.50	2.00	3.63	0.50
H-50434W	FIP Union x SWT	1	600 PSI CWP Max	250°F Max	4.19	2.63	4.19	0.50
H-50435W	FIP Union x SWT	1 1/4	600 PSI CWP Max	250°F Max	4.50	3.00	4.50	0.75
H-50436W	FIP Union x SWT	1 1/2	600 PSI CWP Max	250°F Max	5.38	3.50	5.50	0.75
H-80433W	FIP Union x Press	3/4	250 PSI CWP Max	250°F Max	4.32	2.63	3.50	0.50
H-80434W	FIP Union x Press	1	250 PSI CWP Max	250°F Max	4.80	2.63	4.65	0.50
H-80435W	FIP Union x Press	1 1/4	250 PSI CWP Max	250°F Max	5.20	2.63	4.65	0.75
H-80436W	FIP Union x Press	1 1/2	250 PSI CWP Max	250°F Max	6.20	3.30	5.50	0.75



H-x156W Series

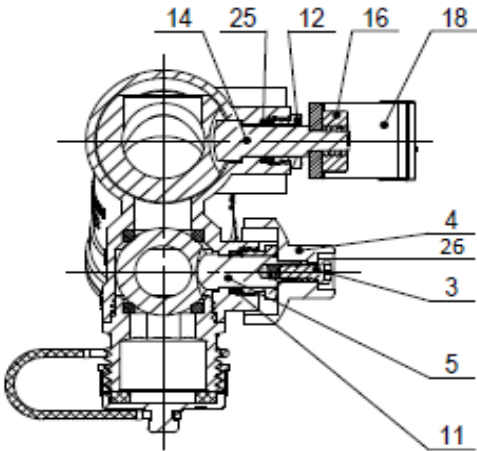
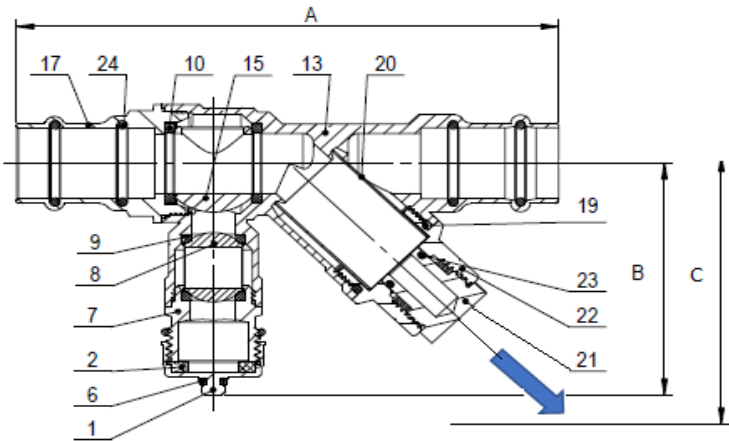
Pro-Pal Ball Drain Strainer
Full Port Forged DZR Brass Ball Valve
w/ Hi-Flow Multi-Function Hose Drain,
Integral Y-Strainer (20 Mesh),
1/2" Plugged NPT Port
& Adjustable Packing Glands

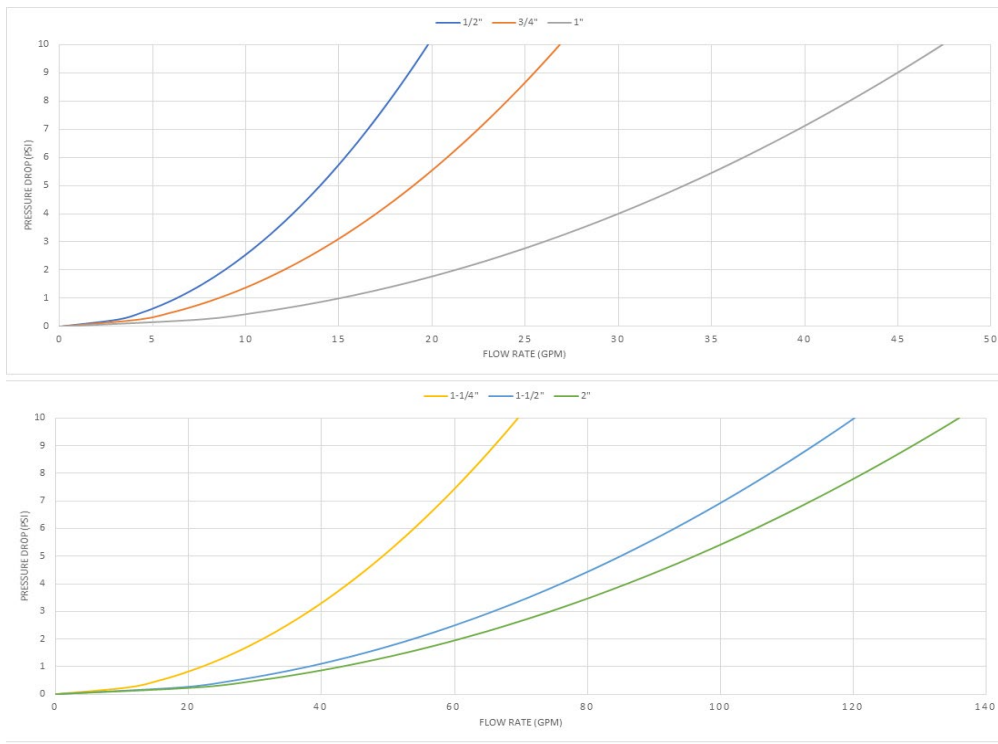
Certifications

Certified to NSF/ANSI 61 & 372
Lead-Free



NO.	DESCRIPTION	MATERIAL
1	Cap	Brass
2	Gasket	EPDM
3	Screw	Stainless Steel
4	Handle	Aluminum
5	Stem	Brass
6	Strap	PVC
7	Cap	Brass
8	Ball	Brass HCP
9	Seat	PTFE
10	Seat	PTFE
11	Packing	PTFE
12	Packing Gland	Brass
13	Body	Lead-Free DZR Brass
14	Stem	Brass
15	Ball	Brass HCP
16	Handle Nut	Stainless Steel
17	Cap	Lead-Free DZR Brass
18	Handle	Steel CP
19	O Ring	EPDM
20	strainer	Stainless Steel
21	1/2"NPT Plug	Lead-Free DZR Brass
22	Cap	Lead-Free DZR Brass
23	O Ring	EPDM
24	O Ring	EPDM
25	Packing	PTFE
26	Packing Gland	Brass





Designed for residential or light commercial use with water, oil, or glycol mix. It is actuated by a blowout proof stem and features an adjustable packing gland. Threaded ends comply with ANSI B1.20.1.

ITEM#	Connection Type	SIZE (in)	Max Temp	Pressure Rating	A	B	C
H-41562W	FIP	1/2	200°F Max	250 PSI CWP Max	3.58	3.00	3.25
H-41563W	FIP	3/4	200°F Max	250 PSI CWP Max	4.30	3.00	3.75
H-41564W	FIP	1	200°F Max	250 PSI CWP Max	4.72	3.00	4.00
H-41565W	FIP	1 1/4	200°F Max	250 PSI CWP Max	5.75	3.50	4.50
H-81562W	Press	1/2	200°F Max	250 PSI CWP Max	5.09	3.00	3.25
H-81563W	Press	3/4	200°F Max	250 PSI CWP Max	6.18	3.00	3.75
H-81564W	Press	1	200°F Max	250 PSI CWP Max	6.46	3.00	4.00
H-81565W	Press	1 1/4	200°F Max	250 PSI CWP Max	7.78	3.50	4.50

H-x061W Series

Pro-Pal Ball Drain
Full Port Forged Brass Ball Valve
w/ Hi-Flow Hose Drain,
Reversible Handle
& Adjustable Packing Glands

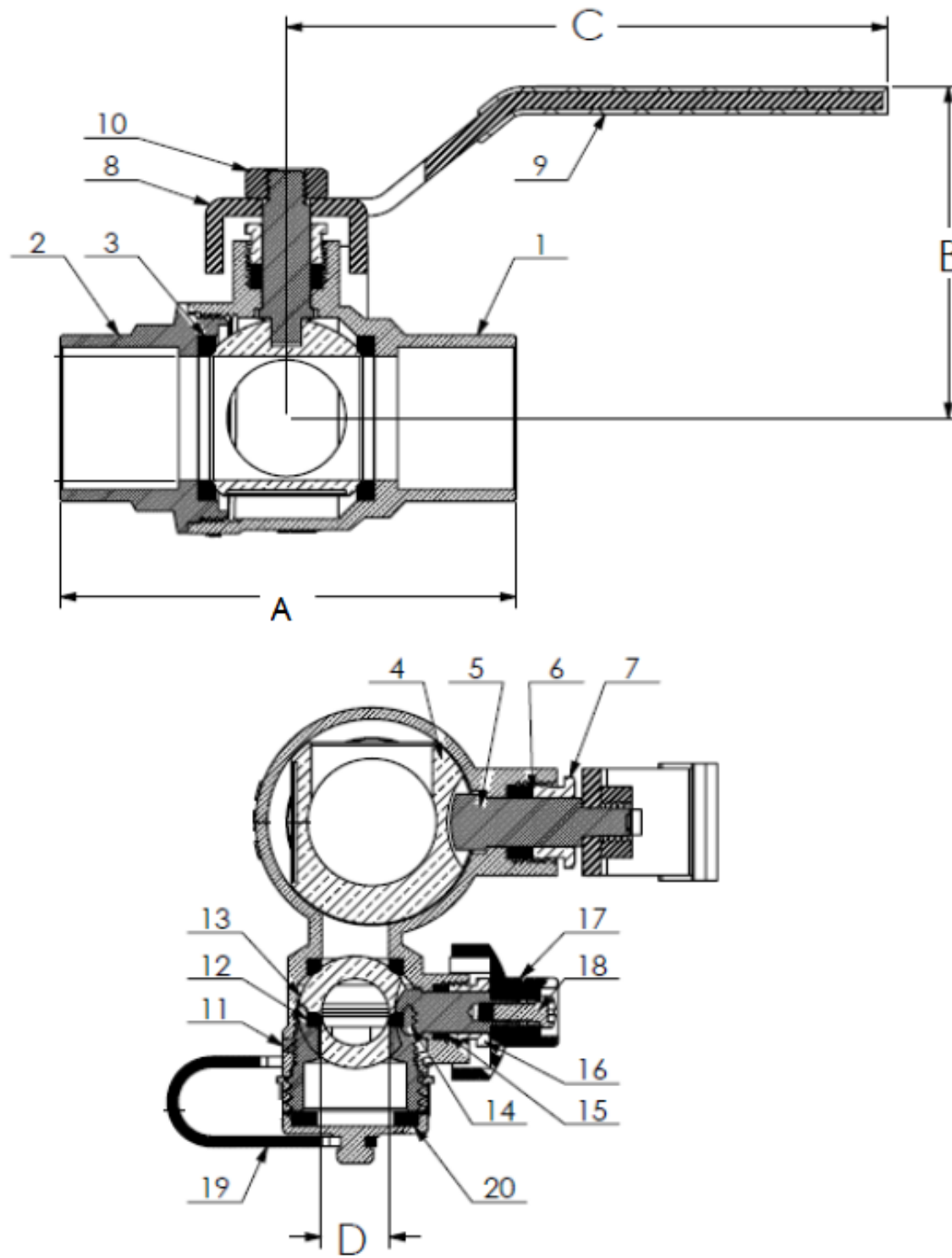
Certifications
Certified to NSF/ANSI 61 & 372
Lead-Free



NO.	DESCRIPTION	MATERIAL
1	Body	Lead Free DZR Brass
2	Cap	Lead Free DZR Brass
3	Seat	PTFE
4	Ball	Brass HCP
5	Stem	Brass
6	Packing	PTFE
7	Packing Gland	Brass
8	Handle	Steel CP
9	Handle Jacket	Vinyl
10	Handle Nut	Stainless Steel
11	Cap	Brass
12	Seat	PTFE
13	Ball	Brass HCP
14	Stem	Brass
15	Packing	PTFE
16	Packing Gland	Brass
17	Handle	Aluminum
18	Handle Screw	Brass
19	Cap & Strap	Brass W/ PVC Strap
20	Gasket	EPDM

ITEM#	Connection Type	SIZE (in)	Pressure Rating	Max Temp	A	B	C	D
* H-10612W	ASTM F1807 PEX	1/2	400 PSI CWP Max	200°F Max	2.90	2.50	3.50	0.50
* H-10613W	ASTM F1807 PEX	3/4	400 PSI CWP Max	200°F Max	3.15	2.50	3.50	0.50
* H-10614W	ASTM F1807 PEX	1	400 PSI CWP Max	200°F Max	3.88	2.75	4.63	0.50
* H-10615W	ASTM F1807 PEX	1 1/4	400 PSI CWP Max	200°F Max	4.51	3.00	4.50	0.75
* H-10616W	ASTM F1807 PEX	1 1/2	400 PSI CWP Max	200°F Max	5.13	3.63	5.63	0.75
* H-10617W	ASTM F1807 PEX	2	400 PSI CWP Max	200°F Max	6.64	4.00	5.63	0.75
* H-30612W	ASTM F1960 PEX	1/2	400 PSI CWP Max	200°F Max	2.96	2.50	3.50	0.50
* H-30613W	ASTM F1960 PEX	3/4	400 PSI CWP Max	200°F Max	3.72	2.50	3.50	0.50
* H-30614W	ASTM F1960 PEX	1	400 PSI CWP Max	200°F Max	4.59	2.75	4.63	0.50
* H-30615W	ASTM F1960 PEX	1 1/4	400 PSI CWP Max	200°F Max	5.48	3.00	4.50	0.75
* H-30616W	ASTM F1960 PEX	1 1/2	400 PSI CWP Max	200°F Max	6.21	3.63	5.63	0.75
* H-30617W	ASTM F1960 PEX	2	400 PSI CWP Max	200°F Max	7.82	4.00	5.63	0.75
H-40612W	FIP	1/2	600 PSI CWP Max	350°F Max	2.50	2.00	3.88	0.50
H-40613W	FIP	3/4	600 PSI CWP Max	350°F Max	2.63	2.06	3.88	0.50
H-40614W	FIP	1	600 PSI CWP Max	350°F Max	3.25	2.63	4.63	0.50
H-40615W	FIP	1 1/4	600 PSI CWP Max	350°F Max	3.50	3.00	4.63	0.75
H-40616W	FIP	1 1/2	600 PSI CWP Max	350°F Max	3.88	3.50	5.63	0.75
H-40617W	FIP	2	600 PSI CWP Max	350°F Max	4.38	4.00	5.63	0.75
H-50612W	SWT	1/2	600 PSI CWP Max	250°F Max	2.00	2.00	3.88	0.50
H-50613W	SWT	3/4	600 PSI CWP Max	250°F Max	2.88	2.06	3.88	0.50
H-50614W	SWT	1	600 PSI CWP Max	250°F Max	3.56	2.63	4.63	0.50
H-50615W	SWT	1 1/4	600 PSI CWP Max	250°F Max	3.88	3.00	4.63	0.75
H-50616W	SWT	1 1/2	600 PSI CWP Max	250°F Max	4.63	3.50	5.63	0.75
H-50617W	SWT	2	600 PSI CWP Max	250°F Max	5.50	4.00	5.63	0.75
H-80612W	Press	1/2	250 PSI CWP Max	250°F Max	3.75	1.94	3.88	0.50
H-80613W	Press	3/4	250 PSI CWP Max	250°F Max	4.44	2.13	3.88	0.50
H-80614W	Press	1	250 PSI CWP Max	250°F Max	4.81	2.63	4.63	0.50
H-80615W	Press	1 1/4	250 PSI CWP Max	250°F Max	5.50	3.00	4.63	0.75
H-80616W	Press	1 1/2	250 PSI CWP Max	250°F Max	5.88	3.56	5.63	0.75
H-80617W	Press	2	250 PSI CWP Max	250°F Max	7.00	3.94	5.63	0.75





Designed for residential, commercial or industrial use. This approved Webstone valve is actuated by a blowout proof stem. *Certified to NSF/ANSI 14.





QuickSetter+™ Low-lead balancing valve with flow meter, press connections

Submittal Data 02936.1 NA — Issue Date 08/2021

Application

The QuickSetter+™ manual balancing valve contains a built-in flow meter and sight gauge, negating the need for differential pressure gauges and reference charts. Circuit balancing is fast, easy and accurate. Constructed of low-lead brass, QuickSetter+™ is ideally suited for use in plumbing applications such as hot water recirculation systems. The built-in check valve protects against circuit thermo-siphoning. The outlet temperature gauge (optional) verifies the fluid temperature in the circuit. The flow meter sight gauge is dry (not exposed to the fluid) thus eliminating the possibility of gauge clouding/scaling over time. Low-lead ball valves available separately, field install.

Typical Specification

Furnish and install on the plans and described herein, a Caleffi QuickSetter+™ balancing valve with flow meter as manufactured by Caleffi. Each balancing valve must be designed with DZR low-lead brass body (<0.25% Lead content) certified by ICC-ES, stainless steel ball, chrome-plated brass ball control stem, PTFE ball seal seat, PSU control stem guide, DZR low-lead brass flow meter body and headwork, stainless steel flow meter bypass valve stem, stainless steel flow meter springs, PSU flow meter float and indicator cover, peroxide-cured EPDM seals, and provided complete with inlet flow check valve. Can be provided with optional mixed outlet dual-scale temperature gauge, 30 to 210°F (0 - 100°C) scale, 2 inch diameter. Each balancing valve shall be a Caleffi model 132 or approved equal. (See product instructions for specific installation information.)

Technical Data

Materials

Valve

Body:	DZR low-lead brass
Ball:	stainless steel
Ball control stem:	brass, chrome plated
Ball seal seat:	PTFE
Control stem guide:	PSU
Seals:	peroxide-cured EPDM

Flow meter

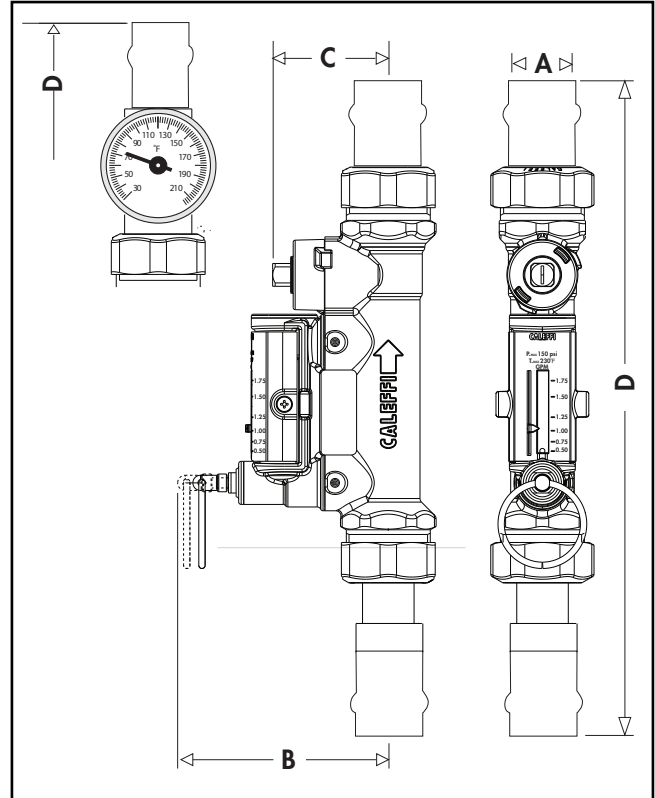
Body and headwork:	DZR low-lead brass
Bypass valve stem:	stainless steel
Springs:	stainless steel
Seals:	peroxide-cured EPDM
Flow meter float and indicator cover:	PSU

Complies with NSF/ANSI 372, Drinking Water System Components-Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction in Drinking Water Act, as certified by ICC-ES, file PMG-1360.

Performance

Suitable Fluids:	water, glycol solutions
Max. percentage of glycol:	50%
Max. working pressure:	150 psi (10 bar)
Working temperature range:	14 - 230°F (-10-110°C)
Flow rate range unit of measurement:	1/2 - 1 3/4 gpm; 2 - 7 gpm
Accuracy:	±10%
Control stem angle of rotation:	90°
Control stem adjustment wrench:	9 mm
Press connections:	3/4 and 1 inch

Dimensions



Code	Flow Scale (gpm)	A	B	C	D	Wt (lb)
132536AFC	0.5-1.75	3/4"	3 5/16"	1 13/16"	9 7/8"	1.8
132556AFC	2 - 7	3/4"				1.8
132636AFC	0.5-1.75	1"	3 5/16"	1 13/16"	10 1/4"	2.2
132656AFC	2 - 7	1"				2.2

Code	Flow Scale (gpm)	A	B	C	D	Wt (lb)
132537AFC*	0.5-1.75	3/4"	3 5/16"	1 13/16"	12 1/8"	2.2
132557AFC*	2 - 7	3/4"			12 1/8"	2.2
132637AFC*	0.5-1.75	1"	3 5/16"	1 13/16"	12 1/2"	2.6
132657AFC*	2 - 7	1"			12 1/2"	2.6

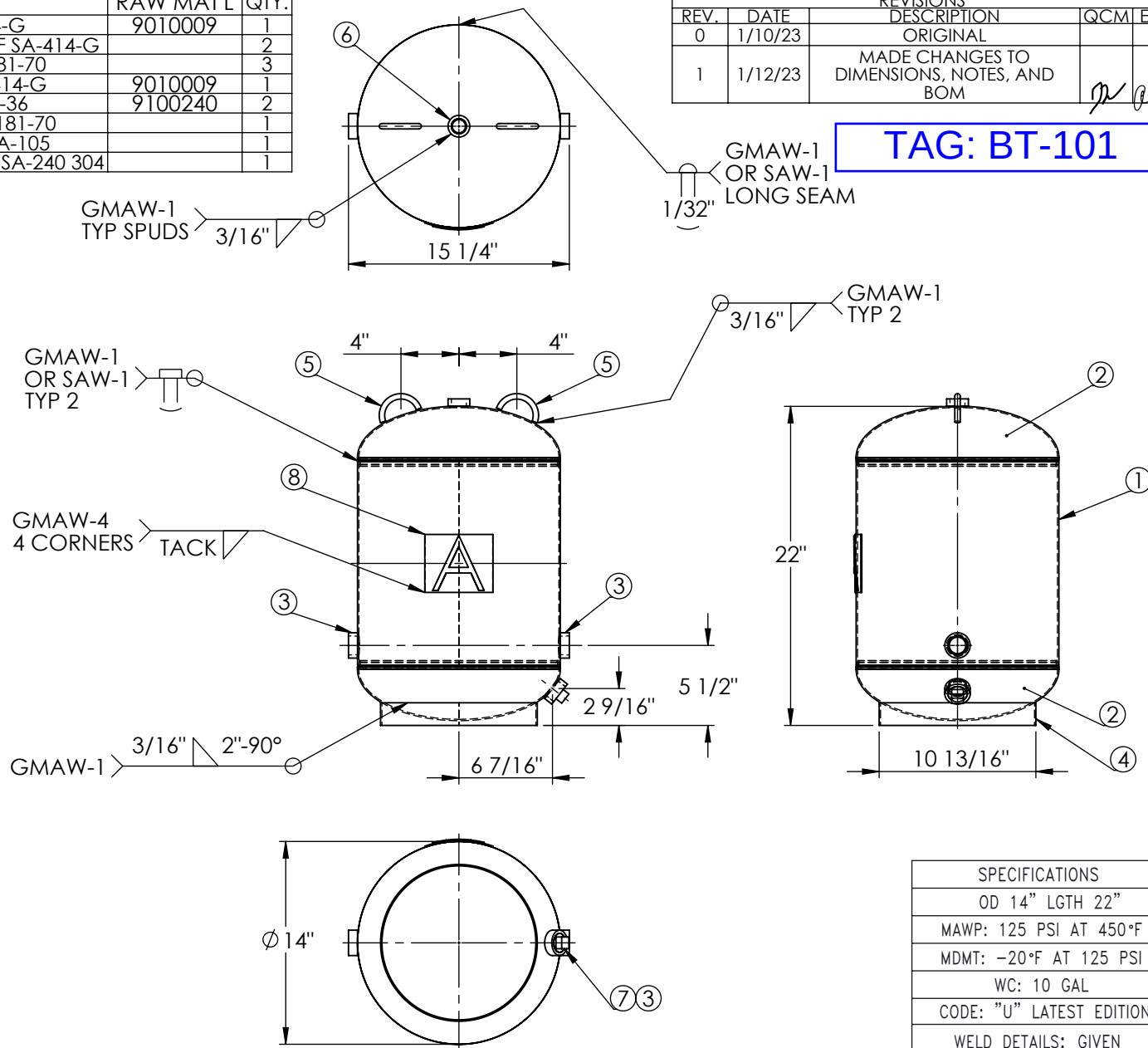
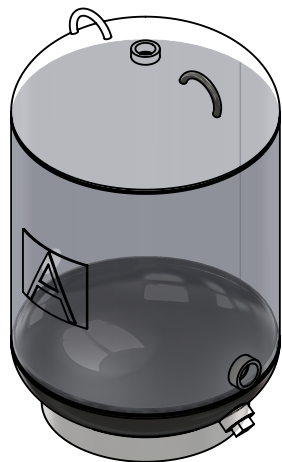
*with dual-scale temperature gauge 30 - 210°F (0 - 100°C).

