INSTALLATION INSTRUCTIONS AND OWNER'S MANUAL

FOR

ELECTRIC ON-DEMAND TANKLESS WATER HEATERS:
SpecAdvantage with PhD Technology
SafeAdvantage with PhD Technology

208 and 480 VAC three phase 32 – 144 kW
600 VAC three phase 130 / 150 kW

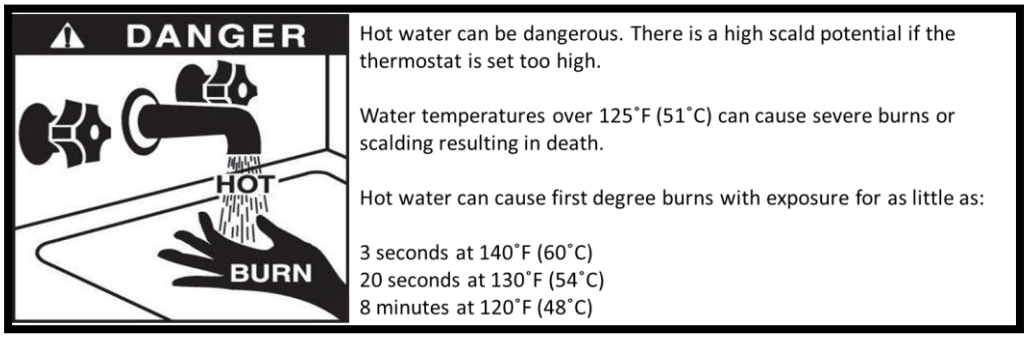
IMPORTANT SAFETY INSTRUCTIONS

⚠WARNING ***BEFORE ATTEMPTING INSTALLATION OR SERVICE OF THIS HEATER, DISCONNECT ELECTRICAL POWER AT THE SERVICE BREAKER PANEL. FAILURE TO DO SO CAN RESULT IN SERIOUS INJURY, DEATH AND/OR PROPERTY DAMAGE.***

A green terminal (or a wire connector marked "G", "GR, "Ground", or "GROUNDING") is provided within the control box. To reduce the risk of electric shock, connect this terminal or connector to the grounding terminal of the electric service or supply panel with a continuous copper wire in accordance with your local electrical code.

⚠CAUTION

- **Provide your heater with potable, uninterrupted supply of water at a constant minimum pressure of 25 or 45 PSI (based on model) and maximum pressure of 150 PSI.**
- **Use copper conductors only.**
- **Use Water Hammer Arrestors in applications with excess pipe lengths or fast acting valves, neglecting to do so will damage the heater and void the warranty.**
- **Use appropriate water conditioning to prevent water hardness in excess of 10 grains per gallon. Also ensure that the pH level of the water is between 6.5 – 7.5. Neglecting to do so will damage the heater and void the warranty.**
- **Do not install in a bath enclosure or shower stall or connect to a salt-regenerated water softener or a water supply of salt water.**
- **In accordance with NEC guideline, this water heater is designed for a continuous duty cycle of 3 hours at 100% power output. Exceeding this rating could damage the heater and void the warranty.**



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Read and understand these instructions thoroughly before attempting the installation or service of this water heater. This heater must be used to heat water only and be in a location where it is not subject to freezing temperatures unless supplied with factory installed freeze protection. If a water softener is used, the softener must be well-maintained and in good working order. Any maintenance issues with a water softener could be detrimental to the operation or longevity of your Eemax tankless water heater. The manufacturer is not liable for any damages resulting from improper installation or misuse. The warranty of this water heater is contingent on proper installation according to these instructions. Please refer to the warranty card packaged with this heater.

Installation of this water heater must conform to the latest requirements of the National Electrical Code and all applicable state and local codes. Detailed information on state and local codes is available through your local authorities. You must understand and comply with these requirements before beginning the installation. Eemax recommends your heater be installed by a licensed plumber and electrician.

Per UL 499, this water heater is not required to be installed with a Temperature and Pressure relief valve (T&P). However, local codes may vary. In case a T&P relief valve is required, it must be installed on the outlet hot water line heater between the heater and the isolation valve.

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1) MOUNTING THE HEATER TO THE WALL

Please follow the mounting instructions as appropriate to your installation. Eemax recommends the heater be installed close to the point of use.