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice. Contractors should request production drawings if prefabricating the system

Job name _____
 Job location _____
 Engineer _____
 Mechanical contractor _____
 Contractor's P.O. No. _____
 Representative _____

Size _____
 Quantity _____
 Approval _____
 Service _____
 Tag No. _____
 Notes _____

TAG: BT-101



SPECIFICATIONS
OD 14" LGTH 22"
MAWP: 125 PSI AT 450°F
MDMT: -20°F AT 125 PSI
WC: 10 GAL
CODE: "U" LATEST EDITION
WELD DETAILS: GIVEN

1. EXTERIOR: GRUNDFOS STD BLACK WITH WHITE LOGO
2. INSTALL PLASTIC THREAD PROTECTORS.
3. NO POST-WELD HEAT TREATMENT REQUIRED.
4. ESTIMATED WEIGHT: 32.28 LB

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/4''$
ANGULAR $\pm 2 \ 1/2^\circ$



GRUNDFOS HBT 125# SPC

1:11

A-V010156-1

3 BY: MG

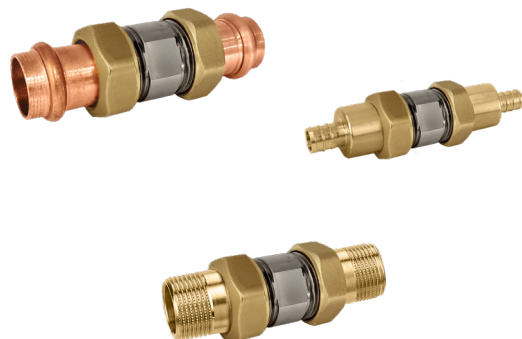
Low-lead serviceable inline check valves

NA51 series



01363/24 NA

Replaces 01363/23 NA



NSF/ANSI/CAN 372



Function

A check valve ensures that water only flows in a single direction of a plumbing or hydronic system.

The NA51 series low-lead serviceable inline spring check valves, ideal for residential and commercial applications, feature union connections with a variety of end connection options for easy installation and maintenance.

The valve is constructed of a stainless steel body and low-lead brass or copper tailpieces.

It complies with low lead laws and listed by ICC-ES. It meets codes IPC, IRC, UPC and NPC for use in accordance with the US and Canadian plumbing codes.

Product range

NA512 series	Serviceable inline spring check valves with NPT female and male threaded, press, PEX crimp and expansion, and sweat dual union connections, flowing Cv 17.....sizes ½" and ¾"
NA513 series	Serviceable inline spring check valves with NPT female and male threaded, press, PEX crimp and expansion, and sweat dual union connections, flowing Cv 30.....sizes 1" and 1¼"
NA514 series	Serviceable inline spring check valves with NPT female and male threaded, press, PEX crimp and expansion, and sweat dual union connections, flowing Cv 75.....sizes 1½" and 2"

Technical specifications

Materials	
- body:	stainless steel
- check valve:	EPDM, PPO/GF
	color black in NA512 (sizes ½" & ¾")
	color white in NA513 & NA514 (sizes 1" - 2")
- fitting tailpieces:	low-lead brass
	copper

Performance

Suitable fluids:	water and non-hazardous glycol solution up to 50%
Max. Working pressure:	150 psi (10 bar)
Operating temperature range:	NA512: 32 to 250°F (0 to 121°C)
	NA513, NA514: 32 to 150°F (0 to 65°C)
Max. temperature, NA513, NA514 only:	for one hour: 190°F (88°C)
Opening pressure differential:	0.25 psi (size ½" through 1¼")
	0.50 psi (size 1½" & 2")
Flow capacity:	Cv 17 (size ½" & ¾")
	Cv 30 (size 1" & 1¼")
	Cv 75 (size 1½" & 2")

Certifications

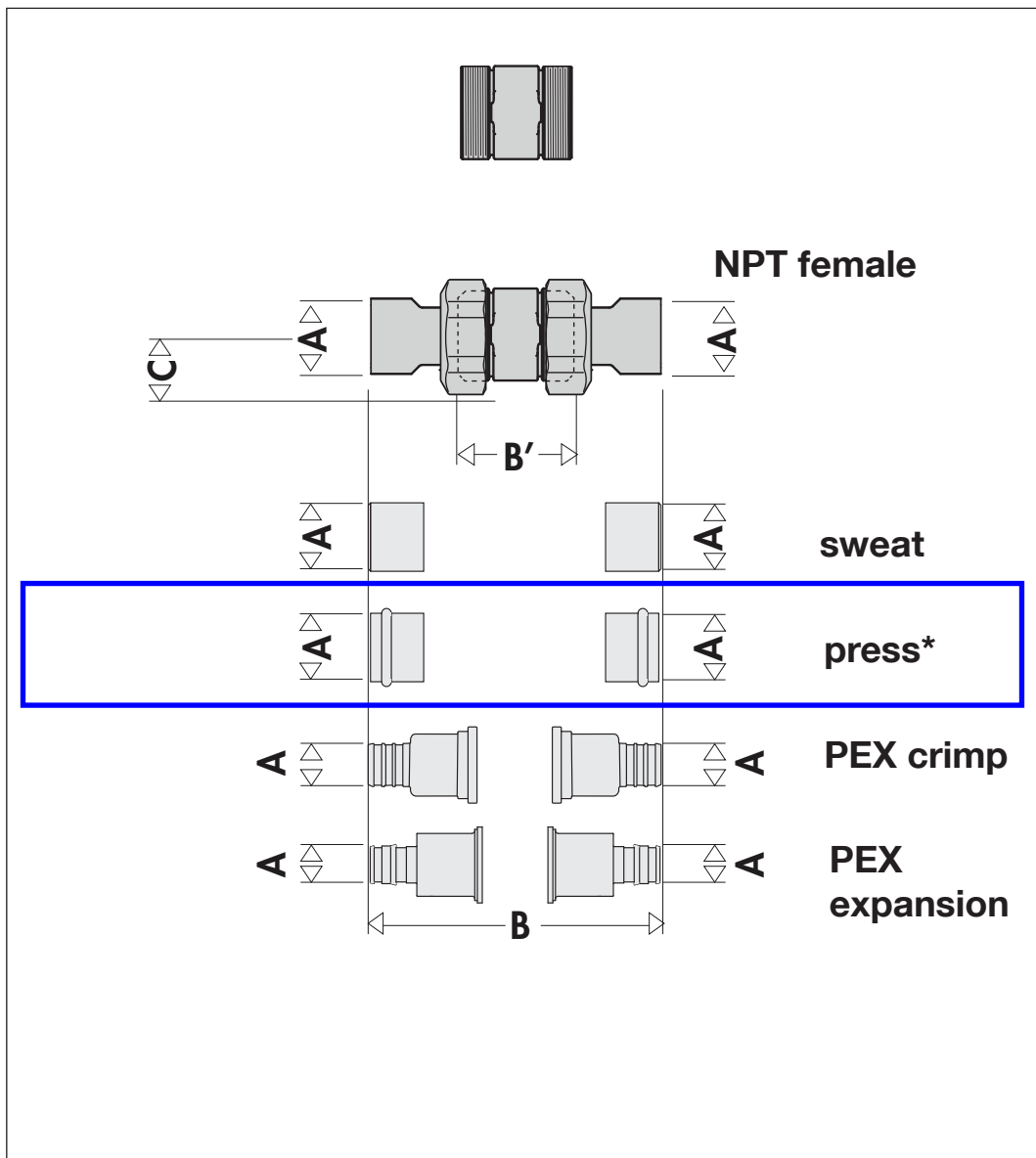
1. Complies with codes IPC, IRC, UPC and NPC.
2. NSF/ANSI/CAN 372, Drinking Water System Components-Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction in Drinking Water Act, Vermont Act 193 - The Lead in Plumbing Supplies Law and Maryland's Lead Free Law HB.372, certified by ICC-ES, file PMG-1360.
3. PEX crimp fittings designed to ASTM F 1807.
4. PEX expansion fittings designed to ASTM F 1960.

Connections

Main connections:	½", ¾", 1", 1¼", 1½" & 2"
	NPT female and male dual union
	sweat dual union
	press dual union
	PEX expansion dual union (½", ¾" only)
	PEX crimp dual union (½", ¾" only)

Lay length, for press connection pipe cutout:	size ½" - 2 7/16"
	size ¾" - 2 5/16"
	size 1" - 4"
	size 1¼" - 5 7/8"
	size 1½" - 5 1/8"
	size 2" - 7 7/8"

Dimensions

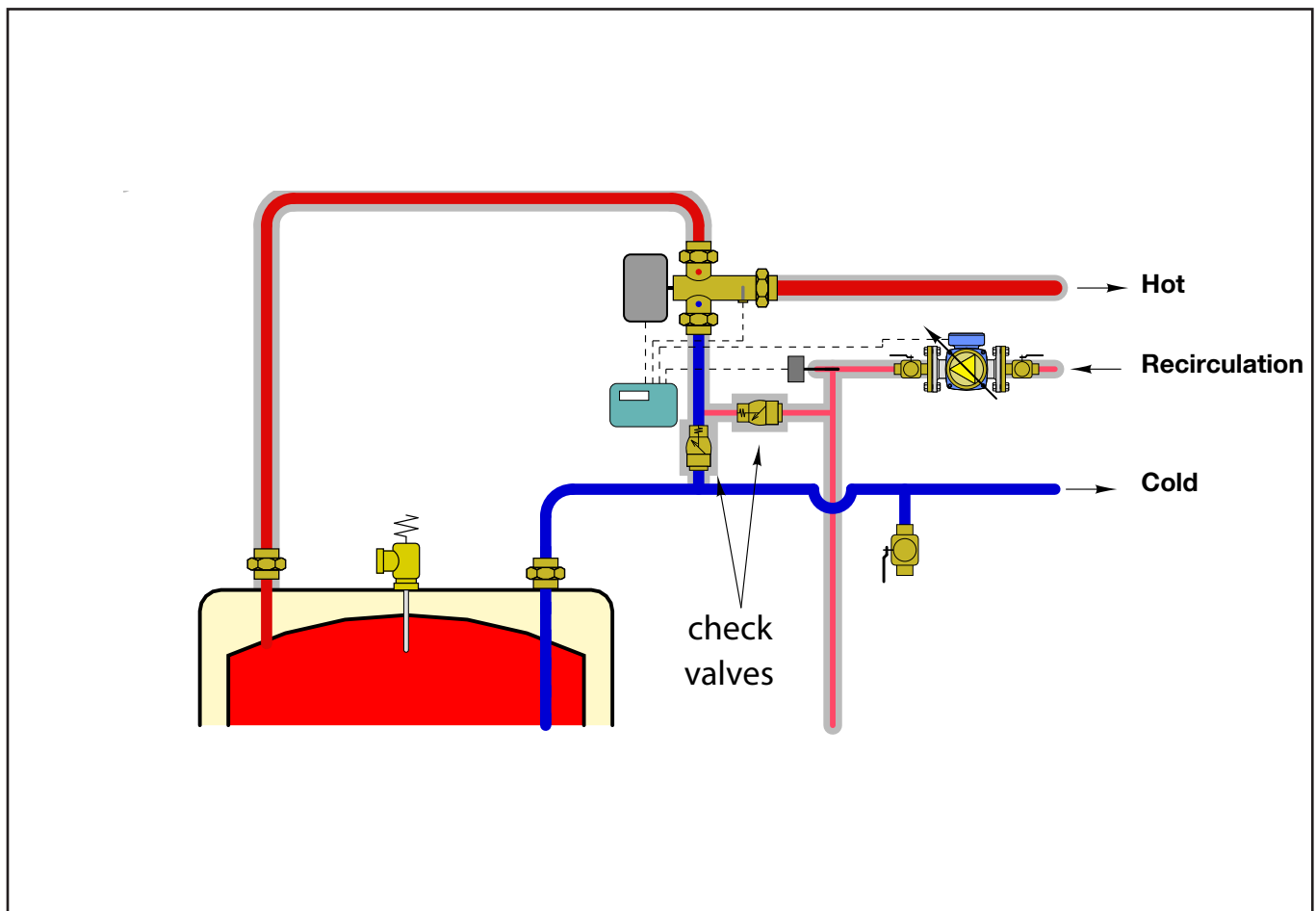


*Lay length:

- 1/2" press- 2 7/16 inch.
- 3/4" press- 2 5/16 inch.
- 1" press- 4 inch.
- 1 1/4" press- 5 7/8 inch.
- 1 1/2" press- 5 1/8 inch.
- 2" press- 7 7/8 inch.

Code	A	B	B'	C	Wt (lb)
NA51200	1" metric, no fittings (1)	--	1 9/16"	5/8"	1.0
NA51240	1/2" NPT Male	3 5/8"		13/16"	1.5
NA51249	1/2" SWT	3 1/8"			
NA51243	1/2" NPT Female	4"			
NA51246	1/2" press	3 15/16"			
NA51247	1/2" PEX crimp	4 15/16"			
NA51248	1/2" PEX expansion	5 3/16"			
NA51250	3/4" NPT Male	3 5/16"			
NA51259	3/4" SWT	3 5/8"			
NA51253	3/4" NPT Female	4 3/16"			
NA51256	3/4" press	4 5/16"			
NA51257	3/4" PEX crimp	4 15/16"			
NA51258	3/4" PEX expansion	5 5/8"			
NA51300	1 1/2" metric, no fittings (1)	--	1 3/4"	3/4"	1.5
NA51360	1" NPT Male	4 1/8"		1 1/8"	2.0
NA51369	1" SWT	3 7/8"			
NA51363	1" NPT Female	3 7/8"			
NA51366	1" press	5 7/8"			
NA51370	1 1/4" NPT Male	5 3/8"			
NA51379	1 1/4" SWT	3 3/8"			
NA51373	1 1/4" NPT Female	5 3/8"			
NA51376	1 1/4" press	7 7/8"			
NA51400	2 1/2" metric, no fittings (1)	--	2 1/4"	1 1/4"	2.0
NA51480	1 1/2" NPT Male	6 7/8"		1 3/4"	3.0
NA51489	1 1/2" SWT	6 5/8"			
NA51486	1 1/2" press	7 7/8"			
NA51490	2" NPT Male	6 7/8"			
NA51499	2" SWT	5 3/8"			
NA51493	2" NPT Female	5 5/8"			
NA51496	2" press	10 7/8"			

(1) Check valve body threads match the nut size when field installing tailpieces.
See fittings table in Caleffi Catalog.



Find us in
MasterSpec®
 a product of The American Institute of Architects
<https://get.caleffi.info/specpoint>



find BIM Revit files and system templates at
<https://bim.caleffi.com/en-us>

SPECIFICATION SUMMARY

NA51 series

Serviceable inline spring check valves, certified by ICC-ES to NSF/ANSI/CAN 372. Meets codes IPC, IRC and UPC for use in accordance with the US and Canadian plumbing codes. Sizes 1/2" to 2" with NPT female union, NPT male union, sweat union or press union connections, sizes 1/2" & 3/4" PEX crimp union or PEX expansion union connections. PEX crimp fittings must comply with ASTM F 1807. PEX expansion fittings must comply with ASTM F 1960. Stainless steel body with low-lead brass or copper tailpieces, certified by and listed by ICC-ES. Check valve in EPDM, PPO/GF, color black for NA512 (sizes 1/2" & 3/4"); color white for NA513 & NA514 (sizes 1" - 2"). Maximum working temperature, NA513 & NA514 only: for one-hour 190 degrees F (88 degrees C). Operating temperature range, NA512 (sizes 1/2" & 3/4"): 32 degrees F to 250 degrees F (0 degrees C to 120 degrees C); NA513 & NA514 (sizes 1" - 2"): 32 degrees F to 150 degrees F (0 degrees C to 65 degrees C). Maximum working pressure 150 psi (10 bar). Operating pressure differential 0.25 psi (sizes 1/2" to 1 1/4"), 0.5 psi (sizes 1 1/2" to 2"). Flow capacity: Cv 17 (1/2" & 3/4"), Cv 30 (1" & 1 1/4"), Cv 75 (1 1/2" & 2").

We reserve the right to make changes and improvements to the products and related data in this publication, at any time and without prior notice.



Caleffi North America, Inc.
 3883 W. Milwaukee Road, Milwaukee, WI 53208
 Tel: 414-238-2360 · Fax: 414-238-2366
 Technical Support: 414-338-6338 / techsupport.us@caleffi.com
 sales@caleffi.com · www.caleffi.com
 © Copyright 2024 Caleffi North America, Inc.

MOTORIZED ZONE VALVES



Z1

Z1 Normally closed actuators fit on Z2 and Z3 valves. Normally open actuators fit on Z2 valves only. Easy pushbutton attachment 7/8" knockout for 1/2" conduit connector. Power: 24 and 120 VAC. Power consumption: 5 W, 7 VA. Conduit connector size: 1/2". Rating of auxiliary switch contacts: 24 VAC: 0.0 A min, 0.4 A max (24 V). 120 and Z111900 VAC: 0.25 A min, 5.0 A max (230 V). UL873, cULus Listed & CE. UL 1995 sec.18 air plenums and ducts. U.S. Patent 7,048,251.

Normally closed

Code	Description	Lbs	USD
Z111000	24 V, micro-switch, 18" wires	1.1	113.00
Z111900	24 V, high current switch, 18" wires	1.1	113.00
Z116000	120 V, micro-switch, 6" wires	1.1	113.00
Z111L03CST	24 V, micro-switch, terminal blocks	1.1	117.00
Z161000	24 V, terminal blocks	1.1	107.00
Z121000	24 V, 18" wires	1.1	105.00
Z126000	120 V, 6" wires	1.1	105.00

Normally open

Code	Description	Lbs	USD
Z131000	24 V, micro-switch, 18" wires	1.1	124.00
Z136000	120 V, micro-switch, 6" wires	1.1	124.00
Z141000	24 V, 18" wires	1.1	114.00
Z146000	120 V, 6" wires	1.1	114.00

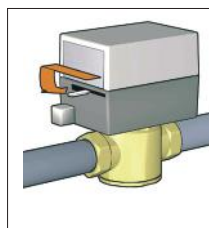
Function

The Z-one™ valve is a truly universal zone valve that can be used in a wide range of commercial and residential applications; from fan coils to baseboard, radiant to high rise, the Z-one is the professional's valve of choice. The Z-one can be used in both chilled or hot water and low pressure steam applications. With Delta P close off pressures of up to 75 PSI, the Z-one outperforms all other zone valves. The Z-one is available in sizes from 1/2" to 1 1/4" sweat or NPT connections on valve body, with removable actuator available in 24 to 120 voltages.

Some models of Z-one actuators contain an auxiliary micro-switch to operate other devices. The 24 V actuators use a sealed reed switch, which has been produced specifically for use with relays, boiler contacts (TT) and DDC systems. It requires no minimum current load. The 120 V actuators for applications requiring greater than 400 mA, use a conventional micro-switch with silver contacts. The auxiliary switch is activated when the valve is 60% open or when the actuator is manually opened.

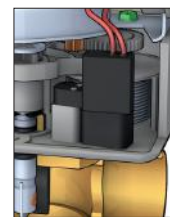
• Manual opening (Normally closed actuator only)

The valve can be opened manually by moving the lever for opening it. When the power is restored the manual control is automatically overridden. The auxiliary switch in 24 V actuators is tripped when the unit is put into manual open position. This helps during start up to check if the wiring is correct without firing the valve electrically with the thermostat.

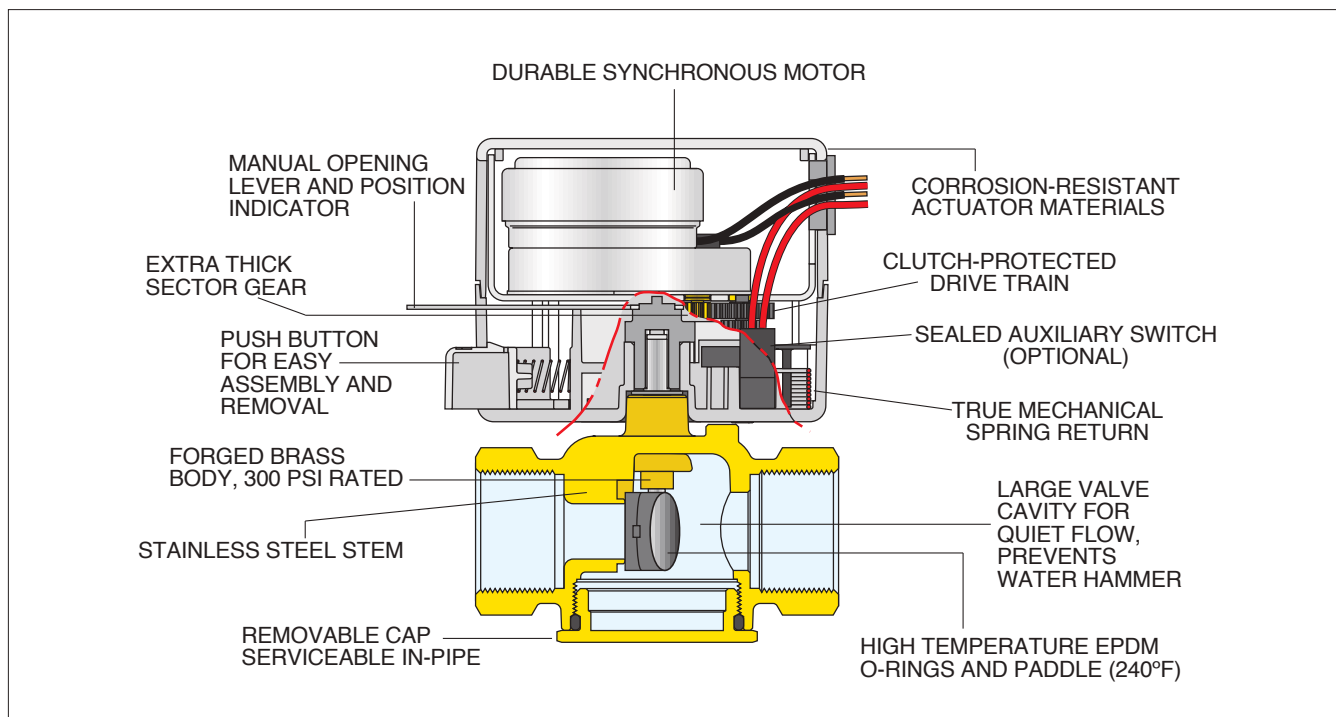


• Auxiliary micro-switch

The actuator contains an auxiliary microswitch to operate other devices. The 24 V actuators use a sealed reed switch, which has been produced specifically for use with relays, boiler contacts (TT) and DDC systems. It requires no minimum current load. The 120 V actuators use a conventional micro-switch with silver contacts. The auxiliary micro-switch is activated when the valve is 60% open or when the actuator is manually opened.



Construction details



MOTORIZED ZONE VALVES

Z2 2-way

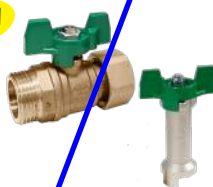


Two-way on/off two position valve.
Straight through flow pattern.
Brass body.
Stainless steel stem.
EPDM rubber seals and paddle.
Max. working pressure: 300 psi.
Max temperature: 240°F.

Code	Description	Cv	Δ P	Lbs	USD
Z200041	Inverted flare	1.0	75 psi	1.1	49.90
Z200042	Inverted flare	2.5	50 psi	1.1	49.90
Z200043	Inverted flare	3.5	30 psi	1.1	49.90
Z200053	½" SAE Flare	3.5	30 psi	1.1	63.90
Z200411	½" FNPT	1.0	75 psi	1.1	49.90
Z207411	½" FNPT LL	1.0	75 psi	1.1	68.10
Z200412	½" FNPT	2.5	50 psi	1.1	49.90
Z200413	½" FNPT	3.5	30 psi	1.1	49.90
Z200431	½" sweat	1.0	75 psi	1.0	45.70
Z200432	½" sweat	2.5	50 psi	1.0	45.70
Z207433	½" sweat LL	3.5	30 psi	1.0	63.90
Z200512	¾" FNPT	2.5	50 psi	1.2	68.10
Z200513	¾" FNPT	3.5	30 psi	1.2	68.10
Z200515	¾" FNPT	5.0	25 psi	1.2	68.10
Z200517	¾" FNPT	7.5	20 psi	1.2	68.10
Z200532	¾" sweat	2.5	50 psi	1.1	60.30
Z207533*	¾" sweat LL	3.5	30 psi	1.1	78.40
Z200535	¾" sweat	5.0	25 psi	1.1	60.30
Z200537	¾" sweat	7.5	20 psi	1.1	60.30
Z207537*	¾" sweat LL	7.5	20 psi	1.1	78.40
Z200617	1" FNPT	7.5	20 psi	1.3	108.00
Z200635	1" sweat	5.0	25 psi	1.2	102.00
Z200637	1" sweat	7.5	20 psi	1.2	102.00
Z200737	1¼" sweat	7.5	20 psi	1.3	137.00

LL Low-lead brass body.

NEW



Isolation ball valve.
Low lead MxF union union fits between
valve body and tailpiece.

Code	Description	Lbs	USD
290030	1" M x 1" F union ball valve	1.0	46.20
NA10815	Stem extension for 290030	0.2	26.30



Z3 3-way



Three-way on/off two position valve.
Diverting flow pattern.
Brass body.
Stainless steel stem.
EPDM rubber seals and paddle.
Max. working pressure: 300 psi.
Max temperature: 240°F.

Code	Description	Cv	Δ P	Lbs	USD
Z300053	½" SAE Flare	3.5	30 psi	1.1	79.80
Z300411	½" FNPT	1.0	75 psi	1.1	66.50
Z300412	½" FNPT	2.5	50 psi	1.1	66.50
Z300413	½" FNPT	3.5	30 psi	1.1	66.50
Z300431	½" sweat	1.0	75 psi	1.0	62.40
Z300432	½" sweat	2.5	50 psi	1.0	62.40
Z307433*	½" sweat LL	3.5	30 psi	1.0	80.40
Z300512	¾" FNPT	2.5	50 psi	1.2	83.10
Z300513	¾" FNPT	3.5	30 psi	1.2	83.10
Z300515	¾" FNPT	5.0	25 psi	1.2	83.10
Z300517	¾" FNPT	7.5	20 psi	1.2	83.10
Z300532	¾" sweat	2.5	50 psi	1.1	77.10
Z300533	¾" sweat	3.5	30 psi	1.1	77.10
Z300535	¾" sweat	5.0	25 psi	1.1	77.10
Z307537*	¾" sweat LL	7.5	20 psi	1.1	95.30
Z300617	1" FNPT	7.5	20 psi	1.3	125.00
Z300635	1" sweat	5.0	25 psi	1.2	116.00
Z300637	1" sweat	7.5	20 psi	1.2	116.00
Z300737	1¼" sweat	7.5	20 psi	1.3	141.00

*LL Low-lead brass body.



2-way male union valve body.
Select fittings in Section 8 Table.

Code	Description	Cv	Δ P	Lbs	USD
Z200683	1" male union body	3.5	30 psi	1.1	68.10
Z200687	1" male union body	7.5	20 psi	1.1	68.10



3-way male union valve body.
Select fittings in Section 8 Table.

Code	Description	Cv	Δ P	Lbs	USD
Z300687	1" male union body	7.5	20 psi	1.2	86.60



Two-way and three-way zone valve body
repair kit. Includes valve stem paddle with
O-rings, O-clip and one bottom cap O-ring.

Code	Description	Lbs	USD
F69293	Fits all ½" & ¾" sweat Z2, Z3	0.4	17.20
F69294	Fits all ¾" NPT and all 1", 1¼" Z2, Z3	0.4	17.20

GNLA-SERIES

HVAC EXPANSION TANKS

Models: GNLA-35 to GNLA-800L

Rev: G1 3/25/2020



Job Name _____	Submitted By _____	Date _____
Location _____	Approved By _____	Date _____
_____	Order No. _____	Date _____
Engineer _____	Notes _____	
Contractor _____	_____	
Sales Rep. _____	_____	

Description:

GNLA tanks are ASME removeable bladder type pre-charged HVAC expansion tanks. They are designed to absorb the expansion forces and control the pressure in heating/cooling systems. The system's expanded water (fully compatible with water/glycol mixtures) is contained in a full acceptance heavy-duty butyl bladder that prevents tank corrosion and waterlogging problems. All GNLA expansion tanks can be installed vertically or horizontally.

Construction:

Shell: Carbon Steel
 Heads: Carbon Steel
 Exterior: Carbocoat 140 - Harvester Red
 Interior: Heavy Duty Butyl Bladder

Design Parameters:

Maximum Design Pressure: 125 PSIG*
 Temperature Range: -20°F to 240°F

*150, 200 & 250 PSIG available

Model Number	Part Number	Tank Volume (Gallons)	Tagging Information	Quantity
GNLA-35	99397643	10		
GNLA-50	99397644	13		
GNLA-85	99397645	23		
GNLA-130	99397646	35		
GNLA-200	99397647	53		
GNLA-300	99397648	79		
GNLA-400	99397649	106		
GNLA-500	99397650	132		
GNLA-600	99397651	158		
GNLA-800L	99397652	211		

Typical Specification

Furnish and install, as shown on plans, a _____ gallon _____" diameter X _____" (high) pre-charged steel HVAC expansion tank with heavy-duty butyl bladder. The tank shall have multiple water-side connections to eliminate stagnate water within the tank, a 0.302"-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements, a pressure gauge, and bladder integrity monitor. The tank must be constructed in accordance with the most recent addendum of Section VIII Division 1 of the ASME Boiler and Pressure Vessel Code and rated for 125 psig.

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



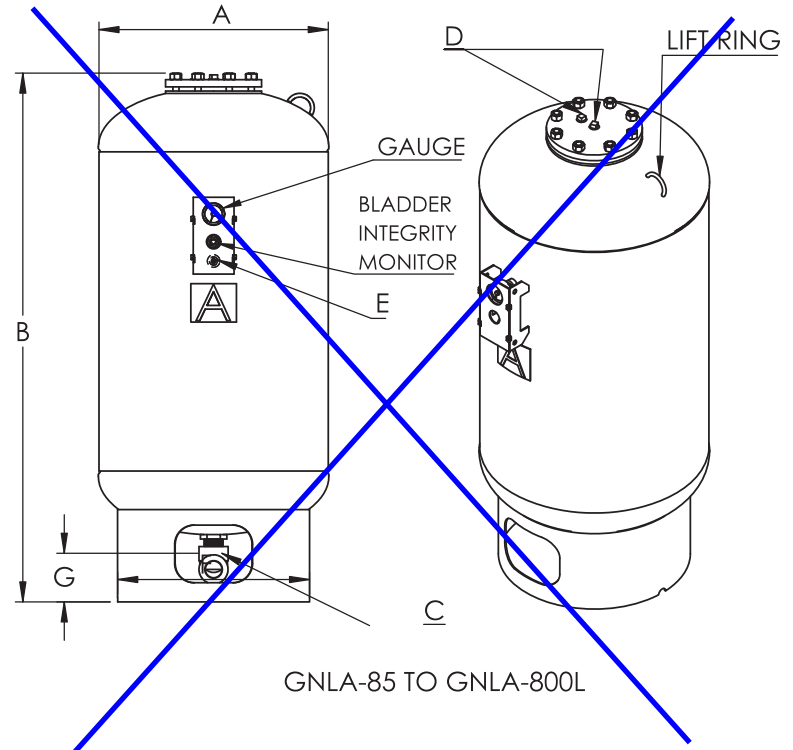
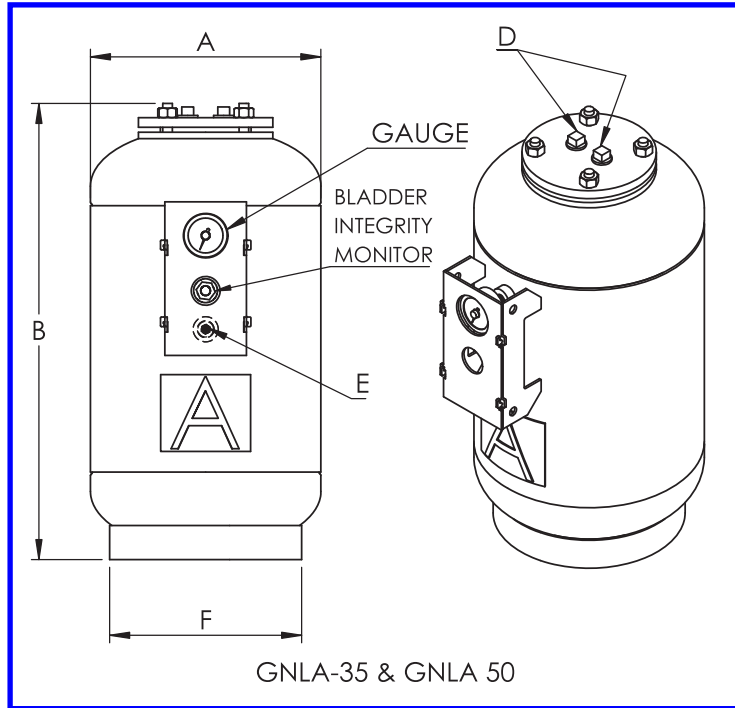
SUBMITTAL

GNLA-SERIES

HVAC EXPANSION TANKS

Models: GNLA-35 to GNLA-800L

Rev: G1 3/25/2020



Dimensions & Weights:

Model Number	Dimensions in Inches						Approx. Shipping Weight (lbs)	
	A	B	System Connection		Charging Valve	F		G
			C	D	E			
GNLA-35	12	23 1/2	-	3/4 NPT	0.302"-32NC	10	-	40
GNLA-50	14	24	-			50		
GNLA-85	16	37	1 NPT			12	5 1/2	90
GNLA-130	20		16			125		
GNLA-200	24	43	1 1/2 NPT			20	5 1/4	210
GNLA-300		55						225
GNLA-400	30	49	2 NPT			24		300
GNLA-500		57						335
GNLA-600		65						360
GNLA-800L		76						475

Notes:

- Tanks are factory pre-charged at 40 psig and field adjustable.
- California code-sight glass is available upon request.
- Both top and bottom connections (C & D) access the bladder.
- Mounting clips are available upon request.

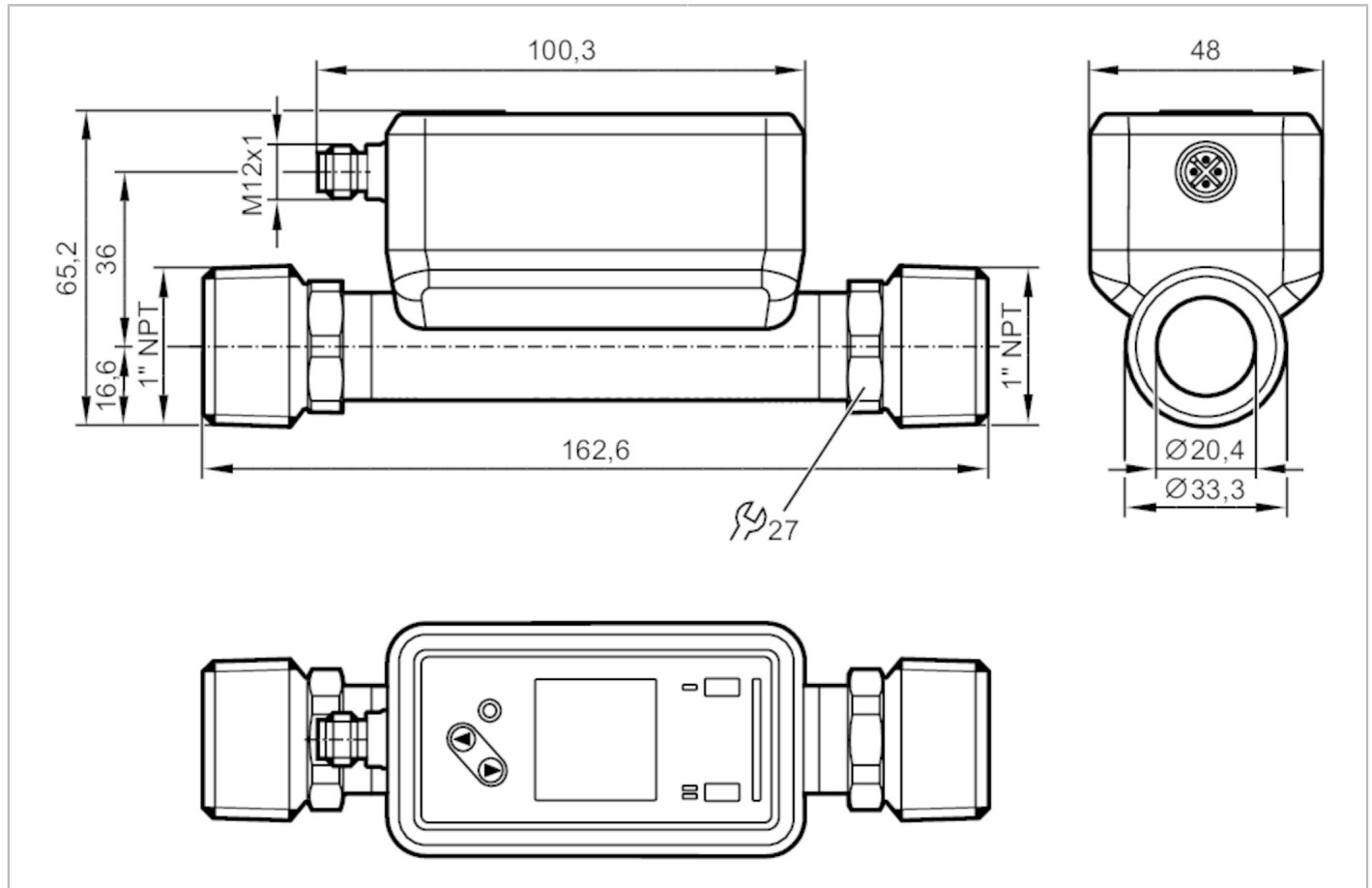
SU8621

FM-102 ONLY - Potable Side ONLY



Ultrasonic flow meter

SUN11XFBFRKG/US



ACS CE PA cUL US LISTED IO-Link KTW/W270 NSF Reg31

Product characteristics

Measuring range	1...240 l/min	0.06...14.4 m³/h	16...3804 gph	0.26...63.4 gpm
Process connection	threaded connection 1" NPT external thread DN25			

Application

Special feature	Gold-plated contacts	
Media	ultra-pure water; water; hydrous media	
Note on media	hydrous media: for media with >10 % additives, the repeatability is the only available value	
Medium temperature	-20...100 °C	-4...212 °F
Min. bursting pressure	150 bar	15 MPa
Pressure rating	100 bar	10 MPa
Vacuum resistance [mbar]	-1000	
MAWP (for applications according to CRN) [bar]	100	

Electrical data

Operating voltage [V]	18...32 DC; (to SELV/PELV)
Current consumption [mA]	< 75
Protection class	III
Reverse polarity protection	yes
Power-on delay time [s]	5
Measuring principle	ultrasonic



Ultrasonic flow meter

SUN11XFBFRKG/US

Inputs					
Inputs		counter reset			
Outputs					
Total number of outputs		2			
Output signal		switching signal; pulse signal; analogue signal; IO-Link; frequency signal; diagnostic signal; totaliser switching signal			
Electrical design		PNP/NPN			
Output function		normally open / normally closed; (parameterisable)			
Max. voltage drop switching output DC	[V]	2			
Permanent current rating of switching output DC	[mA]	100			
Switching frequency DC	[Hz]	0...10000			
Analogue current output	[mA]	4...20			
Max. load	[Ω]	500			
Pulse output		flow rate meter			
Short-circuit protection		yes			
Type of short-circuit protection		pulsed			
Overload protection		yes			
Measuring/setting range					
Measuring range		1...240 l/min	0.06...14.4 m³/h	16...3804 gph	0.26...63.4 gpm
Display range		-288...288 l/min	-17.28...17.28 m³/h	-4565...4565 gph	-76.08...76.08 gpm
Resolution		0.1 l/min	0.001 m³/h	1 gph	0.02 gpm
Set point SP		2.3...240 l/min	0.139...14.4 m³/h	37...3804 gph	0.61...63.4 gpm
Reset point rP		1.1...238.8 l/min	0.064...14.325 m³/h	17...3784 gph	0.28...63.07 gpm
Analogue start point ASP		-240...192 l/min	-14.4...11.522 m³/h	-3804...3044 gph	-63.4...50.73 gpm
Analogue end point AEP		-191.9...240 l/min	-11.511...14.4 m³/h	-3041...3804 gph	-50.68...63.4 gpm
Low flow cut-off LFC		1...12 l/min	0.06...0.72 m³/h	16...190 gph	0.26...3.17 gpm
Frequency end point, FEP		48.1...240 l/min	2.889...14.4 m³/h	763...3804 gph	12.72...63.4 gpm
Frequency at the end point FRP	[Hz]	1...10000			
Volumetric flow quantity monitoring					
Pulse length		[s]	0.002...2		
Pulse value		0.02...99990000 l; 0.005...26414563.515 gal			
Temperature monitoring					
Measuring range		-20...100 °C		-4...212 °F	
Display range		-44...124 °C		-47.2...255.2 °F	
Resolution		0.1 °C		0.1 °F	
Set point SP		-19.6...100 °C		-3.2...212 °F	
Reset point rP		-20...99.6 °C		-4...211.2 °F	
Analogue start point		-20...76 °C		-4...168.8 °F	
Analogue end point		4...100 °C		39.2...212 °F	
Frequency start point, FSP		-20...76 °C		4...168.8 °F	
Frequency end point, FEP		4...100 °C		4...168.8 °F	
Frequency at the end point FRP	[Hz]	1...10000			



Ultrasonic flow meter

SUN11XFBFRKG/US

Accuracy / deviations		
Flow monitoring		
Accuracy (in the measuring range)		± (1,0 % MW + 0,5 % MEW)
Repeatability		± 0,2 % MEW
Temperature monitoring		
Accuracy	[K]	± 2,5 (Q > 5 % MEW)
Temperature coefficient [% of the span / 10 K]		0,2
Response times		
Flow monitoring		
Response time	[s]	< 0.25; (dAP = 0, T09)
Damping process value dAP	[s]	0...5
Temperature monitoring		
Dynamic response T05 / T09	[s]	5,7 / 86
Software / programming		
Diagnostic functions		direction of flow detection; signal quality
Interfaces		
Communication interface		IO-Link
Transmission type		COM2 (38,4 kBaud)
IO-Link revision		1.1.3
SDCI standard		IEC 61131-9: 2013-07
Profiles	Function class	Designation
	0x4000	Identification and Diagnosis
Required master port type		A
Process data analogue		3
Process data binary		2
Min. process cycle time	[ms]	9.6
IO-Link process data (cyclical)	function	bit length
	totaliser	32
	Flow monitoring	32
	Temperature monitoring	32
	status	4
	Output 1	1
	Output 2	1
Supported DeviceIDs	Type of operation	DeviceID
	default	1463
Operating conditions		
Ambient temperature	[°C]	-20...60
Storage temperature	[°C]	-25...80
Protection		IP 67
Tests / approvals		
EMC	DIN 61326-1:2021	
CPA approval	model number	002US
	accuracy class	1,5

SU8621

FM-102 ONLY - Potable Side ONLY



Ultrasonic flow meter

SUN11XFBFRKG/US

Shock resistance	DIN IEC 68-2-27	20 g (11ms)
Vibration resistance	DIN IEC 68-2-6	5 g (10...2000Hz)
MTTF [years]	160	
UL approval	UL Approval no.	I034
	File number UL	E174189
Pressure Equipment Directive	can be used for group 2 fluids; group 1 fluids on request	

Mechanical data

Weight [g]	631.5
Housing	rectangular
Type of mounting	inlet pipe length 5xDN; outlet pipe length 1xDN
Dimensions [mm]	162.6 x 48 x 65.2
Materials	housing: stainless steel (316L/1.4404); Display: PFA; Sealing Display: FKM; connector: POKAN
Materials (wetted parts)	Pipe section: stainless steel (316L/1.4404)
Process connection	threaded connection 1" NPT external thread DN25
Surface characteristics Ra/Rz of the wetted parts	49.21 µin

Displays / operating elements

Display	colour display 1,44", 128 x 128 pixels
Switching function	2 x LED, yellow
diagnosis	1 x LED, three-colour

Accessories

Items supplied	package insert
----------------	----------------

Remarks

Remarks	MW = measured value
	MEW = Final value of the measuring range
	pulse and totaliser signal are only available for one of the two outputs
	the accuracy indications are adhered to over the entire application area
Pack quantity	1 pcs.

Electrical connection

Connector: 1 x M12; coding: A; Contacts: gold-plated

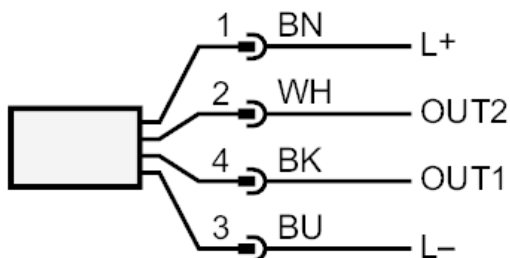




Ultrasonic flow meter

SUN11XFBFRKG/US

Connection



OUT1/IO-Link: switching output volumetric flow quantity monitoring
switching output Temperature monitoring
Pulse output quantity meter
frequency output volumetric flow quantity monitoring
frequency output Temperature monitoring
signal output Preset counter

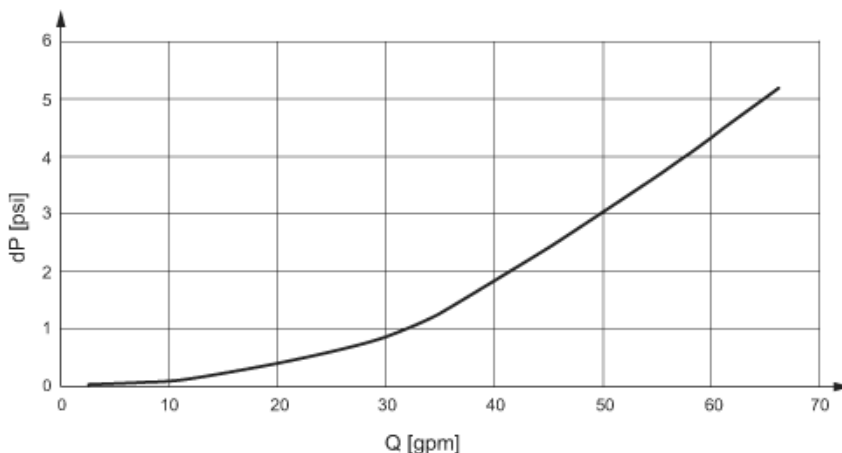
OUT2/InD: switching output volumetric flow quantity monitoring
switching output Temperature monitoring
Pulse output quantity meter
analogue output flow
analogue output temperature
signal output Preset counter
input counter reset

colours to DIN EN
60947-5-2

Core colours
BK= black
BN= brown
BU= blue
WH= white

Diagrams and graphs

Note on pressure loss



SU8621

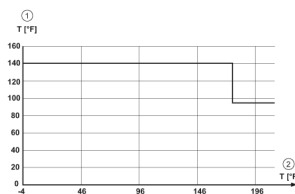
FM-102 ONLY - Potable Side ONLY



Ultrasonic flow meter

SUN11XFBFRKG/US

derating ambient temperature



- 1 Ambient temperature
- 2 Medium temperature



This HX selection is for nominal sizing purposes and not representative of any specific project sizing conditions. Actual performance must be assessed from QAHV corrected capacity with selection software tools from which resulting output capacity and approximate leaving water can be derived. Consult with Mitsubishi representative for guidance on project specific QAHV selections.

SWEP International AB
P O Box 105
Järvgatan 3B
SE-261 44 Landskrona, Sweden
www.swepgroup.com

SINGLE PHASE - PERFORMANCE

SWEP SSP G8 2025.910.5.0

HEAT EXCHANGER: BDW16DWHx81/2P

Heat Exchanger

Date: 16/09/2025

SSP Alias: B16DW2P/2P

DUTY REQUIREMENTS		Side 1	Side 2
Fluid		Propylene Glycol - Water (30.0 mass%)	Water
Flow type		Counter-Current	
Circuit		primary	secondary
Heat load	Btu/h	188400	
Inlet temperature	°F	176.0	41.0
Outlet temperature	°F	70.0	151.9
Flow rate	US gpm	3.800	3.400
Thermal length		4.01	4.19

PLATE HEAT EXCHANGER		Side 1	Side 2
Total heat transfer area	sqft	34.9	
Heat flux	Btu/h,sqft	5400	
Mean temperature difference	°F	26.5	
Overall heat transfer coefficient required	Btu/sqft,h,°F	204	
Pressure drop - total*	psi	0.715	0.532
- in ports	psi	0.0117	9.69e-3
Port diameter (up/down)	in	1.06/1.06	1.06/1.06
Number of channels per pass		20	20
Number of plates		81	
Oversurfacing	%	0	
Fouling factor	sqft,h,°F/Btu	0.000	
Reynolds number		172.8	267.9
Port velocity (up/down)	ft/s	1.35/1.35	1.24/1.24
Channel velocity	ft/s	0.227	0.209
Shear stress	Pa	6.33	4.70
Average wall temperature	°F	108.2	107.3
Largest wall temperature difference	°F	1.7	
Min./Max. wall temperature	°F	54.2/162.9	52.5/161.5

*Excluding pressure drop in connections.

PHYSICAL PROPERTIES		Side 1	Side 2
Reference temperature	°F	123.0	96.5
Dynamic viscosity	cP	1.22	0.709
Density	lb/cuft	63.29	62.04
Heat capacity	Btu/lb,°F	0.9399	0.9980
Thermal conductivity	Btu/ft,h,°F	0.2712	0.3608
Film coefficient	Btu/sqft,h,°F	376	514

TOTALS		Side 1	Side 2
Total weight empty (no connections)*	lb	47.5 - 161.51	
Total weight filled (no connections)*	lb	58.3 - 172.31	
Hold-up volume (Inner Circuit)	cuft	0.09	
Hold-up volume (Outer Circuit)	cuft	0.09	
Port size F1/P1	in	1.06	
Port size F2/P2	in	1.06	
Port size F3/P3	in	1.06	
Port size F4/P4	in	1.06	

*Weight depends on the selected product.