⚠CAUTION This heater must be installed in a location where it is not subject to freezing temperatures, unless supplied with factory installed freeze protection

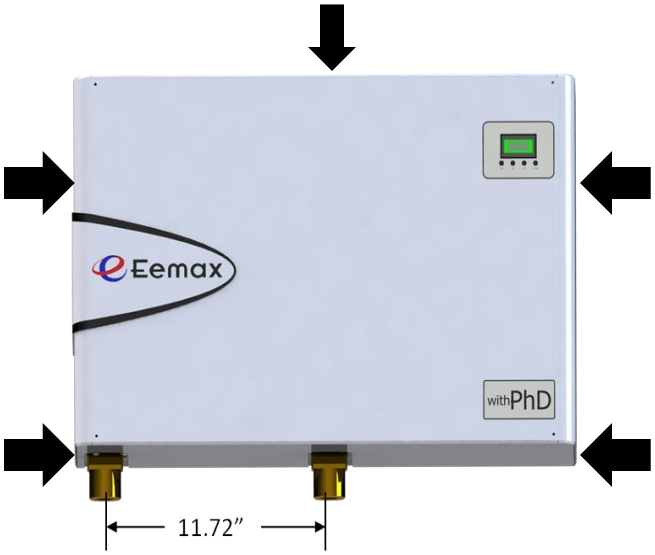
Make sure the brass fittings are at the bottom of the heater. No other heater orientation is permitted.

Recommended clearances:

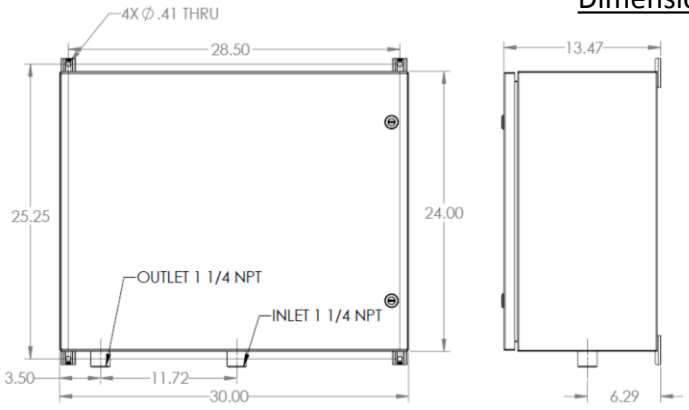
Leave a service clearance of at least 12” inches on all sides of the heater.

SafeAdvantage: SafeAdvantage water heaters are enclosed in a Nema 4 cabinet. For wall mount installation, use appropriately rated fasteners to secure the cabinet with the provided mounting tabs on the outside of each corner to secure it to the wall. For floor mount installation, enclosure legs are available for purchase.

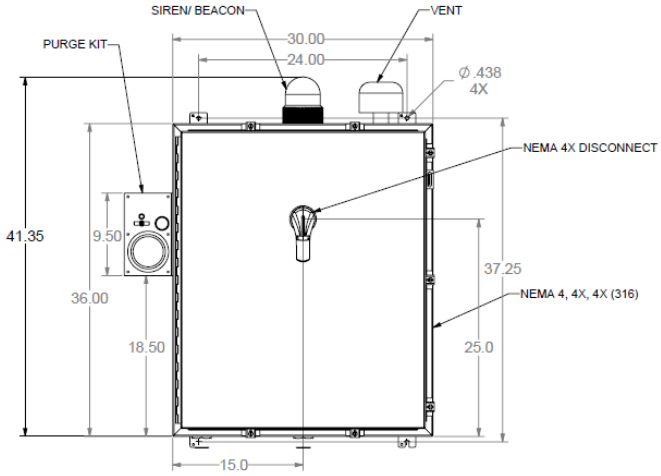
SpecAdvantage: Remove the cover by removing the cover screws as indicated by the arrows (right) and fasten the heater to the wall using the mounting holes located at each corner of the back plate. Be sure to use appropriately rated fasteners to secure the heater in place.