DIMENSIONS



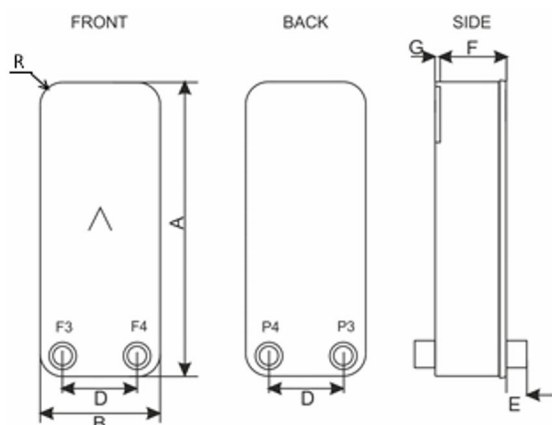
www.swepgroup.com

d5208f20-86ed-473e-b8a2-6021207d0490

Date: 16/09/2025

Page: 1/2

DIMENSIONS



A*	in	14.84 - 16.42 ± 0.08
B*	in	4.7 - 6.28 ± 0.04
C	in	12.95 ± 0.04
D	in	2.83 ± 0.04
E*	in	1 - 3 ± 0.04
F*	in	6.57 - 9.95 $+1\%/-1.5\%$
G	in	0.24 ± 0.04
P	in	1.54
R*	in	0.87 - 0.93

*Dimensions depend on the selected product.

*This is a schematic sketch. For correct drawings please use the order drawing function or contact your SWEP representative.

Legal notice:

By using the SSP/DThermX software the Licensee confirms that the input data is not subject to export control laws including ITAR (International Traffic in Arms Regulations). Licensee further agrees and confirms that the configured products are not subject to export control laws including ITAR and do not qualify as "specially designed" for export control purposes. If you would like to discuss configuration of export controlled products including ITAR-qualifying products, or if your data is export controlled, please reach out to your SWEP representative or email info@swep.net.

Disclaimer:

Data used in this calculation is subject to change without notice. SWEP strives to use "best practice" for the calculations leading to the above results. Calculation is intended to show thermal and hydraulic performance, no consideration has been taken to mechanical strength of the product. Product restrictions - such as pressure, temperatures and corrosion resistance- can be found in SWEP product sheets and other technical documentation. SWEP may have patents, trademarks, copyrights or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from SWEP, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property. To the maximum extent permitted by applicable law, the software, the calculations and the results are provided without warranties of any kind, whether express or implied. No advice or information obtained through use of the software (including information provided in the results), will create any warranty not expressly stated in the applicable license terms. Without limiting the foregoing, SWEP does not warrant that the content (including the calculations and the results) is accurate, reliable or correct. SWEP does not warrant that any system comprising heat exchanger and other components, installed on the basis of calculations in this software, will meet your requirements or function to your satisfaction or expectations.



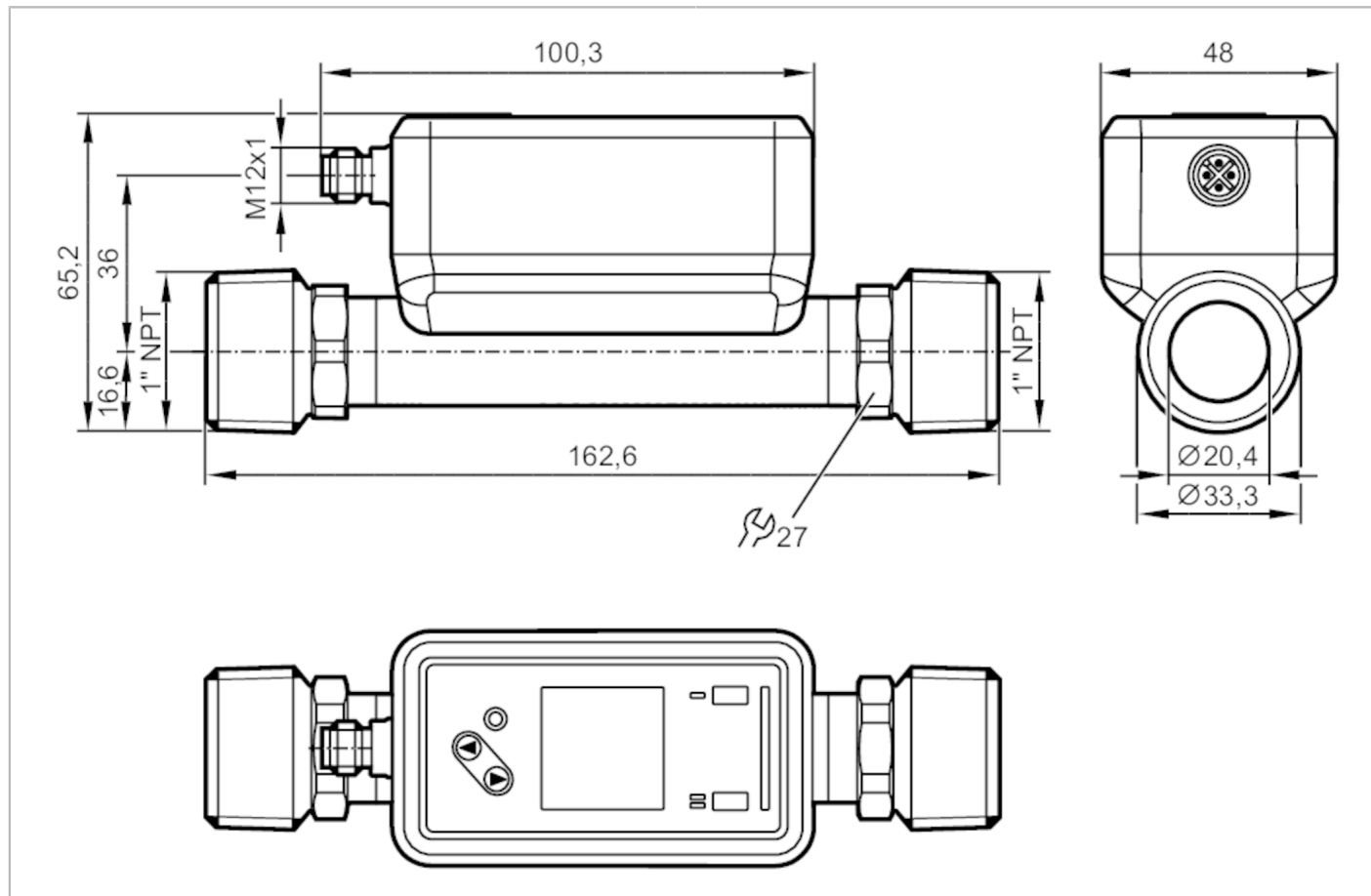
SU8631

FM-101 HP Primary Side ONLY - NOT Potable Side



Ultrasonic flow meter

SUN11XXBFRKG/US



Product characteristics

Measuring range	1...240 l/min	0.06...14.4 m³/h	16...3804 gph	0.26...63.4 gpm
Process connection	threaded connection 1" NPT external thread DN25			

Application

Special feature	Gold-plated contacts	
Media	ultra-pure water; water; hydrous media; glycol solutions; oils; coolants	
Note on media	hydrous media: for media with >10 % additives, the repeatability is the only available value	
	low-viscosity oils with viscosity: 7...40 mm²/s (40 °C)	
	high-viscosity oils with viscosity: 30...68 mm²/s (40 °C)	
Medium temperature	-20...100 °C	-4...212 °F
Min. bursting pressure	150 bar	15 MPa
Pressure rating	100 bar	10 MPa
Vacuum resistance [mbar]	-1000	

Electrical data

Operating voltage [V]	18...32 DC; (to SELV/PELV)			
Current consumption [mA]	< 75			
Protection class	III			
Reverse polarity protection	yes			
Power-on delay time [s]	5			
Measuring principle	ultrasonic			



Ultrasonic flow meter

SUN11XXBFRKG/US

Inputs					
Inputs		counter reset			
Outputs					
Total number of outputs		2			
Output signal		switching signal; pulse signal; analogue signal; IO-Link; frequency signal; diagnostic signal; totaliser switching signal			
Electrical design		PNP/NPN			
Output function		normally open / normally closed; (parameterisable)			
Max. voltage drop switching output DC	[V]	2			
Permanent current rating of switching output DC	[mA]	100			
Switching frequency DC	[Hz]	0...10000			
Analogue current output	[mA]	4...20			
Max. load	[Ω]	500			
Pulse output		flow rate meter			
Short-circuit protection		yes			
Type of short-circuit protection		pulsed			
Overload protection		yes			
Measuring/setting range					
Measuring range		1...240 l/min	0.06...14.4 m³/h	16...3804 gph	0.26...63.4 gpm
Display range		-288...288 l/min	-17.28...17.28 m³/h	-4565...4565 gph	-76.08...76.08 gpm
Resolution		0.1 l/min	0.001 m³/h	1 gph	0.02 gpm
Set point SP		2.3...240 l/min	0.139...14.4 m³/h	37...3804 gph	0.61...63.4 gpm
Reset point rP		1.1...238.8 l/min	0.064...14.325 m³/h	17...3784 gph	0.28...63.07 gpm
Analogue start point ASP		-240...192 l/min	-14.4...11.522 m³/h	-3804...3044 gph	-63.4...50.73 gpm
Analogue end point AEP		-191.9...240 l/min	-11.511...14.4 m³/h	-3041...3804 gph	-50.68...63.4 gpm
Low flow cut-off LFC		1...12 l/min	0.06...0.72 m³/h	16...190 gph	0.26...3.17 gpm
Frequency end point, FEP		48.1...240 l/min	2.889...14.4 m³/h	763...3804 gph	12.72...63.4 gpm
Frequency at the end point FRP	[Hz]	1...10000			
Volumetric flow quantity monitoring					
Pulse length		[s]	0.002...2		
Pulse value		0.02...99990000 l; 0.005...26414563.515 gal			
Temperature monitoring					
Measuring range		-20...100 °C		-4...212 °F	
Display range		-44...124 °C		-47.2...255.2 °F	
Resolution		0.1 °C		0.1 °F	
Set point SP		-19.6...100 °C		-3.2...212 °F	
Reset point rP		-20...99.6 °C		-4...211.2 °F	
Analogue start point		-20...76 °C		-4...168.8 °F	
Analogue end point		4...100 °C		39.2...212 °F	
Frequency start point, FSP		-20...76 °C		4...168.8 °F	
Frequency end point, FEP		4...100 °C		4...212 °F	
Frequency at the end point FRP	[Hz]	1...10000			



Ultrasonic flow meter

SUN11XXBFRKG/US

Accuracy / deviations		
Flow monitoring		
Accuracy (in the measuring range)	glycol solutions (35%)	±(5,0 % MW + 0,5 % MEW)
	high-viscosity oils with viscosity 46mm2/s (40°C)	±(5,0 % MW + 0,5 % MEW)
	low-viscosity oils with viscosity 10mm2/s (40°C)	±(5,0 % MW + 0,5 % MEW)
	water	± (1,0 % MW + 0,5 % MEW)
Repeatability	± 0,2 % MEW	
Temperature monitoring		
Accuracy [K]	± 2,5 (Q > 5 % MEW)	
Temperature coefficient [% of the span / 10 K]	0,2	
Response times		
Flow monitoring		
Response time [s]	< 0.25; (dAP = 0, T09)	
Damping process value dAP [s]	0...5	
Temperature monitoring		
Dynamic response T05 / T09 [s]	5,7 / 86	
Software / programming		
Diagnostic functions	direction of flow detection; signal quality	
Interfaces		
Communication interface	IO-Link	
Transmission type	COM2 (38,4 kBaud)	
IO-Link revision	1.1.3	
SDCI standard	IEC 61131-9: 2013-07	
Profiles	Common - I&D	Identification and Diagnosis
Required master port type	A	
Process data analogue	3	
Process data binary	2	
Min. process cycle time [ms]	9.6	
IO-Link process data (cyclical)	function	bit length
	totaliser	32
	Flow monitoring	32
	Temperature monitoring	32
	status	4
	Output 1	1
	Output 2	1
Supported DeviceIDs	Type of operation	DeviceID
	default	1759
Operating conditions		
Ambient temperature [°C]	-20...60	
Storage temperature [°C]	-25...80	
Protection	IP 67	

SU8631

FM-101 HP Primary Side ONLY - NOT Potable Side



Ultrasonic flow meter

SUN11XXBFRKG/US

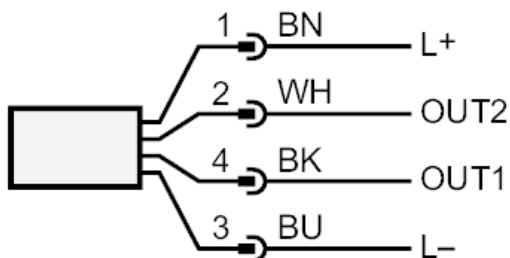
Tests / approvals		
EMC	DIN 61326-1:2021	
Shock resistance	DIN IEC 68-2-27	20 g (11ms)
Vibration resistance	DIN IEC 68-2-6	20 g (10...2000Hz)
MTTF [years]	160	
UL approval	UL Approval no.	I034
Pressure Equipment Directive	can be used for group 2 fluids; group 1 fluids on request	
Mechanical data		
Weight [g]	623.4	
Housing	rectangular	
Type of mounting	inlet pipe length 5xDN; outlet pipe length 1xDN	
Dimensions [mm]	162.6 x 48 x 65.2	
Materials	housing: stainless steel (316L/1.4404); Display: PFA; Sealing Display: FKM; connector: PBT	
Materials (wetted parts)	Pipe section: stainless steel (316L/1.4404)	
Process connection	threaded connection 1" NPT external thread DN25	
Surface characteristics Ra/Rz of the wetted parts	49.21 μin	
Displays / operating elements		
Display		colour display 1,44", 128 x 128 pixels
	Switching function	2 x LED, yellow
	diagnosis	1 x LED, three-colour
Display unit	l/min; l/h; m³/h; m/s; gpm; gph; ft/s; oz/min	
Accessories		
Items supplied	package insert	
Remarks		
Remarks	MW = measured value	
	MEW = Final value of the measuring range	
	pulse and totaliser signal are only available for one of the two outputs	
	the accuracy indications are adhered to over the entire application area	
Pack quantity	1 pcs.	
Electrical connection		
Connector: 1 x M12; coding: A; Contacts: gold-plated		
		



Ultrasonic flow meter

SUN11XXBFRKG/US

Connection



OUT1/IO-Link: switching output volumetric flow quantity monitoring
switching output Temperature monitoring
Pulse output quantity meter
frequency output volumetric flow quantity monitoring
frequency output Temperature monitoring
signal output Preset counter

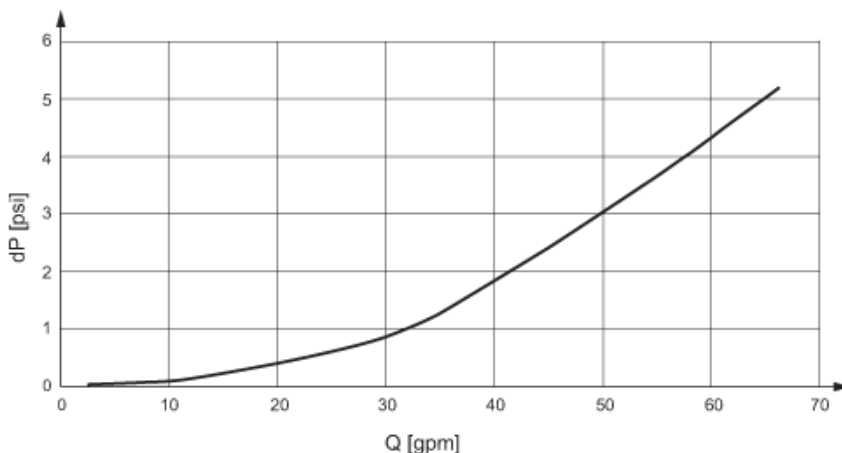
OUT2/InD: switching output volumetric flow quantity monitoring
switching output Temperature monitoring
Pulse output quantity meter
analogue output flow
analogue output temperature
signal output Preset counter
input counter reset

colours to DIN EN
60947-5-2

Core colours
BK= black
BN= brown
BU= blue
WH= white

Diagrams and graphs

Note on pressure loss



SU8631

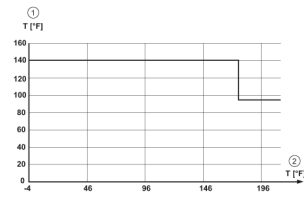
FM-101 HP Primary Side ONLY - NOT Potable Side



Ultrasonic flow meter

SUN11XXBFRKG/US

derating ambient temperature



- 1 Ambient temperature
- 2 Medium temperature

Bourdon Tube Pressure Gauges Stainless Steel Series Type 232.53 - Dry Case Type 233.53 - Liquid-filled Case

TAG: PG-101-102

WIKA Datasheet 23X.53

Applications

- With liquid filled case for applications with high dynamic pressure pulsations or vibration
- Suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system
- Process industry: chemical/petrochemical, power stations, mining, on and offshore, environmental technology, mechanical engineering and plant construction

Product features

- Excellent load-cycle stability and shock resistance
- All stainless steel construction
- Positive pressure ranges to 15,000 psi (1,000 bar)

Specifications

Design

ASME B40.100 & EN 837-1

Sizes

2" 2½" & 4" (50, 63 and 100 mm)

Accuracy class

2" & 2½": ± 2/1/2% of span (ASME B40.100 Grade A)
4": ± 1.0% of span (ASME B40.100 Grade 1A)

Ranges

Vacuum / compound to 200 psi (16 bar)
Pressure from 15 psi (1 bar) to 15,000 psi (1,000 bar)
or other equivalent units of pressure or vacuum

Working pressure

2" & 2½": Steady:	3/4 scale value
Fluctuating:	2/3 full scale value
Short time:	full scale value

4": Steady:	full scale value
Fluctuating:	0.9 x full scale value
Short time:	1.3 x full scale value

Operating temperature

Ambient: -40°F to +140°F (-40°C to +60°C) - dry
-4°F to +140°F (-20°C to +60°C) - glycerine filled
-40°F to +140°F (-40°C to +60°C) - silicone filled
Medium: +212°F (+100°C) maximum



Bourdon Tube Pressure Gauge Model 232.53 - 2½"

Temperature error

Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% of span for every 18°F (10°K) rising or falling.

Ingress protection

IP 65 per EN 60529 / IEC 60259

Pressure connection

Material: 316 stainless steel
Lower mount (LM) or center back mount (CBM)
Lower back mount (LBM) for 4" size
1/8" NPT, 1/4" NPT or 1/2" NPT limited to wrench flat area

Bourdon tube

Material: 316 stainless steel
≤ 1,500 psi (100 bar): C-shape,
> 1,500 psi (100 bar): Helical type

Movement

Stainless steel

Dial

White aluminum with black lettering, 2" and 2½" with stop pin

Pointer

Black aluminum

Case

304 stainless steel with vent plug for ranges ≤ 300 psi and
SS crimp ring
Welded case / socket connection

Window

Polycarbonate

Liquid filling

Glycerine
Glycerine/Water

Approvals

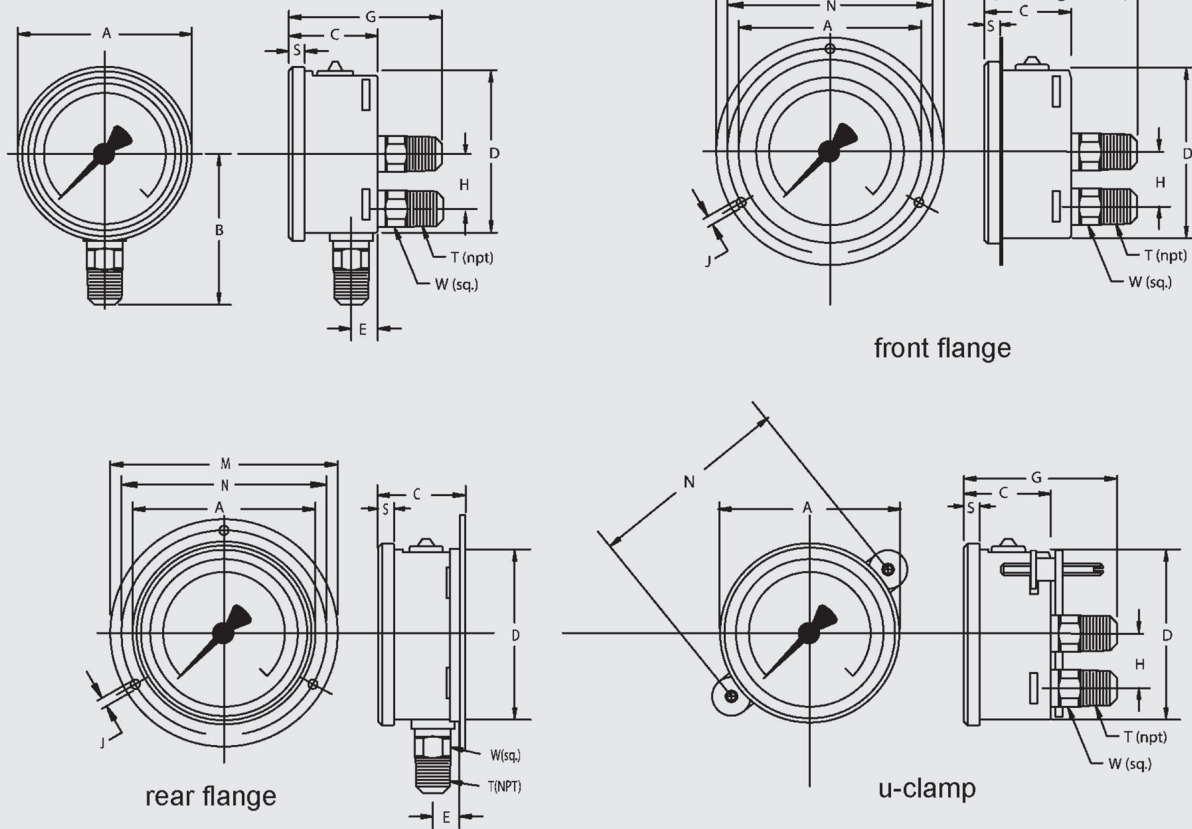
NGV 3.1 Approval

Optional extras

- SS restrictor
- SS front flange
- SS rear flange (2½" and 4" only)
- Zinc-plated steel or SS u-clamp bracket (field installable - see note)
- Cleaned for oxygen service
- Red drag pointer or mark pointer (2½" and 4" only)
- External zero adjustment (4" size only)
- Other pressure connections
- Silicone or Halocarbon Oil case filling
- Other pressure scales available:
bar, kPa, MPa, kg/cm² and dual scales

Note: U-clamp bracket for 2" must be ordered with gauge

Dimensions



front flange

rear flange

u-clamp

Size		A	B	C	D	E	G	H	J	K	M	N	S	T	W	Weight
2"	mm	55	48	30	50	12	53	-	3.6	71	71	60	5.5		14	0.27 lb. dry
	in	2.17	1.89	1.18	1.97	0.47	2.09	-	0.14	2.80	2.80	2.36	0.22	1/4"	0.55	0.33 lb. filled
2.5"	mm	69	54	32	62	13	54	-	3.6	85	88.1	75	6.5		14	0.36 lb. dry
	in	2.69	2.13	1.26	2.45	0.51	2.13	-	0.14	3.35	3.47	2.95	0.26	1/4"	0.55	0.44 lb. filled
4"	mm	107	87	48	100	15.5	79.5	30	4.8	132	132	116	8		22	1.10 lb. dry
	in	4.21	3.43	1.89	3.91	0.61	3.13	1.18	0.19	5.20	5.20	4.57	0.31	1/2"	0.87	1.76 lb. filled

Recommended panel cutout is dimension D + 3 mm

0-100 PSI

H-3000W-P Series

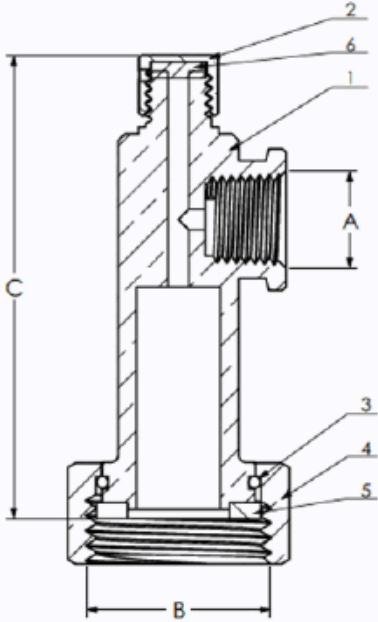
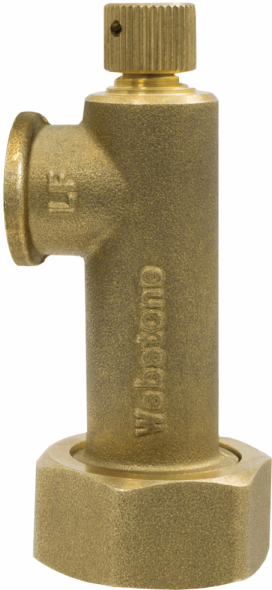
Pro-Pal Add-A-Gauge

Forged Brass Hose Fitting
w/ 1/8" Bleeder (Capped)
For Connection to Pressure Gauge

Certifications

Certified to NSF/ANSI 61

NO.	DESCRIPTION	MATERIAL
1	Body	Brass
2	Bleeder Cap	Brass
3	Snap Ring	Stainless Steel
4	Union Nut	Brass
5	Union Gasket	EPDM
6	Bleeder Cap Gasket	EPDM



	Size (in)	Item#	Max Temp	Pressure Rating	Weight (lbs)	Carton Qty	Case Qty	A	B	C
Hose x FIP Union	3/4" x 1/4"	H-3000W-P	250°F Max	250 PSI CWP Max	0.26	10	100	0.25	0.75	2.75

Specifications: Designed for residential, commercial, or industrial use with water, oil, or gas. Threaded ends comply with ANSI B1.20.1Designed for use with water, oil, glycol mix in residential or commercial plumbing and heating systems.

Precision-Adjustment Pressure-Relief Valve

for Water, 3/4 NPT, 25 to 175 PSI Set Pressure Range

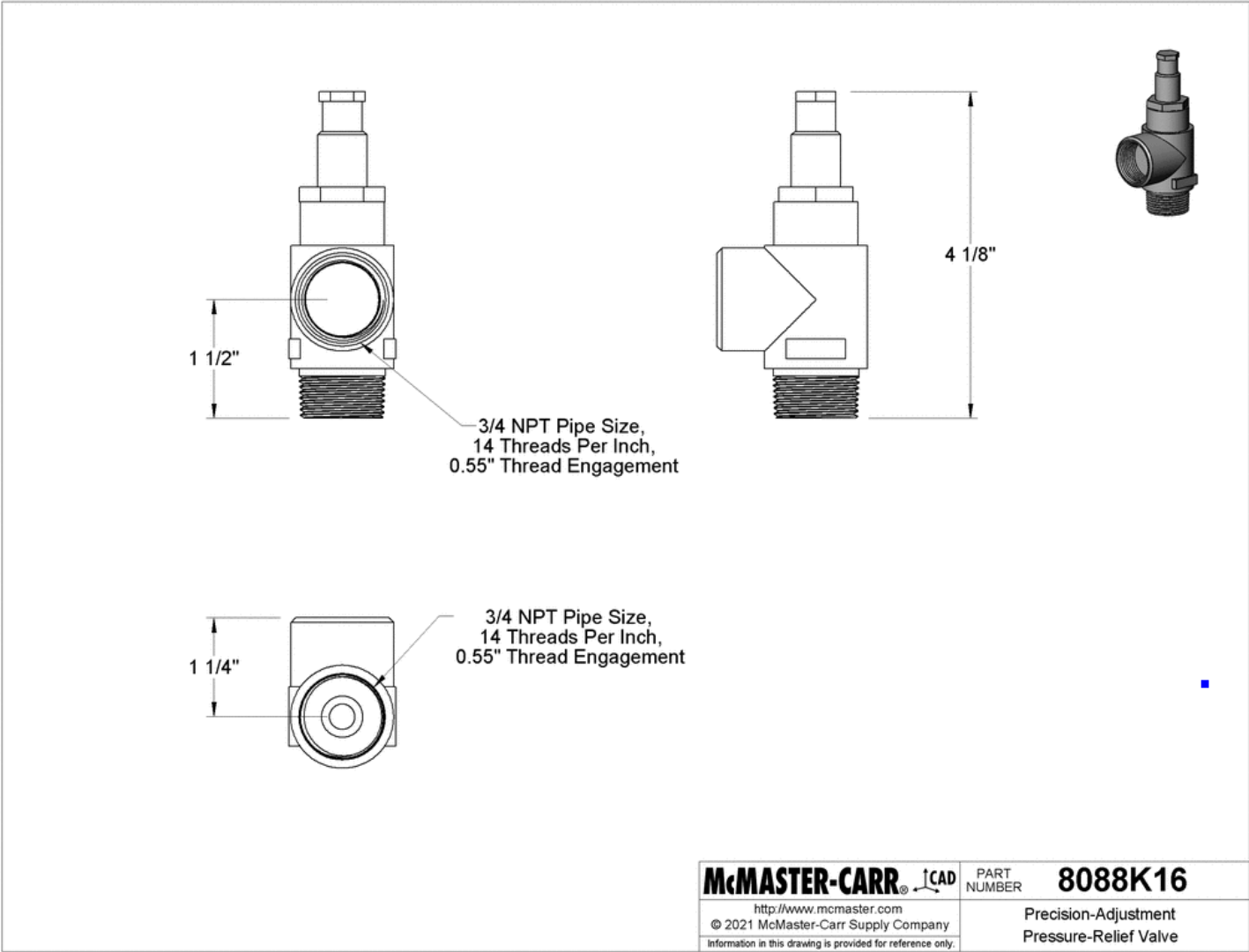


8088K16

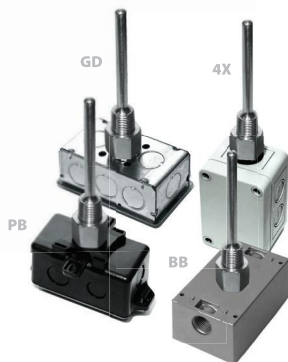
Valve Function	Pressure Relief
For Use With	Water
Activation	Pressure Driven
Inlet	
Pipe Size	3/4
Connection Type	Pipe
Pipe Connection Type	Threaded
Connection	NPT Male
Location	Bottom
Maximum Pressure	220 psi
Relief Port	
Pipe Size	3/4
Connection Type	Pipe
Pipe Connection Type	Threaded
Connection	NPT Female
Location	Side
Set Pressure	
Range	25 to 175 psi
Accuracy	±3%
Configuration	Adjustable
Adjustment Increment	25 psi
Adjustment Method	External Adjustment Screw
Temperature Range	33° to 200° F
Shape	90° Elbow
Overall Height	4 1/8"
Material	
Body	Brass
Seal	Silicone
Valve Type	Relief
Flow Coefficient (Cv)	Not Rated
RoHS	Not Compliant
REACH	Not Compliant
DFARS	Specialty Metals COTS-Exempt
Country of Origin	United States
USMCA Qualifying	No
Schedule B	848140.0000
ECCN	EAR99

Change set pressure without guesswork—the adjustment screw is marked in 25 psi increments for making pressure adjustments without a gauge.

These valves are commonly used with thermal-expansion protection systems and low-capacity pumps. They begin opening at the set pressure and fully open at about 10% over the set pressure. Valves begin closing as pressure drops and fully close when the system pressure is restored below the set pressure.



The information in this 3-D model is provided for reference only.



IMMERSION

Stainless Steel Immersion, Thermistor

The ACI Thermistor Immersion Series features a 1/4" diameter stainless steel probe with two, 14 inch 22 AWG Etched Teflon colored lead wires depending on the probe length ordered to differentiate the different sensor types. The sensors in this series are manufactured using ACI's proven double encapsulation process to eliminate the effects of moisture and to increase the response times using our high quality, thermally conductive epoxy. The immersion sensors include a welded thermowell "-I" version but can be ordered without the welded thermowell "-INW" version. The "INW" version includes a standard 1/2" NPS Male process thread to be used with an optional machined thermowell or in an existing thermowell application. Optional NEMA/IP rated enclosures and NIST certificates are available the back of the product data sheet.

Applications: Chilled Water Systems, Hot Water Systems, Boilers, Pumps, Compressor, Chillers

The ACI Thermistor Immersion Series is covered by ACI's Five (5) Year Limited Warranty. The warranty can be found in the front of ACI's Sensors & Transmitters catalog, as well as on ACI's web site, workaci.com.

Disclaimer: Specification of any thermowell and the materials of construction are the sole responsibility of the designer of the system that incorporates the thermowell. Sole responsibility for ensuring compatibility of the process fluid with the system rests with the end user.

PRODUCT SPECIFICATIONS

Sensor Type Sensor Curve:	Thermistor Non-Linear, NTC (Negative Temperature Coefficient)	
Number Sensing Points Number Wires:	One Two (Non-Polarity Sensitive)	
Sensor Output @ 25°C (77°F) Lead Wire Colors:	A/1.8K: 1.8KΩ nominal Red/Yellow	A/10KS: 10KΩ nominal (White/Blue)
	A/3K: 3KΩ nominal White/Brown	A/10K-E1: 10KΩ nominal (Gray/Orange)
	A/AN (Type III): 10KΩ nominal White/White	A/20K: 20KΩ nominal (Brown/Blue)
	A/AN-BC: 5.238KΩ nominal White/Yellow	A/50K: 50KΩ nominal (Brown/Yellow)
	A/CP (Type II): 10KΩ nominal White/Green	A/100KS: 100KΩ nominal (Black/Yellow)
Accuracy 0-70°C (32-158°F):	A/CSI: 10KΩ nominal (Green/Yellow)	
	+/-0.2°C (+/-0.36°F) except A/10K-E1 Series: +/- 0.3°C (+/-0.54°F)	
Stability:	A/1.8K Series: +/-0.5°C @ 25°C (77°F) and (+/-1.0°C) (+/-1.8°F)	
Response Time (63% Step Change):	Sensor Dependent; Contact ACI for more information on specific sensor	
Power Dissipation Constant:	10 Seconds nominal	
Sensor Operating Temperature Range:	3 mW/°C except A/1.8K Series: 1 mW/°C A/10K-E1 Series: 2 mW/°C	
Enclosure Specifications (Temperature, Flammability, NEMA/IP Ratings):	-40 to 150°C (-40 to 302°F)	
	"-GD" Enclosure: Galvanized Steel, -40°C to 121°C (-40°F to 250°F), NEMA 1 (IP10)	
	"-PB" Enclosure: ABS Plastic, -30°C to 90°C (-22°F to 194°F), UL94-HB, Plenum Rated	
	"-BB" Enclosure: Aluminum, -40°C to 121°C (-40°F to 250°F), Plenum Rated, NEMA 3R	
Storage Temperature Range:	"-4X" Enclosure: Polystyrene Plastic, -40°C to 70°C (-40°F to 158°F), UL94-V2, NEMA 4X (IP 66)	
Operating Humidity Range:	-40 to 85°C (-40 to 185°F)	
Probe Diameter Thermowell Bore Diameter:	10 to 95% RH, non-condensing	
Probe Material Thermowell Material:	0.250" (6.35mm) 0.260"	
Thermowell Instrument Process Thread Size:	304 Stainless Steel 304 Series Stainless Steel	
Fitting Material Flammability Rating:	1/2" NPS (National Pipe Straight) Female Thread 1/2" NPT (National Pipe Tapered) Male Thread	
Fitting Thread Size:	Polyamide 66 (High Performance Nylon 66) UL94-HB	
Foam Pad Material Flammability Rating:	1/2" NPS (National Pipe Straight) Male Thread	
Lead Length Conductor Size:	Neoprene/EPDM/SBR Polymer UL94-HBF; FMVSS-302; MIL-R-6130C	
Lead Wire Insulation Wire Rating:	14" (35.6 cm) 22 AWG (0.65mm)	
Conductor Material:	Etched Teflon (PTFE) Colored Leads Mil Spec 16878/4 Type E	
Product Dimensions Product Weight:	Silver Plated Copper	
Agency Approvals:	See table on back of Product Data sheet	
	CE, RoHS2, WEEE	





MAXIMUM VELOCITY VS THERMOWELL INSERTION LENGTH MACHINED THERMOWELL

Straight Shank Insertion Length "U"					Stepped Shank Insertion Length "U"				
Material:	Media Type:	1.0" (25.4 mm)	2.5" (63.5 mm)	8.0" (203.2 mm)	4.0" (101.6 mm)	6.0" (152.4 mm)	12.0" (304.8 mm)	18.0" (457.2 mm)	24" (609.6 mm)
304/316 SS	Air/Gas/Steam ¹	349 ft/s (106.3 m/s)	349 ft/s (106.3 m/s)	71.9 ft/s (21.9 m/s)	109 ft/s (33.2 m/s)	73.6 ft/s (22.4 m/s)	19.4 ft/s (5.9m/s)	8.8 ft/s (2.7m/s)	5.2 ft/s (1.6m/s)
304/316 SS	Water	360 ft/s (109.7 m/s)	360 ft/s (109.7 m/s)	71.9 ft/s (21.9 m/s)	82.2 ft/s (25.1 m/s)	26.9 ft/s (8.2 m/s)	11.3 ft/s (3.4m/s)	4.7 ft/s (1.43m/s)	2.5 ft/s (0.8m/s)

Note 1: Values are for Air/Gas/ Steam and similar density media based upon Max pressure of 2900 PSI @ 1000°F (537.8°C) | **Note 2:** Values are for Water (No Glycol or other Chemicals factored in) @ 68 °F (20°C) and max pressure of 5700 PSI. (Calculated to ASME PTC 19.3 TW-2016 Code B31.1) | **Note 3:** 6-24" Machined Thermowells meet ASME PTC 19.3 TW-2016 Code B31.1.

MAXIMUM PRESSURE VS TEMPERATURE RATINGS TWO-PART FABRICATED | WELDED THERMOWELL

Material:	70°F (21.1°C)	200°F (93.3°C)	400°F (204.4°C)	600°F (315.6°C)	800°F (426.7°C)	1000°F (537.8°C)	1200°F (648.9°C)
304/316 SS	982 PSI (67.7 Bar)	820 PSI (56.6 Bar)	675 PSI (46.5 Bar)	604 PSI (41.6 Bar)	550 PSI (37.9 Bar)	510 PSI (35.1 Bar)	290 PSI (20.0 Bar)

MAXIMUM FLUID VELOCITY RATINGS TWO-PART FABRICATED | WELDED THERMOWELL

Straight Shank Insertion Length "U"				
Material:	Media Type:	2.5" (63.5 mm)	4.0" (101.6 mm)	6.0" (152.4 mm)
304/316 SS	Air/Gas/Steam ²	169 ft/s (51.5 m/s)	61 ft/s (18.6 m/s)	20 ft/s (6.1 m/s)
304/316 SS	Water	88 ft/s (26.8 m/s)	20 ft/s (6.1 m/s)	10 ft/s (3.05 m/s)

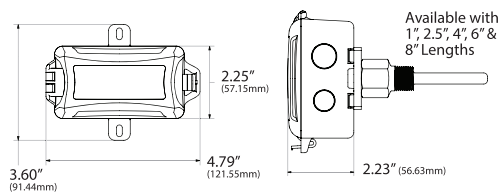
Note 2: Values are for Air/Gas/ Steam and similar density media





DIMENSIONAL DRAWINGS. WEIGHTS

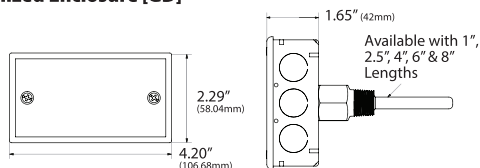
Plastic Box Enclosure [PB]



Plastic Box Enclosure [PB] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-PB	0.20 lbs. (0.091 kg)	0.24 lbs. (0.109 kg)	0.28 lbs. (0.127 kg)	0.32 lbs. (0.145 kg)	0.36 lbs. (0.163 kg)
A/xx-I-yy-PB	N/A	0.24 lbs. (0.109 kg)	0.60 lbs. (0.272 kg)	0.64 lbs. (0.290 kg)	N/A
A/xx-IM-yy-PB	0.40 lbs. (0.182 kg)	0.58 lbs. (0.263 kg)	0.74 lbs. (0.336 kg)	0.92 lbs. (0.417 kg)	1.15 lbs. (0.522 kg)

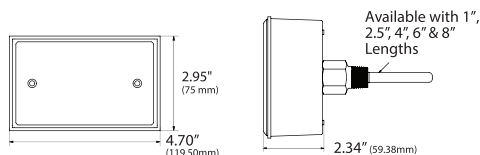
Galvanized Enclosure [GD]



Galvanized Enclosure [GD] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-GD	0.62 lbs. (0.281 kg)	0.66 lbs. (0.299 kg)	0.70 lbs. (0.318 kg)	0.74 lbs. (0.336 kg)	0.78 lbs. (0.354 kg)
A/xx-I-yy-GD	N/A	0.88 lbs. (0.399 kg)	1.00 lbs. (0.454 kg)	1.04 lbs. (0.472 kg)	N/A
A/xx-IM-yy-GD	0.81 lbs. (0.367 kg)	1.00 lbs. (0.454 kg)	1.16 lbs. (0.526 kg)	1.32 lbs. (0.599 kg)	1.55 lbs. (0.703 kg)

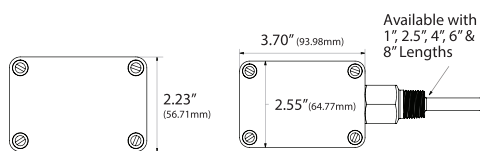
Bell Box Enclosure [BB]



Bell Box Enclosure [BB] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-BB	0.64 lbs. (0.290 kg)	0.68 lbs. (0.308 kg)	0.70 lbs. (0.318 kg)	0.74 lbs. (0.336 kg)	0.80 lbs. (0.363 kg)
A/xx-I-yy-BB	N/A	1.02 lbs. (0.463 kg)	1.00 lbs. (0.454 kg)	1.04 lbs. (0.472 kg)	N/A
A/xx-IM-yy-BB	0.83 lbs. (0.376 kg)	1.02 lbs. (0.463 kg)	1.16 lbs. (0.526 kg)	1.32 lbs. (0.599 kg)	1.59 lbs. (0.721 kg)

NEMA 4X Enclosure [4X]

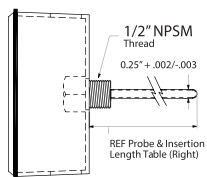


NEMA 4X Enclosure [4X] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-4X	0.28 lbs. (0.127 kg)	0.32 lbs. (0.145 kg)	0.36 lbs. (0.163 kg)	0.40 lbs. (0.181 kg)	0.44 lbs. (0.200 kg)
A/xx-I-yy-4X	N/A	0.64 lbs. (0.290 kg)	0.68 lbs. (0.308 kg)	0.72 lbs. (0.327 kg)	N/A
A/xx-IM-yy-4X	0.48 lbs. (0.218 kg)	0.66 lbs. (0.299 kg)	0.82 lbs. (0.372 kg)	1.00 lbs. (0.454 kg)	1.27 lbs. (0.576 kg)

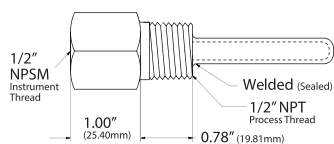
N/A = Not Available | xx = Sensor Type | yy = Insertion Length

PROBE AND INSERTION LENGTH IMMERSION NO WELL



Pictured Above: immersion no well (INW) sensor in Bell Box Enclosure (BB).

Pictured Below: welded two piece thermowell to show connection and depth reference. Thermowell not included with immersion no well (INW).



Probe & Insertion Length

Probe Length	Insertion Length	ACI Part #	Thermowell Part #
3"	2.81" +/- 0.13"	A/xx-INW-1"-yy-zz	A/M1"
4.5"	4.31" +/- 0.13"	A/xx-INW-2.5"-yy-zz	A/2.5" or A/M2.5"
6"	5.81" +/- 0.13"	A/xx-INW-4"-yy-zz	A/4" or A/M4"
8"	7.81" +/- 0.13"	A/xx-INW-6"-yy-zz	A/6" or A/M6"
10"	9.81" +/- 0.13"	A/xx-INW-8"-yy-zz	A/M8"
13"	12.75" +/- 0.13"	A/xx-INW-12"-yy-zz	A/M12"
19"	18.75" +/- 0.13"	A/xx-INW-18"-yy-zz	A/M18"
25"	24.75" +/- 0.13"	A/xx-INW-24"-yy-zz	A/M24"





A/CP-IM-2.5"-4X

CUSTOM ORDERING WELDED THERMOWELL

Model # Example: A/ 1.8K I 4" GD NIST
A. B. C. D. E. F.

A. Sensor Series No Selection Required	A/
B. Model Series Select One (1)	1.8K 3K AN AN-BC CP CSI 10KS 10K-E1 20K 100KS
C. Configuration Select One (1)	I=Immersion with Welded Thermowell
D. Insertion Length Select One (1)	2.5" = 2.5" Insertion 4" = 4" Insertion 6" = 6" Insertion
E. Enclosure Select One (1)	GD=Galvanized PB=Plastic BB=Aluminum, NEMA 3R 4X=NEMA 4X
F. NIST Select One (1)	---- = No NIST Certificate NIST= NIST Certificate (3 Points)

MODEL

A/

CUSTOM ORDERING MACHINED THERMOWELL

Model # Example: A/ 1.8K IM 4" GD NIST
A. B. C. D. E. F.

A. Sensor Series No Selection Required	A/
B. Model Series Select One (1)	1.8K 3K AN AN-BC CP CSI 10KS 10K-E1 20K 100KS
C. Configuration Select One (1)	IM=Immersion with Machined Thermowell
D. Insertion Length Select One (1)	1" = 1" Insertion 2.5" = 2.5" Insertion 4" = 4" Insertion 6" = 6" Insertion 8" = 8" Insertion
E. Enclosure Select One (1)	GD=Galvanized PB=Plastic BB=Aluminum, NEMA 3R 4X=NEMA 4X
F. NIST Select One (1)	---- = No NIST Certificate NIST= NIST Certificate (3 Points)

MODEL

A/

Note: Machined Thermowells with lengths of 12", 18" and 24" are available and must be ordered separately | See the Machined Thermowells Data Sheet (Accessories)

CUSTOM ORDERING SENSOR ONLY NO THERMOWELL

Model # Example: A/ 1.8K INW 1" GD NIST
A. B. C. D. E. F.

A. Sensor Series No Selection Required	A/
B. Model Series Select One (1)	1.8K 3K AN AN-BC CP CSI 10KS 10K-E1 20K 100KS
C. Configuration Select One (1)	INW = Immersion without Thermowell
D. Insertion Length Select One (1)	1" = 1" Insertion 2.5" = 2.5" Insertion 4" = 4" Insertion 6" = 6" Insertion 8" = 8" Insertion 12" = 12" Insertion 18" = 18" Insertion 24" = 24" Insertion
E. Enclosure Select One (1)	GD=Galvanized PB=Plastic BB=Aluminum, NEMA 3R 4X=NEMA 4X
F. NIST Select One (1)	---- = No NIST Certificate NIST= NIST Certificate (3 Points)

MODEL

A/

ACCESSORIES ORDERING

Model # Example: NSG HEAT TRANSFER PASTRE 2 oz Or 102595

Model #	Item #	Description
NSG Heat Transfer Paste 2 oz.	102595	Thermal Grease, 2 oz. Tube, Silicone Free, -40 to 320°F (-40 to 160°C)
NSG Heat Transfer Paste 16 oz.	140574	Thermal Grease, 16 oz. Jar, Silicon Free, -40 to 390°F (-40 to 198°C)
A/2.5"	128349	2.5" (63.5 mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/4"	128350	4" (101.6 mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/6"	128351	6" (152.4 mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/M1"	128337	1" (25.4 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M2.5"	128338	2.5" (63.5 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M4"	128343	4" (101.6 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M6"	128344	6" (152.4 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M8"	138725	8" (203.2 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M12"	128339	12" (304.80 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M18"	128341	18" (457.20 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M24"	128342	24" (609.6 mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M2.5" - 316SS	128352	2.5" (63.5 mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell
A/M4" - 316SS	128353	4" (101.6 mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell
A/M6" - 316SS	128354	6" (152.4 mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell



Inspection & Test Plan

GPS INSPECTION AND TEST PLAN (ITP)
GRUNDFOS PACKAGED SOLUTIONS

GCB SO #:

TBD

Part Number:

93282943

PO#:

TBD

Project Name:

Mitsubishi QAHV Phase 2

Revision #

B

Date:

10/31/2024

SI = Submit for Information

SA = Submit for Approval

FD = Submitted w/ O&M's

R = Review Documents

RI = Random Inspection

H = Hold

W = Witness

Buyer/User

Mitsubishi Electric Trane HVAC

Contact:

Matthew Rash

Phone:

0

Email:

0

Third Party

(Not advised at time of issue - if required)

Contact:

Phone:

Email:

FACILITY	QUALITY ACTIVITY	CONTROLLING DOCUMENT	VERIFYING DOCUMENT	COMMENTS	GCB	Buyer/ User	Third Party
	PRODUCTION						
	Welding						
GCB	Welding procedure specification (WPS)	GCB WPS Forms latest revisions	CWI Approved WPS				
GCB	Welding qualification record (PQR)	GCB PQR Forms latest revisions	CWI Approved WPS				
	Skid						
GCB	Visual / Dimensional Inspection	GCBFB530208-01 latest revision	Completed Form		RI	FD	
GCB	NDE - Liquid Penetrant Inspection	GCBFB530208-02 latest revision	Completed Form		RI	FD	
	Piping						
GCB	Visual / dimensional	GCBFB530208-04 latest revision	Completed Form		RI	FD	
GCB	Piping Hydro Test	GCBFB530208-08 latest revision	Completed Form	LEAK TEST AT 80 PSI, THEN TEST SYSTEM AT 125 PSI DURING 10 MINUTES	RI	FD	
	Package						
GCB	Customer Connection Inspection	GCBFB530208-07 latest revision	Completed Form		RI	FD	
	Coatings						
TBD	Surface Preparation / Coating Data	GCBFB530208-05 & 06 latest revision	Certificate of Conformance	GRUNDFOS STANDARD ONE COAT PROCESS COLOR FINISH: JET BLACK RAL 9005	RI	FD	
	COMPONENT TESTING						
	Electrical Verification						
GCB	Electrical Verification	GCBFB530208-09 latest revision	Completed Form		RI	FD	
GCB	Dielectric Withstand Test (Hi-Pot)	GCBFB530208-11 latest revision	Completed Form	1240VAC	RI	FD	
GCB	Grounded Continuity Test	GCBFB530208-12 latest revision	Completed Form		RI	FD	
	Final Inspection						
GCB	Final Production Inspection	GCBFB530208-13 latest revision	Completed Form		RI	FD	



MITSUBISHI ELECTRIC TRANE HVAC US

INTERMEDIATE CONTROLLER V2.1



CONTROLS ENGINEER: JAM

PROJECT MANAGER: JAM

REVISION #: 6

REVISION DATE: 12/05/2024

TOC	2
WIRING NOTES 1	3
WIRING NOTES 2	4
NETWORK RISER	5
QAHV CONTROLS VISUAL OVERVIEW	6
SEQUENCE OF OPERATION	7
PANEL DETAIL	8
PANEL DIMENSIONS	9
BOM	10
CONTROLLER WIRING	11
POWER WIRING	12



MITSUBISHI ELECTRIC
MITSUBISHI ELECTRIC TRANE HVAC US



MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

INTERMEDIATE CONTROLLER V2.1

TOC

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM



REV	DESCRIPTION	DATE	REVISED BY
1	REMOVE PWM CONVERTER	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 4-20 MA SIGNALS	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM

PROJECT NUMBER:
PR-00XXXX

LAST REVISION DATE:
FEBRUARY 24, 2025

SHEET NUMBER:
PAGE 2 OF 12

WIRE SPECIFICATIONS

Cable Type	Implementation	Specifications
B1	General IO	18-2, Shielded, twisted, Class 2 Plenum, White jacket, Blk/Wht Cond
B2	General IO	18-3, Shielded, twisted, Class 2 Plenum, White jacket, Blk/Wht/Red Cond
B3	General IO	18-4, Shielded, twisted, Class 2 Plenum, White jacket, Blk/Wht/Red/Grn Cond
B4	General IO	18-6, Shielded, twisted, Class 2 Plenum, White jacket, Blk/Wht/Rd/Grn/Blu Cond
C1	Ethernet	CAT6, 4P, UTP-Unshielded, CMP, 23AWG, LS PVC Jacket, (Belden 2413 or equivalent)
C2	Ethernet	CAT6, 4P, UTP-Unsheilded, CMP, 28AWG (Slim)
G1	BACNet	22-2, Shielded, twisted, low-cap (12.5 pF/ft) 100ohms imp, Org jacket, Blk/Wht Cond (WCW 043004x or equivalent)
G2	Modbus	22-2, Shielded, twisted, (51 pF/ft) 37ohms imp, Blu or Prpl jacket, Blk/Wht Cond (WCW 0043250 or equivalent)
G3	Modbus	18 GA., Plenum Rated, Twisted, Shielded, Pair, Stranded, Low Cap., I.E. Connect-Air W181P-2090RIB
Hx	General IO	16 AWG, TFFN, 26-stranded, bare copper, 600V (Colors may vary)
M1	M-Net	16-2,Shielded, Stranded, Class 3 Plenum, Flexguard, White Jacket, Blk/Wht Cond (CW162S-1000 or equivalent)
M2	General IO	16-2, Un-Shielded, Stranded, Class 3 Plenum, White Jacket, Blk/Wht Cond (WP161P-2062 or equivalent)
N1	General IO	22-2, Shielded, Plenum
N2	General IO	22-4, Shielded, Plenum
P1	Ethernet/Patch	CAT6 Slim Patch, 1FT, 4P, UTP-Unshielded, CMP, 28AWG, HD-PE/PVC Jacket
P2	Ethernet/Patch	CAT6 Slim Patch, 3FT, 4P, UTP-Unshielded, CMP, 28AWG, HD-PE/PVC Jacket

WIRING DETAIL NOTES

- General:
- Only devices listed on Bill of Material are supplied by Mitsubishi Electric Trane HVAC US LLC (METUS); all other material is either existing or supplied by others.
 - Field verify terminations to all existing devices
 - All devices must be installed according to installation instructions with device, unless specifically directed otherwise by a n authorized METUS representative.
 - Do NOT apply power to control panels until preliminary checkout has been completed by an authorized METUS representative.
 - Each control panel requires a dedicated 120VAC, 15A power source.
 - All wiring must comply with national, state, and local electrical codes.
 - All wiring to be tagged with point name as of shown on drawings at both ends of wire.
 - Provide “red-line” or marked-up drawings representing actual installation to METUS for as-built/record drawing creation.

- RS-485 Communication Wiring:
- Do NOT use different wire types or gauges on the same communication trunk segment.
 - In noisy (high EMI) environments, avoid wire runs parallel to power cables, or wire-way containing lighting circuits
 - It is highly recommended that network wiring be in its own conduit wire-way. It may, however, be routed with other “low voltage” conductors. Intersection of communication cabling with high voltage/current conductors must occur in a perpendicular fashion.
 - Connect the shield to the Earth Ground at one end of the Bus only. This should be at the Network Controller location.
 - Tie together and tape back the shield at each device. Do not allow the shield to contact grounded and/or metallic components on or at the field mounted equipment.

Shielding and Grounding:
The shield should be earth grounded at only one point for the entire bus segment (preferably at the network control panel.) The shield terminals on the controllers are presented as a convenient way to continue the daisy chain of the bus and prevent shield contact with equipment and other metallic components. The shield may be tied or twisted together and taped up on each cable segment at the controller.

Refer to TIA/EIA-485-A standards for addition details and guidance regarding communication cabling installation. Ethernet cabling terminations shall meet T568B wiring standards.

PROJECT NUMBER:
PR-00XXXX

LAST REVISION DATE:
FEBRUARY 24, 2025

SHEET NUMBER:
PAGE 3 OF 12

REVISIONS			
REV	DESCRIPTION	DATE	REVISED BY
1	REMOVE PWM CONVERTER	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 1-20 MA SIGNALS	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM

INTERMEDIATE CONTROLLER V2.1

WIRING NOTES 1

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM

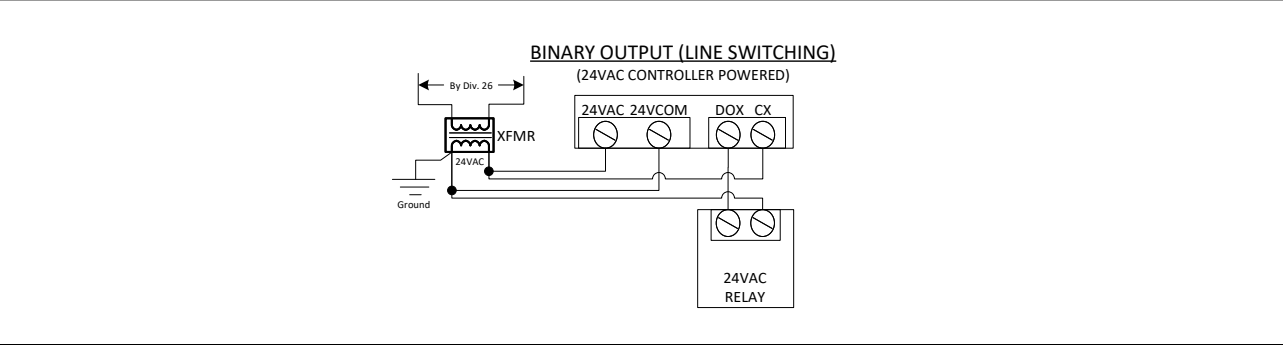
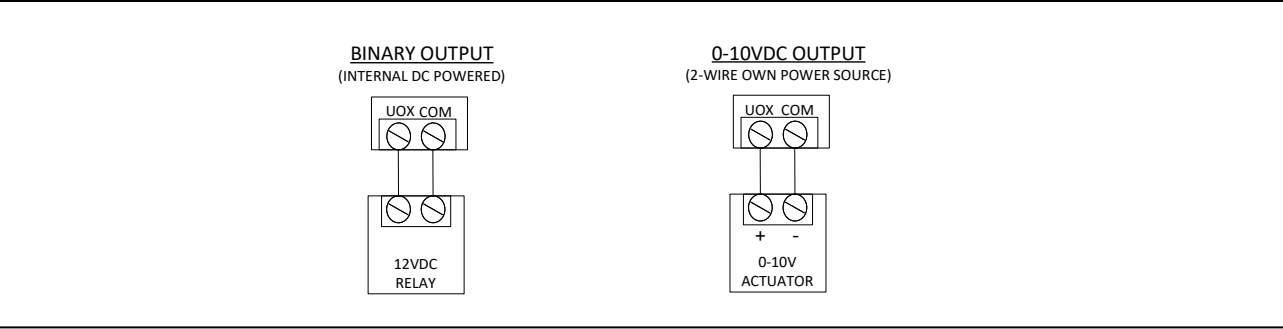
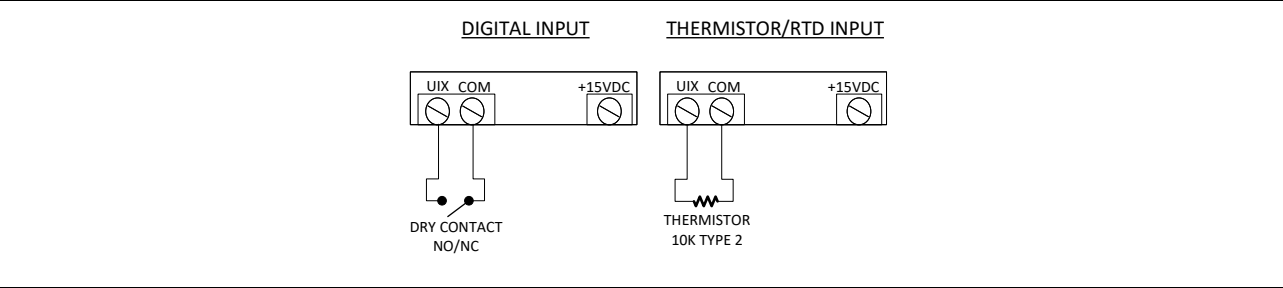
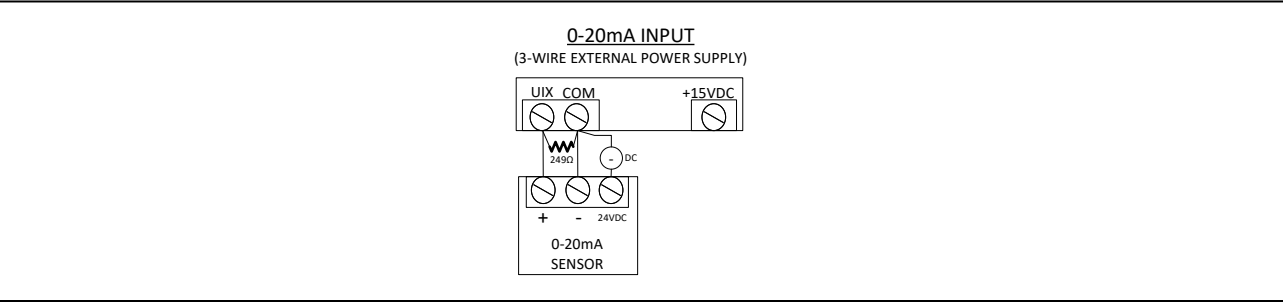


MITSUBISHI ELECTRIC TRANE HVAC US

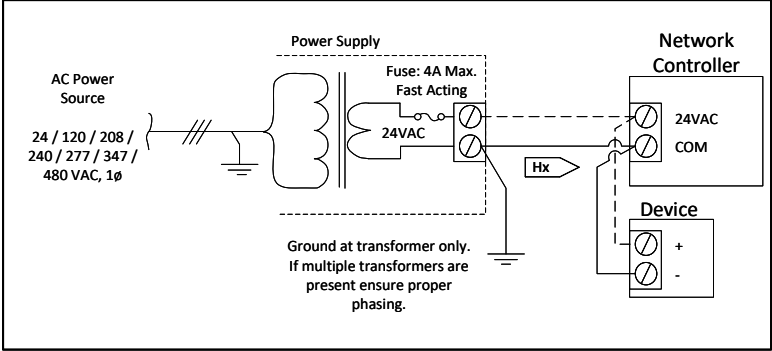
MITSUBISHI ELECTRIC TRANE

MITSUBISHI ELECTRIC TRANE HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

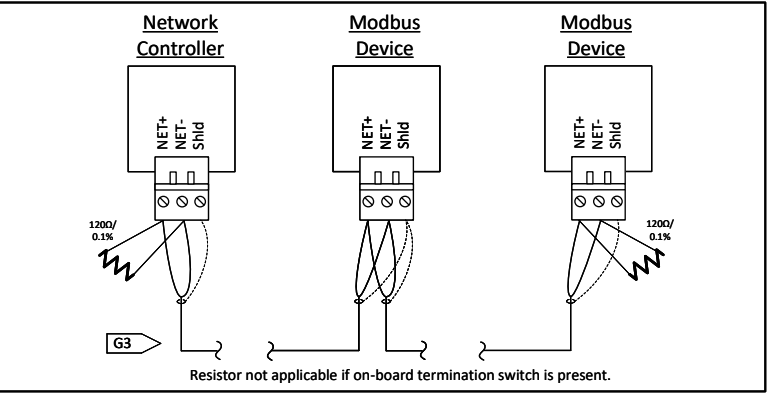
DISTECH ECY-300 SERIES IO WIRING



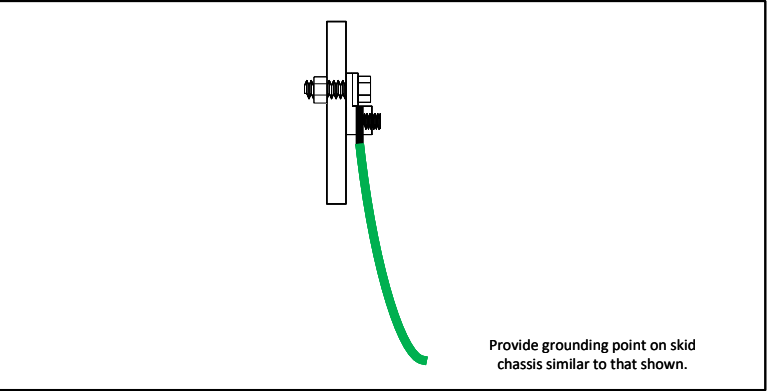
POWER WIRING NOTES



MODBUS DEVICE WIRING



Grounding



PR-00XXXX

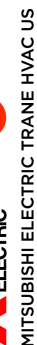
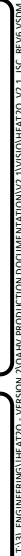
FEBRUARY 24, 2025

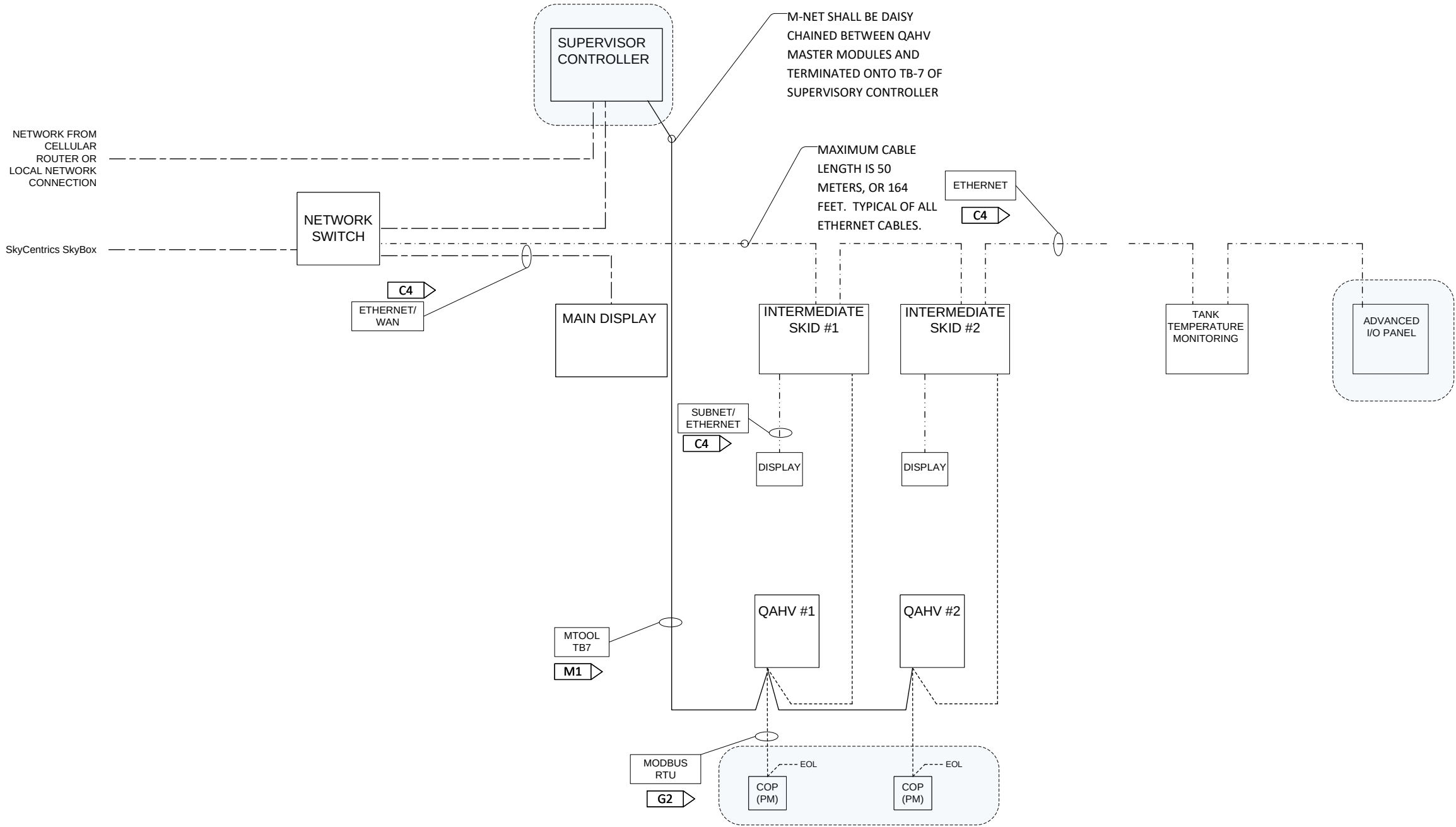
PAGE 4 OF 12

131 ENGINEERING LINE ATCO - VERSION 2104 MAY PRODUCTION DOCUMENTATION V2 1 ISC DEVE USNM

WIRING NOTES 2

PROJECT MANAGER: JAM





INTERMEDIATE CONTROLLER V2.1

NETWORK RISER

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM



REVISIONS			REVISED BY	
REV	DESCRIPTION	DATE		
1	REMOVE PWM CONVERTER	5/10/24	JAM	JAM
2	CORRECT CONTROLLER WIRING DETAIL 4-20 MA SIGNALS	10/16/2024	JAM	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM	JAM
6	UPDATE FM-1	2/21/2025	JAM	JAM

STRAINER, RPZ, PRV, PRESSURE GAUGE AT FILL LINE OF BUILDING MAIN TO BUILDING WATER SUPPLY

FOR FUTURE FILL LINE TO OTHER EQUIPMENT

PLUGGED BALL VALVE TO FUTURE CAHV INDIRECT SWING/STORAGE TANK

HEAT TRAIL 12" BELOW TOP OF TANK

EXPANSION TANK

ADVANCED IO PANEL

120VAC
MCA 5A

B1
(TYP OF 6)
8 AWG – 22AWG
TWISTED PAIR WIRE
(SHIELD NOT REQUIRED)

120VAC
MCA 0.42 A

TANK TEMP MONITORING PANEL

ETHERNET

120VAC
MCA 2.67A
120VAC
MCA 2.67A

SKID S1 PANEL
SKID S2 PANEL

ETHERNET FROM APEX SUBNET
G2, 18AWG – 22AWG TWISTED PAIR SHIELDED WIRE
MODBUS RTU (RS-485)

M1

M-NET
(Optional)

M-NET
(Optional)

Building LAN/Internet Connection by Others

120VAC
MCA 0.95A

SUPERVISORY PANEL

M-NET
(Optional)

CONTROLS OVERVIEW - GENERAL EXAMPLE

Cable Type	Implementation	Specifications
B1	General IO	18-2, Shielded, twisted, Class 2 Plenum, White jacket, Blk/Wht Cond
C1	Ethernet	CAT6, 4P, UTP-Unshielded, CMP, 23AWG, LS PVC Jacket, (Belden 2413 or equivalent)
G3	Modbus	18 GA., Plenum Rated, Twisted, Shielded, Pair, Stranded, Low Cap., I.E. Connect-Air W181P-2090RIB
M1	M-Net	16-2, Shielded, Stranded, Class 3 Plenum, Flexguard, White Jacket, Blk/Wht Cond (CW162S-1000 or equivalent)

INTERMEDIATE CONTROLLER V2.1

QAHV CONTROLS VISUAL OVERVIEW

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM

REV	DESCRIPTION	DATE	REVISOR
1	REMOVE PWM CONVERTER	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 1-20 MA SIGNALS	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM



MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

Overview

The QAHV module is an electric heat pump designed to generate hot water. The QAHV module along with an intermediate skid and storage tank(s) make up a highly efficient hot water heating and storage system.

System Design

Each QAHV module is paired with a single intermediate skid. The intermediate skid includes a double walled plate type heat exchanger, primary and secondary loop inlet/outlet temperature and flow sensors, and a secondary loop circulator pump and a flow control valve to circulate water thru the heat exchanger and into the storage tank(s)

The skid mounted heat exchanger segments the water heating circuit into primary and secondary loops. The QAHV module is the source of heating for the primary loop. Primary loop flow and temperature control is maintained by the QAHV module’s internal controls which initiate upon receiving a signal from the intermediate kid control panel. Communication to the QAHV module will be over Modbus via the Procon A1M adapter connected to the QAHV module’s CN105 port. Secondary loop flow and temperature will be controlled by a programable DDC controller (Distech Controls - ECY303). Up to 6 storage tanks are included with the system to store hot water, similarly to a rechargeable battery storing electrical energy. Tank temperature is monitored by up to 6 immersion type temperature sensors that report to the tank temperature control panel. The tank temperature control panel reports to both the intermediate skid and supervisory control panels over an IP based local area network.

System Operation

System Start

When the storage tank temperature falls below the target On setpoint 130 °F (adj.), a system start is initiated. The skid controller will send the QAHV module a signal to start. Once the minimum flow rate 0.5 GPM (adj.) has been reached on the primary loop, the secondary loop circulator pump will start. The secondary loop circulator pump speed will modulate to keep the secondary loop flow rate equal to the primary loop flow rate.

Control Valve Operation

The 3-way 2-position control valve CV-1 will transition the water flow from the high flow circuit to the low flow circuit to achieve equal turndown in the primary and secondary loops during low flow operation. When the flow rate on the primary loop is below 2 GPM (adj.), CV-1 will transition to direct water thru the low flow circuit. When the primary flow rate is above 2 GPM, CV-1 will transition to direct flow thru the high flow circuit. The valve will fail to the high flow position.

System Shutdown

Once the storage tank temperature reaches the target Off setpoint 160 °F (adj.), a system shutdown will be initiated. A signal to stop will be sent to the QAHV module. The secondary loop circulator pump speed will ramp down to minimum speed and the control valve CV-1 will transition to the low flow position. After 2 min (adj), the secondary loop circulator pump will shutdown and the control valve CV-1 will transition to the high flow position.

Local/Supervisory Control Mode

Local monitoring and control of the intermediate skid and it’s connected components is made possible by the ECx-Display. It provides an interface at the skid to allow an installer and/or start-up technician the ability to perform testing and startup functions such as leak checking, air bleeding, test and balancing. It also allows the skid and its associated QAHV module to operate standalone. Supervisory control is provided when a remote supervisory control panel is added to the system. The supervisory control panel provides centralized control, staging and redundancy, and is also the gateway for remote monitoring and enabling additional features.

Local Control Mode

When the skid control panel is placed in the Local Control Mode at the local display and is connected to the tank temperature control panel., the intermediate skid and associated QAHV module is able to operate standalone.

Hot Water Storage Mode – Standalone operation

The user will select an available tank temperature sensor from the local display that will be used to initiate a start of the QAHV system when water temperature at that sensor falls below the target On setpoint. A second sensor will be selected to stop the QAHV system when water temperature at that sensor is it at the target Off setpoint. Allowing the system to maintain a fixed minimum and maximum amount of hot water supply.

Startup and Commissioning

Startup personnel can use the skid mounted local display to monitor and independently control the various sensors, circulator pump and control valve during the initial startup and testing phase.

Test Mode Operation

Low and high flow test mode operations are provided to allow the test and balancing agent the ability to set the secondary loop circulator pump’s minimum and maximum speed in alignment with the system design minimum and maximum flow rate.

Low Flow Test Mode

When Low Flow Test Mode is selected, the secondary circulator pump is started, and the control valve will direct the water flow thru the low flow circuit setter. The startup agent can then jog the pump speed up or down until the desired minimum secondary loop low flow value, as read from the secondary loop flow meter, is reached.

High Flow Test Mode

When High Flow Test Mode is selected, the secondary circulator pump is started, and the control valve will direct the water flow thru the high flow circuit setter. The startup agent can then jog the pump speed up or down until the desired maximum secondary loop low flow value, as read from the secondary loop flow meter, is reached.

Supervisory Control Mode

When the skid control panel is placed into Supervisory Control Mode at the local display, standalone operation is suspended and operational control of the skid and associated QAHV module is managed by the supervisory control panel. Details on the operational requirements of the Supervisory Control Panel can be found in the Supervisory Control Panel Requirements page.

REVISIONS		
REV	DESCRIPTION	DATE
1	REMOVE PWM CONVERTER	5/10/24
2	CORRECT CONTROLLER WIRING DETAIL 1-20 MA SIGNALS	10/16/2024
3	UPDATE PLANT OVERVIEW	10/31/2024
4	REVISE WIRING NOTES 2	11/14/2024
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024
6	UPDATE FM-1	2/21/2025

INTERMEDIATE CONTROLLER V2.1

SEQUENCE OF OPERATION

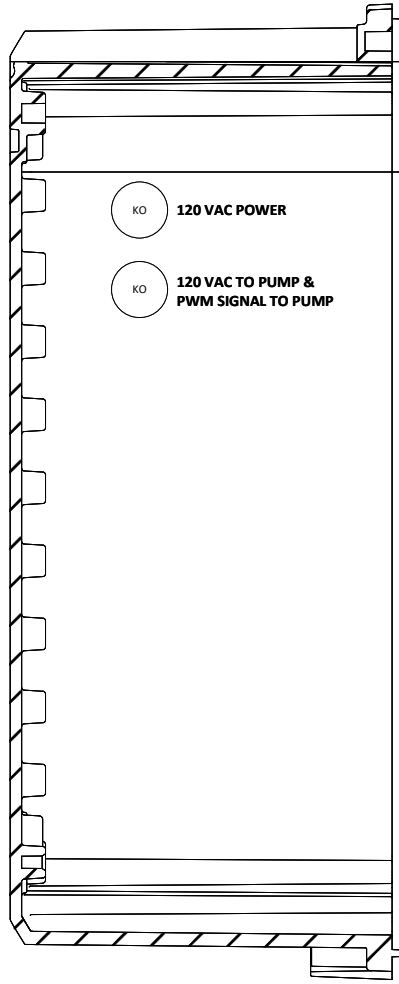
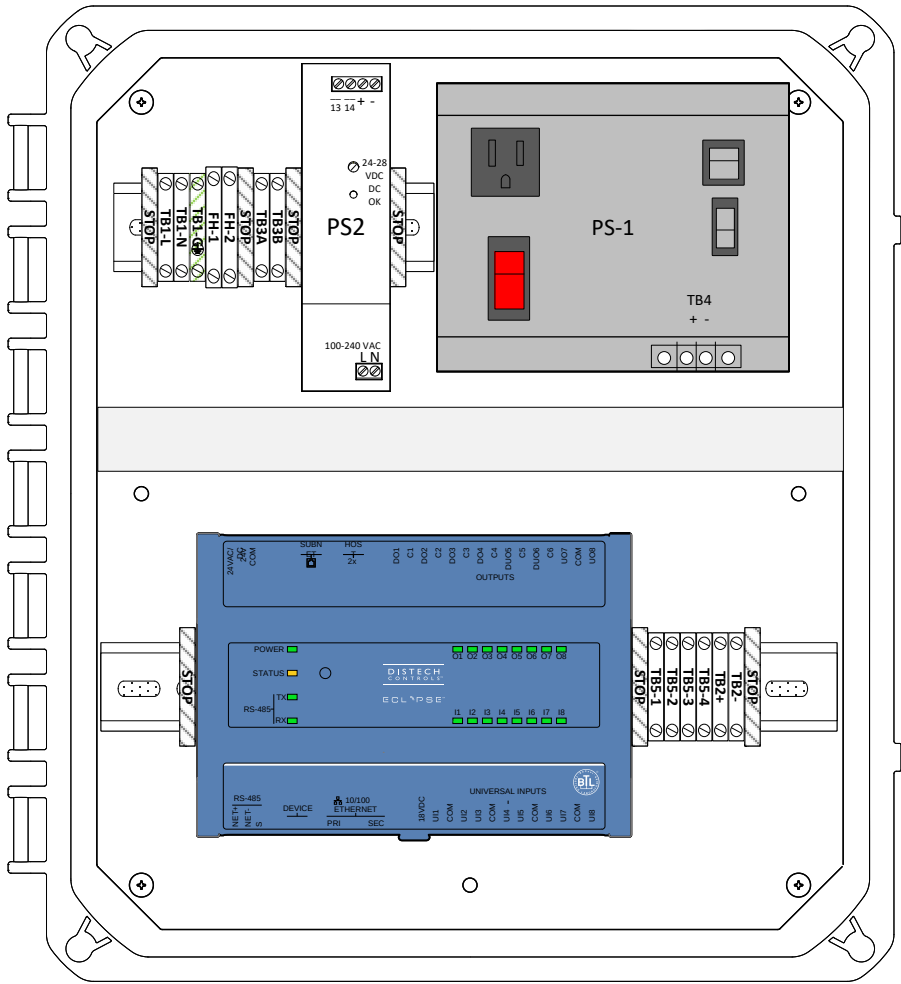
LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM



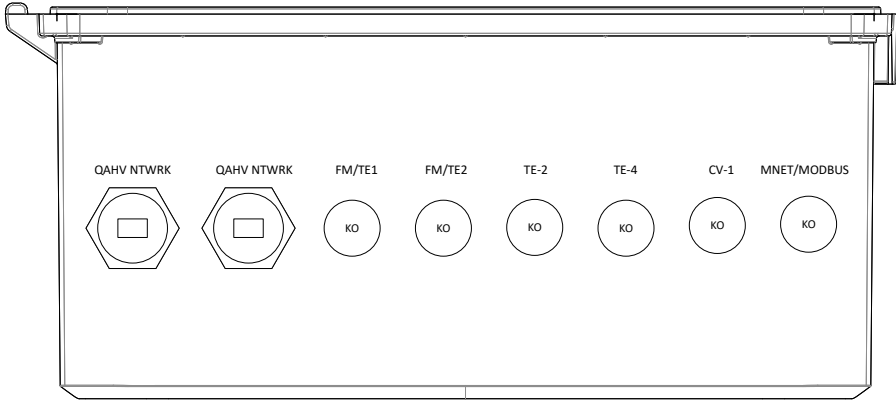


MITSUBISHI ELECTRIC TRANE HVAC US

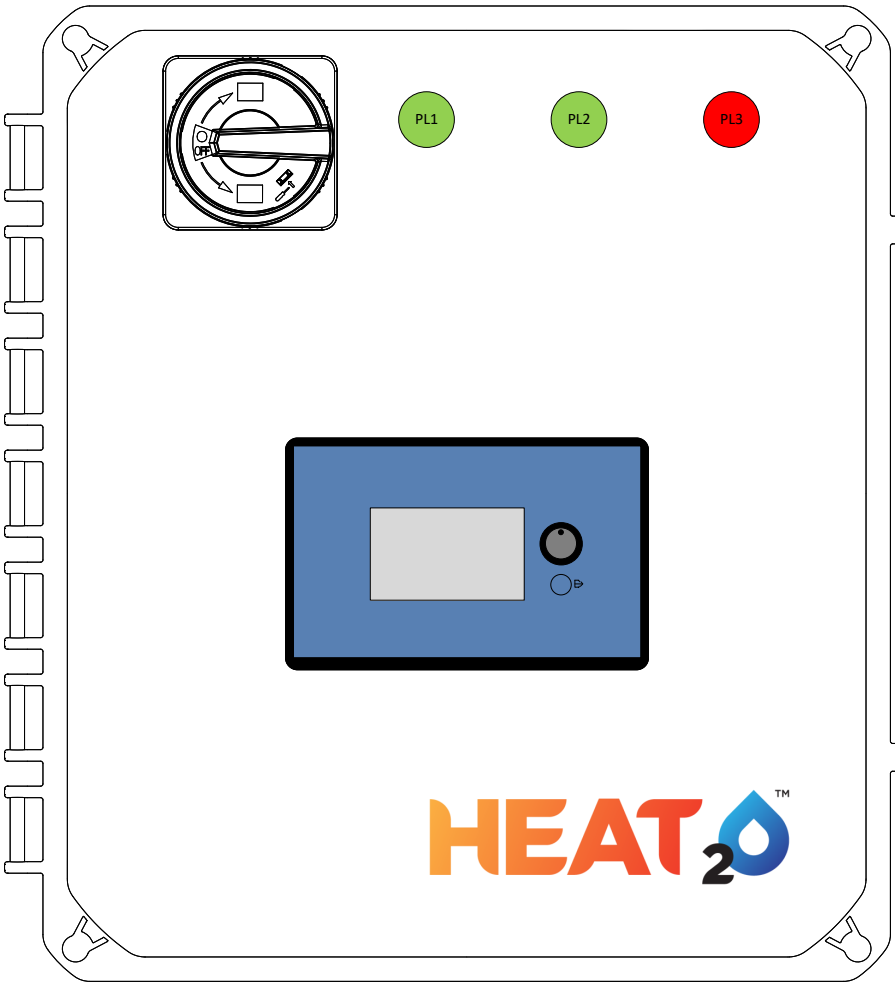
MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904



HINGE SIDE DETAIL



BOTTOM DETAIL



INTERMEDIATE CONTROLLER V2.1

PANEL DETAIL

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM

REV	DESCRIPTION	DATE	REVISED BY
1	REMOVE PWM CONVERTER	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 1-20 MA SIGNALS	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM

PROJECT NUMBER:	PR-00XXXX
LAST REVISION DATE:	FEBRUARY 24, 2025
SHEET NUMBER:	PAGE 8 OF 12



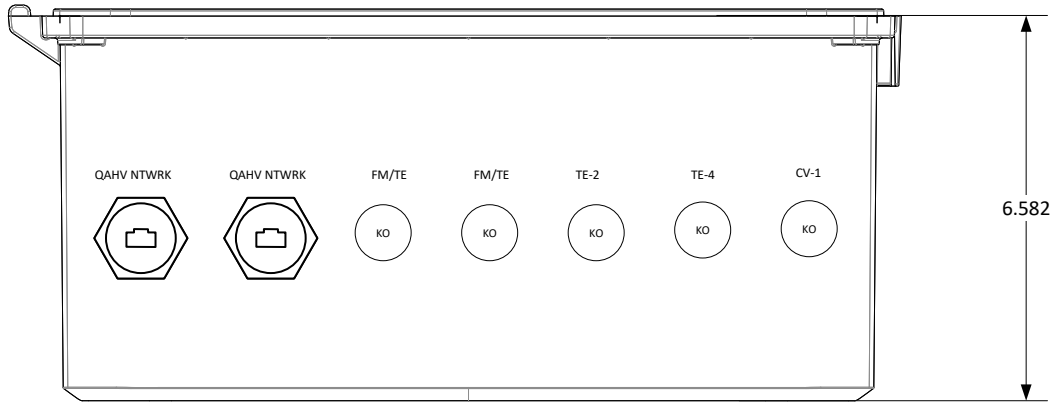
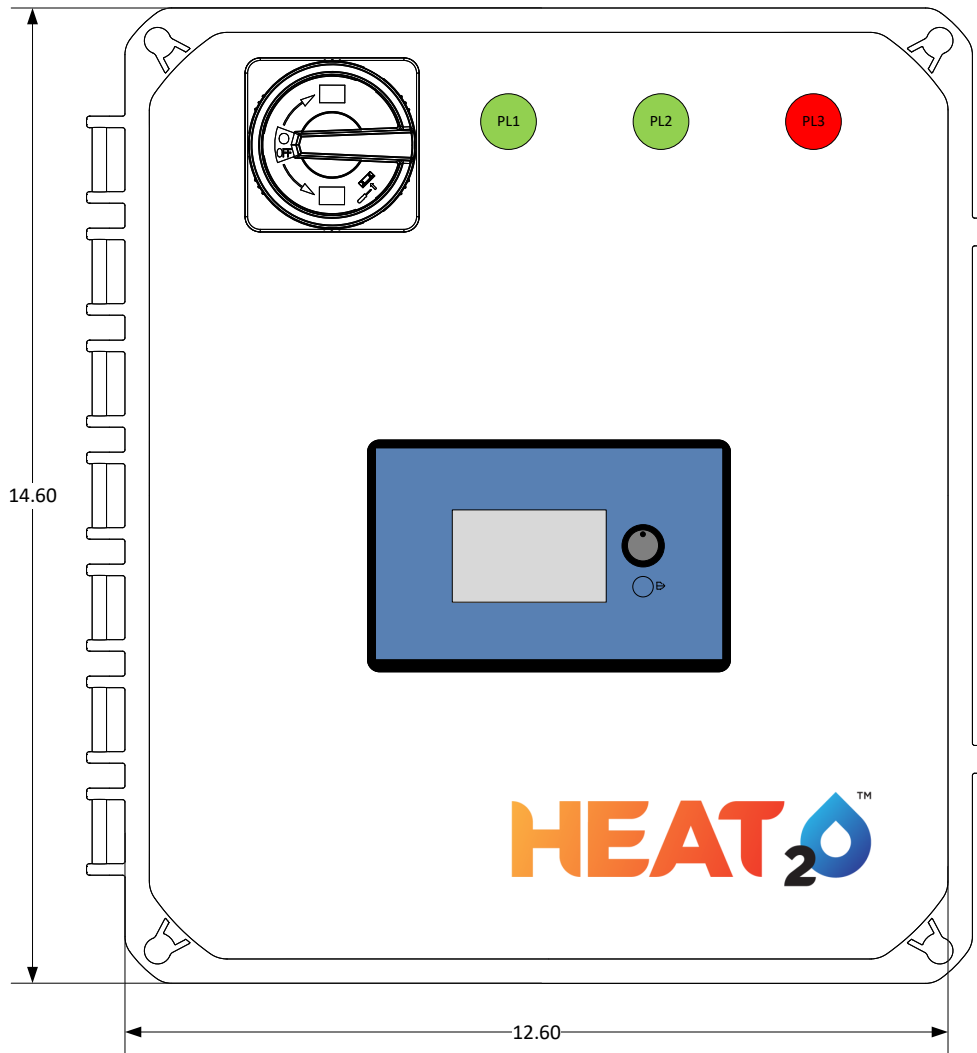
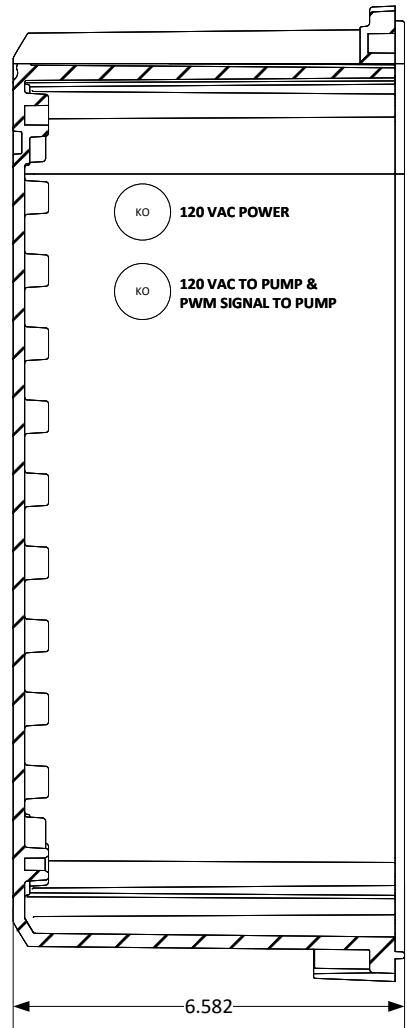
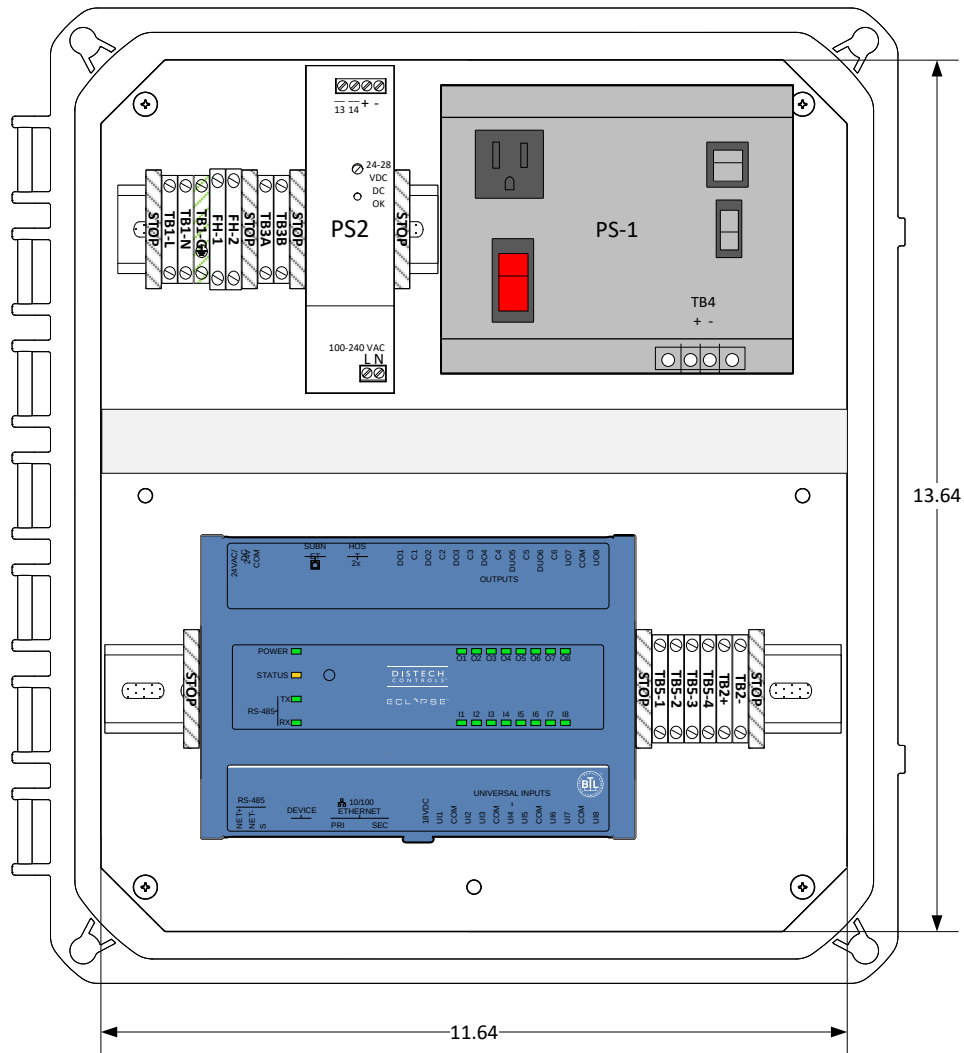
MITSUBISHI ELECTRIC
MITSUBISHI ELECTRIC TRANE HVAC US



TRANE
MITSUBISHI ELECTRIC TRANE HVAC US

MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904



BOTTOM DETAIL

INTERMEDIATE CONTROLLER V2.1

PANEL DIMENSIONS

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM

REVISIONS			
REV	DESCRIPTION	DATE	REVISED BY
1	REMOVE PWM CONVERTER	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 1-20 MA SIGNALS	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM

MITSUBISHI ELECTRIC
MITSUBISHI ELECTRIC TRANE HVAC US

MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904



Bill of Material				
Part	Model	Manufacturer	Description	QTY
BP	ZX-1412P-01	POLYCASE	14x12 BACKPLANE	1
DIN	0814681	PHOENIX CONTACT	DIN RAIL, 1 METER	1
DSP	PDIDI-DISPBLK-00	DISTECH	ECLYPSE DISPLAY	1
F-1	K235-3	LITTLEFUSE	3 AMP FUSE	2
FH-1	3046032	PHOENIX CONTACT	DIN RAIL FUSE HOLDER, G / 5 X 20	2
ISC	CDIY-303-QAHV-SKID	DISTECH	INTERMEDIATE SKID CONTROLLER	1
NT	626-1461-ND	CONEC	MODULAR CONNECTOR/COUPLER, PANEL MOUNT	2
PC1	MISC	MISC	PATCH CABLE 24"	1
PC2	MISC	MISC	PATCH CABLE 6"	2
PCN	PAC-UKPRC001-CN-1	METUS	PROCON, MODBUS	1
PL1	IDC-HW1P-1QD-G-120V	IDEC	PILOT LIGHT, GREEN, 22MM, 120V, LED	1
PL2	IDC-HW1P-1QD-G-24V	IDEC	PILOT LIGHT, GREEN, 22MM, 24V, LED	1
PL3	IDC-HW1P-1QD-R-24V	IDEC	PILOT LIGHT, RED, 22MM, 24V, LED	1
PNL	JG-26295A-02	POLYCASE	14x12x6 ENCLOSURE	1
PS-1	PSH40AB10	FUNCTIONAL DEVICES	24 VAC POWER SUPPLY	1
PS-2	2904599	PHOENIX CONTACT	24 VDC POWER SUPPLY, 36W	1
RST	MISC	MISC	249 OHM 1/2W RESISTOR	4
STOP	3022276	PHOENIX CONTACT	TERMINAL BLOCK, END STOP	7
SW-1	ML1-032-E-H03R	MERZ	PANEL MOUNTED DISCONNECT SWITCH	1
TB	3044131	PHOENIX CONTACT	TERMINAL BLOCK, 2 CONDUCTOR	10
TBE	3047028	PHOENIX CONTACT	TERMINAL BLOCK, END	3
TBG	3209536	PHOENIX CONTACT	TERMINAL BLOCK, GROUND	1
WD	3240188	PHOENIX CONTACT	WIRE DUCT W/ COVER, 40 mm X 25 mm	1



MITSUBISHI ELECTRIC
MITSUBISHI ELECTRIC TRANE HVAC US



MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

INTERMEDIATE CONTROLLER V2.1

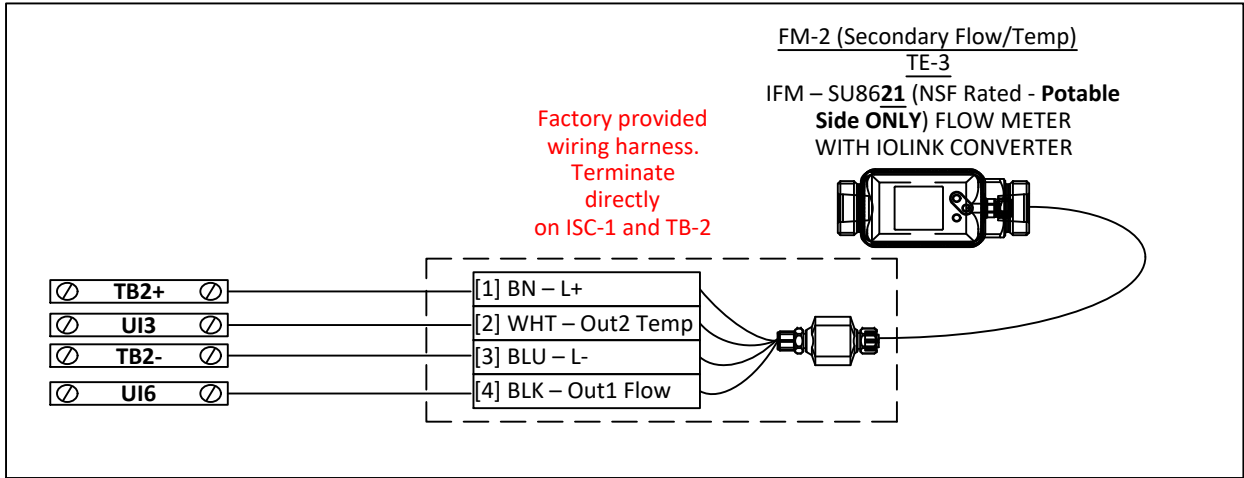
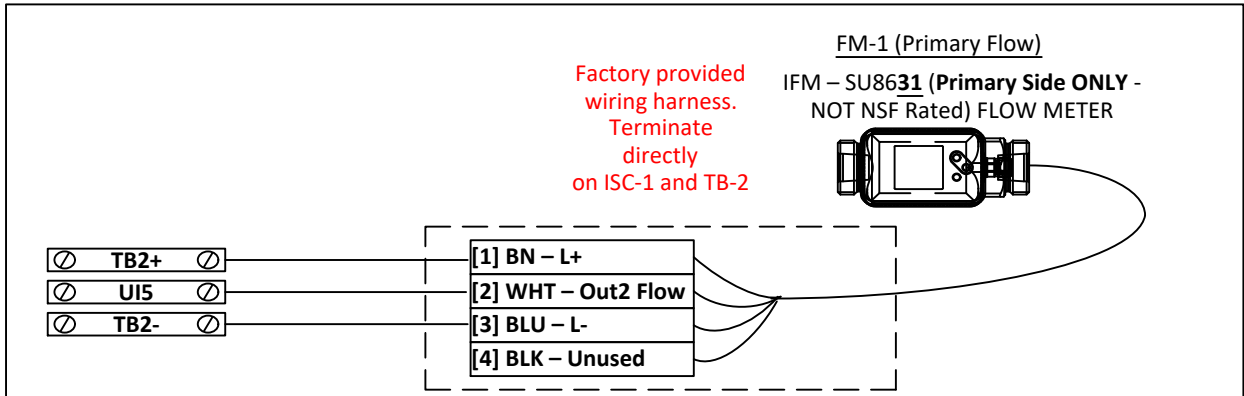
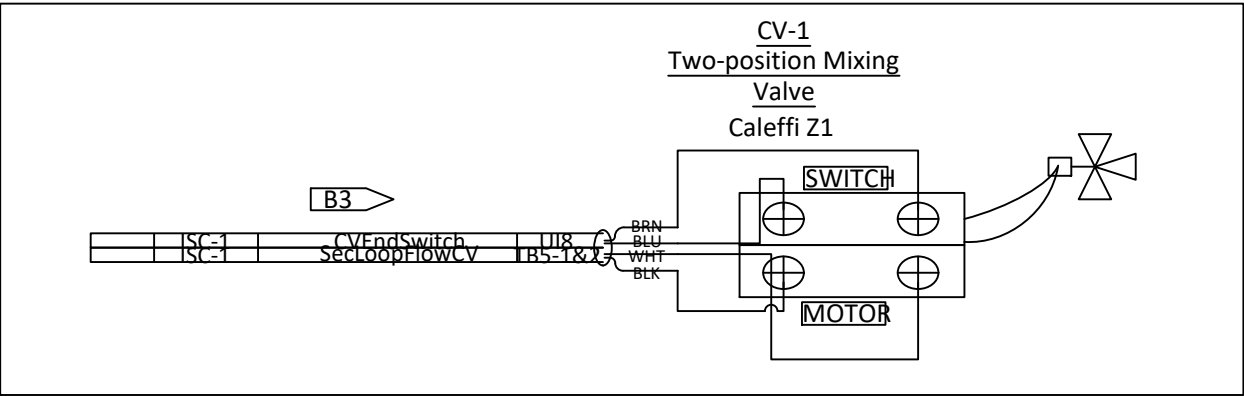
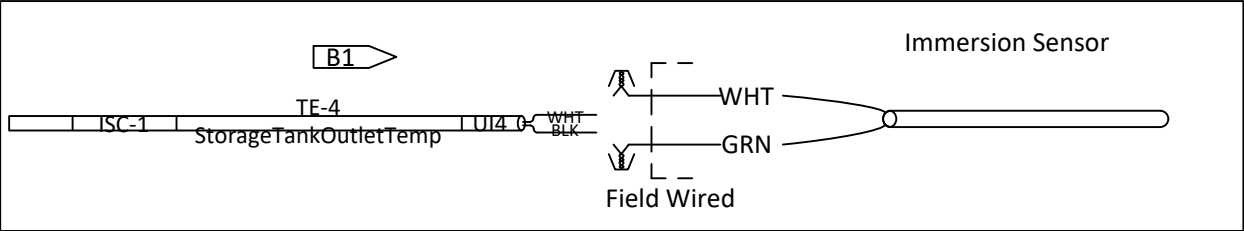
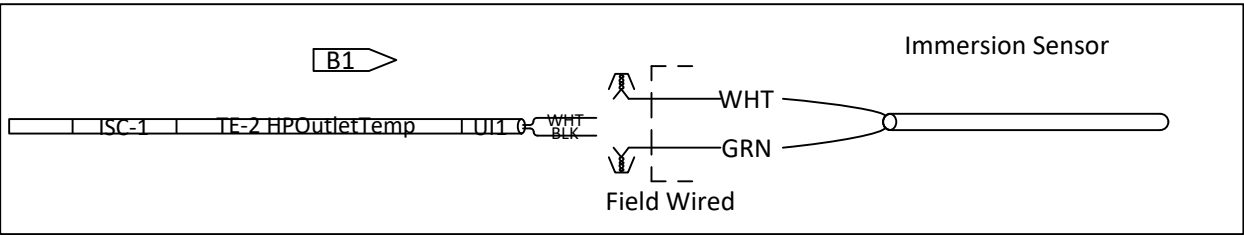
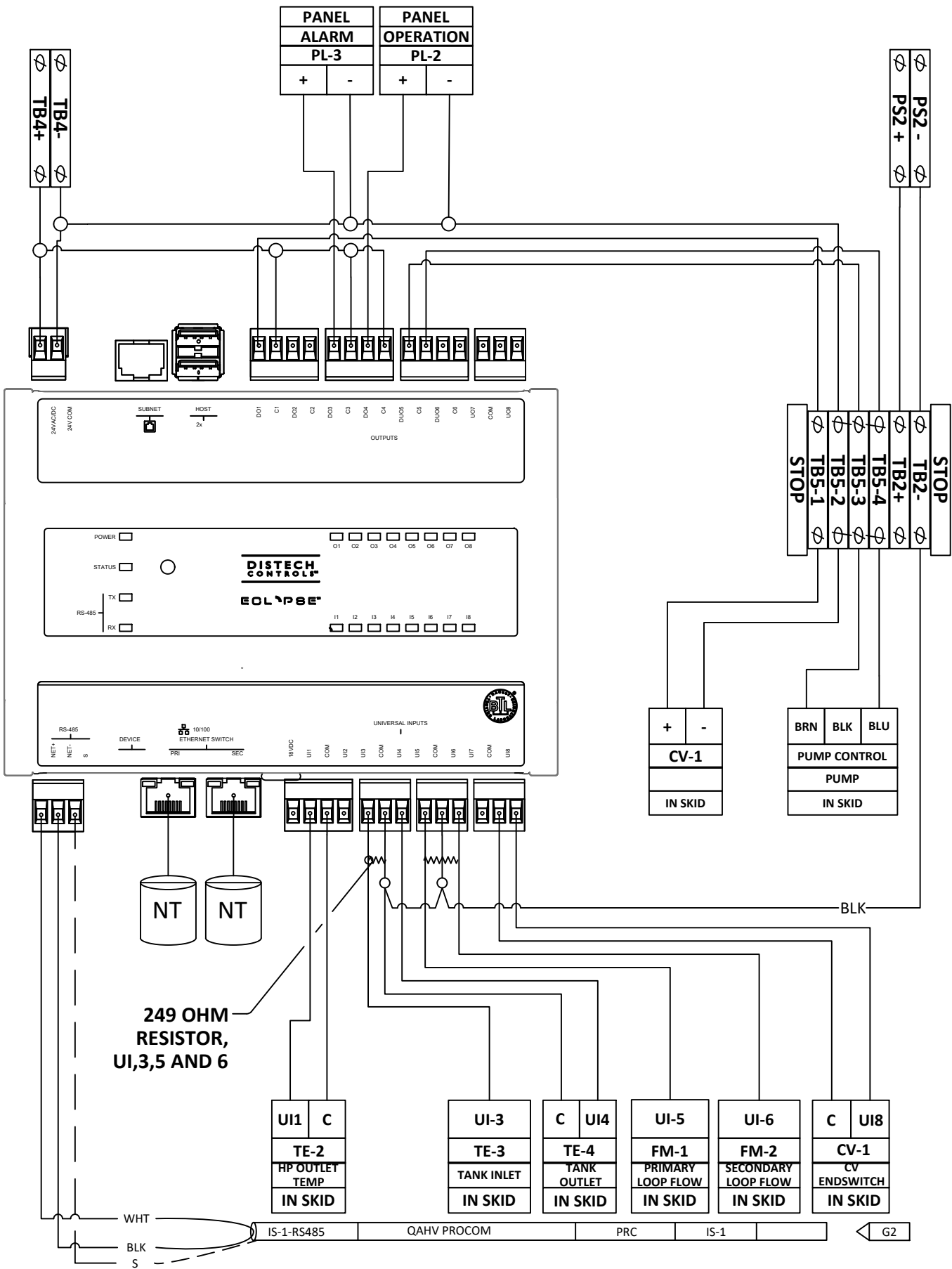
BOM

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM



REV		REVISIONS		REVISED BY	
REV	DESCRIPTION	DATE	REVISIONS	DATE	REVISED BY
1	REMOVE PWM CONVERTER	5/10/24	JAM	5/10/24	JAM
2	CORRECT CONTROLLER WIRING DETAIL 4-20 MA SIGNALS	10/16/2024	JAM	10/16/2024	JAM
3	UPDATE PLANT OVERVIEW	10/31/2024	JAM	10/31/2024	JAM
4	REVISE WIRING NOTES 2	11/4/2024	JAM	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM	2/21/2025	JAM

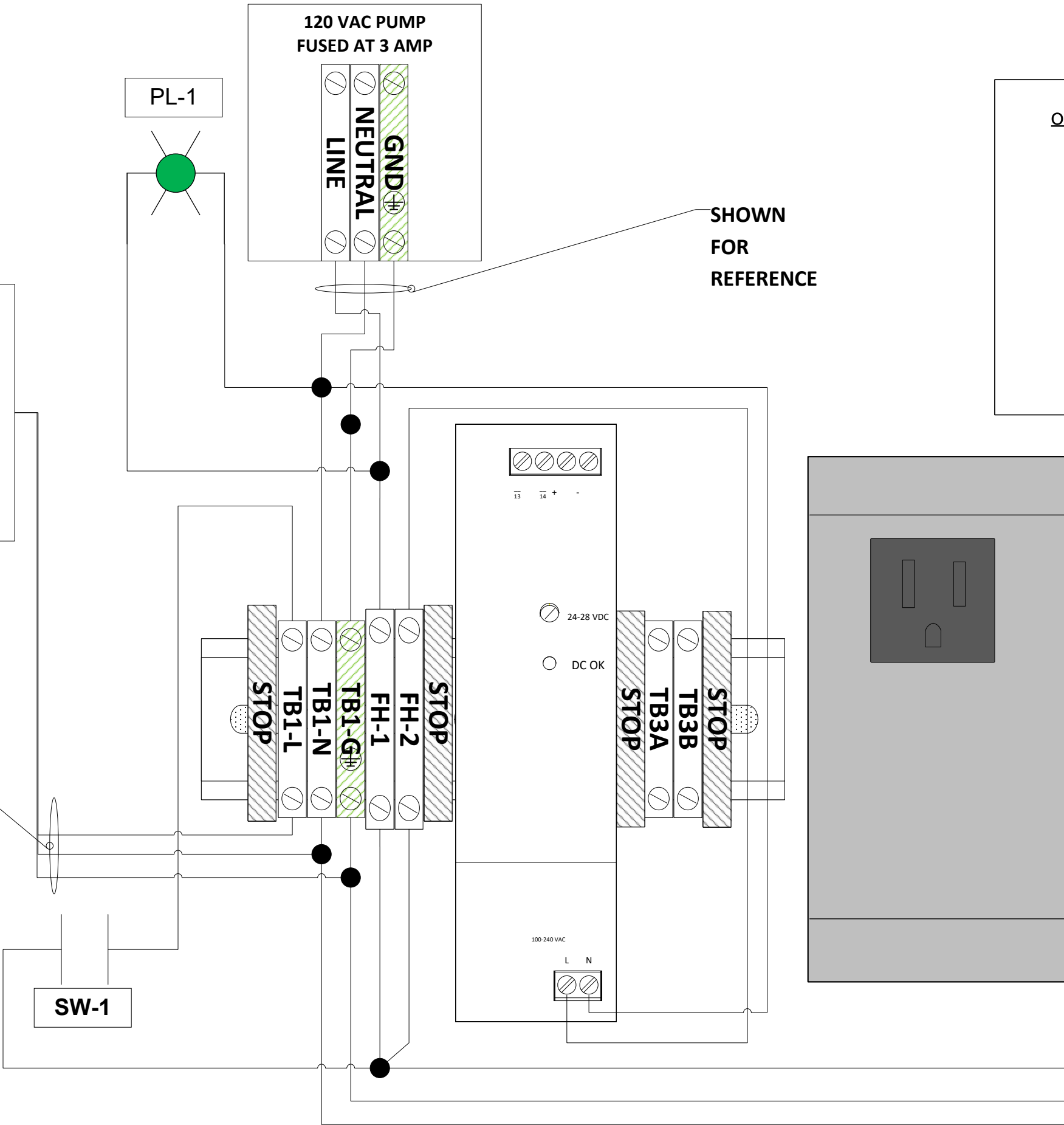
ISC WIRING DETAILS



HEAT₂O - CONNECT/KIT
ISC Wiring Details

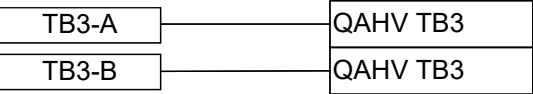
FIELD
CONNECTIONS BY
OTHERS

120 VAC,
NEUTRAL
AND
GROUND



MAINTENANCE TOOL DETAIL

OPTIONAL QAHV M-NET SERVICE CONNECTION



INTERMEDIATE CONTROLLER V2.1

POWER WIRING

LOCATION: XXXXXXXXXXXXXXXX
CONTROLS ENGINEER: JAM
PROJECT MANAGER: JAM

MITSUBISHI ELECTRIC
MITSUBISHI ELECTRIC TRANE HVAC US

TRANE
MITSUBISHI ELECTRIC TRANE
HVAC US LLC
1340 SATELLITE BLVD.
SUWANEE, GA 30024
PHONE: (800) 433-4822
FAX: (800) 889-9904

REVISIONS		REVISED BY	
REV	DESCRIPTION	DATE	
7	SEC PUMP WIRING CHANGE	4/7/2025	ENE
8	SEC PUMP WIRING UPDATE	07/02/2025	ENE
3	PANEL TERMINAL REDLINES	08/20/2025	ENE
4	REVISE WIRING NOTES 2	11/4/2024	JAM
5	REVISE BOM, WIRE DUCT AND FUSE HOLDER	12/05/2024	JAM
6	UPDATE FM-1	2/21/2025	JAM



PROJECT NUMBER:
PR-00XXXX

LAST REVISION DATE:
AUGUST 20, 2025

SHEET NUMBER:
PAGE 12 OF 12

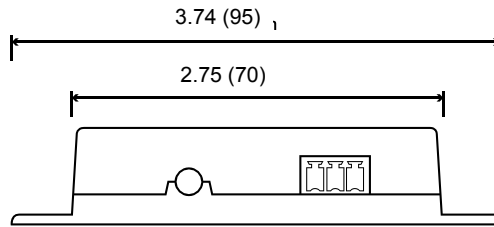
PROCON MELCOBEMS MINI (A1M)



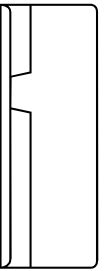
DIMENSIONS

Units: in. (mm)

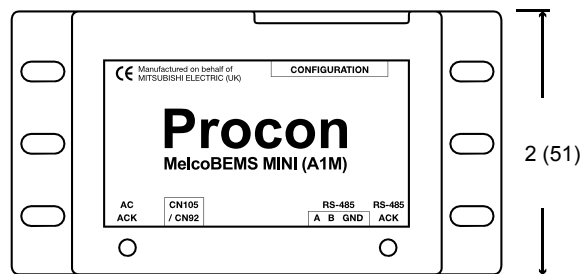
Front View



Side View

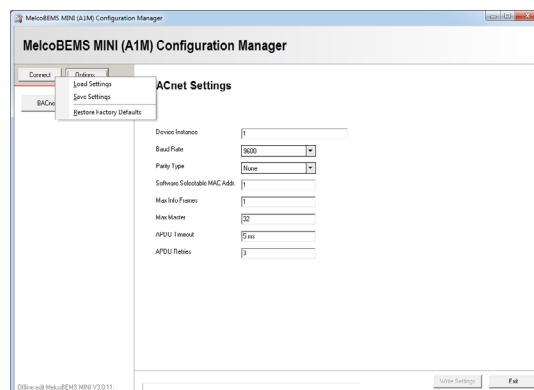


Top View



CONFIGURATION TOOL: MELCOBEMS MINI V1.0.1.0B.EXE

- Software downloadable from MyLinkDrive.com
- Software tool to setup BACnet® setting through Modbus Points Table
- Requires field supplied part: USB to RS-485 adapter



USB to RS-485

1340 Satellite Boulevard, Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

BMS Data Table

BACnet Points Table - Requires Optional Supervisory Panel Accessory

Type	Object ID	Name	Default Value	Units
Binary Value	1	EcoPort_Override	Inactive	
Binary Value	2	SupervisorValidation	Active	
Binary Value	3	EcoPortCommStatus	Inactive	
Binary Value	4	SkidCommunication	Inactive	
Binary Value	5	TankCommunication	Inactive	
Binary Value	6	AdvIOCommunication	Inactive	
Binary Value	101	EnergyModeSel_Norm	Inactive	
Binary Value	102	EnergyModeSel_Shed	Inactive	
Binary Value	103	EnergyModeSel_CritPeak	Inactive	
Binary Value	201	Request_NormalMode	Inactive	
Binary Value	202	Request_ShedMode	Inactive	
Binary Value	203	Request_CritPeakMode	Inactive	
Multi State Value	1	EcoPort_OpState	1	
Multi State Value	2	EcoPort_Event	1	
Multi State Value	3	SystemRequestType	1	
Multi State Value	4	TankStageStateActive	1	
Multi State Value	8000	Version	19	
Analog Value	1	OffSensorSelNum_Norm	1	
Analog Value	2	OffSensorTemp_Norm	0	°F
Analog Value	3	OnSensorSelNum_Norm	1	
Analog Value	4	OnSensorTemp_Norm	0	°F
Analog Value	5	OffSensorSelNum_Shed	1	
Analog Value	6	OffSensorTemp_Shed	0	°F
Analog Value	7	OnSensorSelNum_Shed	1	
Analog Value	8	OnSensorTemp_Shed	0	°F
Analog Value	9	OffSensorSelNum_Crit Peak	1	
Analog Value	10	OffSensorTemp_Crit Peak	0	°F
Analog Value	11	OnSensorSelNum_Crit Peak	1	
Analog Value	12	OnSensorTemp_Crit Peak	0	°F
Analog Value	13	EcoPort_Duration	0	s
Analog Value	14	SkidControllersConnected	0	
Analog Value	15	HomeEnergyUse	0	
Analog Value	16	CellPhonesCharged	0	
Analog Value	17	GallonsOfGasoline	0	
Analog Value	18	BarrelsOfOil	0	
Analog Value	19	TreeSeedlings	0	
Analog Value	20	AcresOfForest	0	
Analog Value	21	ForestPreservation	0	
Analog Value	22	TankControllersConnected	0	
Analog Value	23	AdvIOControllersConnected	0	
Analog Value	102	SystemOffTempSP_Norm	140	°F
Analog Value	103	PriLoopTempSP_Norm	150	°F
Analog Value	104	SystemOnTempSP_Norm	130	°F
Analog Value	106	SystemOffTempSP_Shed	140	°F

Type	Object ID	Name	Default Value	Units
Analog Value	107	PriLoopTempSP_Shed	150	°F
Analog Value	108	SystemOnTempSP_Shed	130	°F
Analog Value	110	SystemOffTempSP_CritPeak	140	°F
Analog Value	111	PriLoopTempSP_CritPeak	150	°F
Analog Value	112	SystemOnTempSP_CritPeak	130	°F
Analog Value	114	SystemOffTempSP_LoadUp	140	°F
Analog Value	115	PriLoopTempSP_LoadUp	150	°F
Analog Value	116	SystemOnTempSP_LoadUp	130	°F
Analog Value	117	ActiveOnSetpoint	0	°F
Analog Value	118	ActiveOnSensor	0	
Analog Value	119	ActiveOffSetpoint	0	°F
Analog Value	120	ActiveOffSensor	0	
Analog Value	121	ActivePrimarySetpoint	150	°F
Analog Value	201	SystemCOP	0	
Analog Value	202	SystemPower	0	kW
Analog Value	203	TotalEnergyUse	0	kWh
Analog Value	8001	GraphicsVersionMajor	0	
Analog Value	8002	GraphicsVersionMinor	0	
Analog Input	101	TankTemp1		°F
Analog Input	102	TankTemp2		°F
Analog Input	103	TankTemp3		°F
Analog Input	104	TankTemp4		°F
Analog Input	105	TankTemp5		°F
Analog Input	106	TankTemp6		°F
Binary Value	1	ControlMode	Inactive	
Binary Value	2	PriFluidType	Inactive	
Binary Value	3	TankSequenceEnable	Inactive	
Multi State Value	1	SystemRequestType	2	
Multi State Value	8000	Version	10	
Analog Value	1	SysOnTempSpActive	130	°F
Analog Value	2	SystemOffTempSPActive	140	°F
Analog Value	3	SysOnSensorSelNumActive	1	°F
Analog Value	4	SysOffSensorSelNumActive	1	°F
Analog Value	5	PriLoopTempSPActive	150	°F
Analog Input	101	HPOutletTemp		°F
Analog Input	102	HPInletTemp		°F
Analog Input	103	StorageTankInletTemp		°F
Analog Input	104	StorageTankOutletTemp		°F
Analog Input	105	PriLoopFlow		gal/min
Analog Input	106	SecLoopFlow		gal/min
Binary Value	1	SystemEnable	Inactive	
Binary Value	2	ControlMode	Inactive	
Binary Value	3	FanMode	Active	
Binary Value	4	CompressorRunStatus	Inactive	
Binary Value	5	CapacityMode	Inactive	

Specifications are subject to change without notice.

© 2020 Mitsubishi Electric Trane HVAC US LLC. All rights reserved.

BMS Data Table

BACnet Points Table Continued - Requires Optional Supervisory Panel Accessory

Type	Object ID	Name	Default Value	Units
Binary Value	6	FanModeSet	Inactive	
Binary Value	7	CapacityModeSet	Inactive	
Binary Value	8	SequenceEnable	Inactive	
Binary Value	9	QAHVCommsStatus	Inactive	
Binary Value	10	PowerMeterCommsStatus	Inactive	
Binary Value	11	QAHVRestartDelayStatus	Inactive	
Binary Value	12	QAHVTimeReset	Inactive	
Binary Value	13	PrimaryFluidType	Inactive	
Binary Value	101	SupervisorCmd	Inactive	
Binary Value	400	PriLoopFlowAlm	Inactive	
Binary Value	401	SecLoopFlowAlm	Inactive	
Binary Value	402	TankLowTempAlm	Inactive	
Binary Value	403	QAHVModuleError	Inactive	
Binary Value	404	LeakAlarm	Inactive	
Binary Output	101	SecLoopFlowCV	Inactive	
Binary Output	103	CommonAlarm	Inactive	
Binary Output	104	SystemOperationalStatus	Inactive	
Binary Input	107	LeakDetector		
Binary Input	108	CVEndSwitch		
Multi State Value	1	TestMode	1	
Multi State Value	2	DefrostStatus	1	
Multi State Value	3	OnOffStatus	1	
Multi State Value	4	SystemVoltage	1	
Multi State Value	8000	Version	29	
Analog Output	102	SecPumpCtrl_old	0	%
Analog Output	105	SecPumpCtrl	0	%
Analog Value	1	SystemOnTempSP	130	°F
Analog Value	2	SystemOffTempSP	140	°F
Analog Value	3	PriLoopMinFlowSP	0.5	gal/min
Analog Value	4	PriLoopLowFlowSP	2	gal/min
Analog Value	5	PriLoopLowFlowSPDb	0.2	gal/min
Analog Value	6	OnSensorTemp	NaN	°F
Analog Value	7	OffSensorTemp	NaN	°F
Analog Value	8	SecPumpMaxSpdSP	100	%
Analog Value	9	SecPumpMinSpdSP	23	%
Analog Value	10	SecPumpRampTim	60	s
Analog Value	11	SystemShutdownDelay	120	s
Analog Value	12	GlycolCorrectionFactor	0.9	
Analog Value	13	PriLoopBTUH	0	BTU/h
Analog Value	14	SecLoopBTUH	0	BTU/h
Analog Value	15	COPKitEnergy	0	kWh
Analog Value	16	COPKitPower	0	kW
Analog Value	17	OnSensorSelNum	1	
Analog Value	18	OffSensorSelNum	1	
Analog Value	19	QAHVFaultCode	NaN	

Type	Object ID	Name	Default Value	Units
Analog Value	20	SecFlow_PID_IntegralTime	38	s
Analog Value	21	SecFlow_PID_PropBand	10	gal/min
Analog Value	22	CondensingTemperature	0	°F
Analog Value	23	EvaporativeTemperature	0	°F
Analog Value	24	CompressorFrequency	0	Hz
Analog Value	25	OutletTemperatureSetpoint	0	°F
Analog Value	26	InletTemperature	0	°F
Analog Value	27	OutletTemperature	0	°F
Analog Value	28	CompRunTime	0	h
Analog Value	29	TS1	0	°F
Analog Value	30	TS2	0	°F
Analog Value	31	TS3	0	°F
Analog Value	32	TS4	0	°F
Analog Value	33	TS5	0	°F
Analog Value	34	TS6	0	°F
Analog Value	35	PriLoopTempSP	150	
Analog Value	36	QAHVRestartDelayTime	0	min
Analog Value	37	QAHVStartsToday	0	
Analog Value	38	SystemOnTempSP 1	130	°F
Analog Value	39	SystemOffTempSP 1	140	°F
Analog Value	400	PriLoopLowFlowAlmSP	0.1	gal/min
Analog Value	401	PriLoopFlowAlmDelay	120	s
Analog Value	402	SecLoopLowFlowAlmSP	0.1	gal/min
Analog Value	403	SecLoopFlowAlmDelay	120	s
Analog Value	404	TankLowTempAlmSP	110	°F
Analog Value	405	TankLowTempAlmDelay	120	s
Analog Value	406	QAHVModuleErrorDelay	120	s
Analog Value	407	LeakAlmDelay	5	s
Analog Value	10001	SecondaryFlowPID Input	NaN	gal/min
Analog Value	10002	SecondaryFlowPID Setpoint	NaN	gal/min
Analog Value	10003	SecondaryFlowPID Output	NaN	%