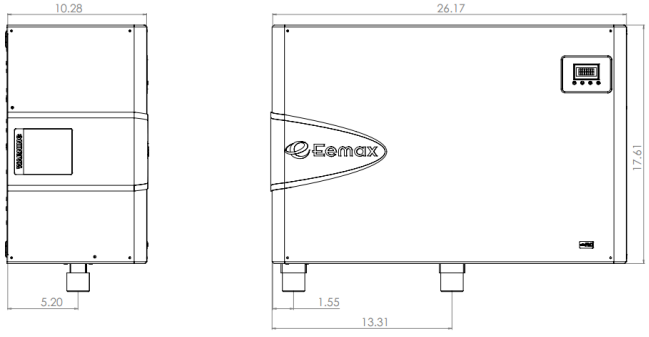


Dimensions

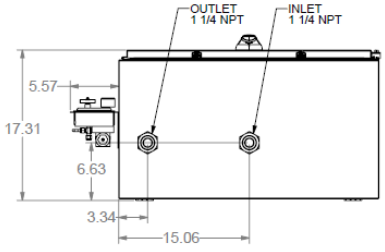


SafeAdvantage





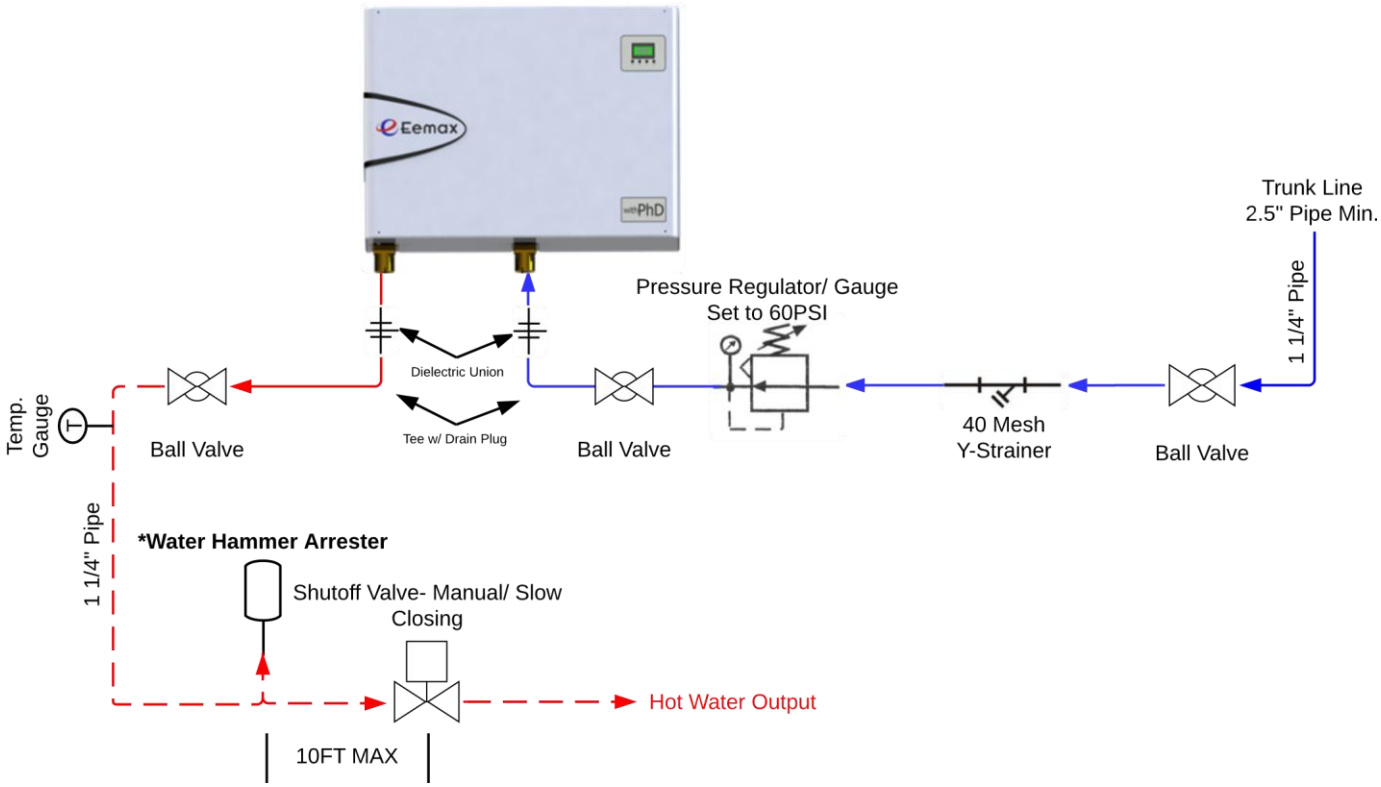
Spec Advantage



Larger cabinet for all optional features

(GFCI, Freeze Protection, Electrical Disconnect, Class 1 Div 2, Siren/ Beacon)

2) PLUMBING HOOK-UP



NOTE:
SCHEMATIC IS FOR GENERAL REFERENCE ONLY.
EEMAX IS NOT HELD LIABLE FOR FINAL DESIGN, INSTALLATION, OR OPERATION. PLEASE CHECK ALL APPLICABLE PLUMBING AND ELECTRICAL CODES.

Water Hammer Arrester Sizing Chart*:

Pipe Length (trunk line to outlet)	Water Hammer Arrester Size	
0-15'	B	*System Criteria:*
15-30'	C	*Max flow rate less than or equal to 30 GPM*
30-50'	D	*Valve closing time greater than or equal to 0.2 seconds*
50-75'	E	*(includes ball valve, spray nozzles, shower valve, etc)*
75-90'	F	*Inlet pressure less than or equal to 60 PSI*
90'+	Contact arrester manufacturer	*Pipe ID greater than or equal to 1.25 in*

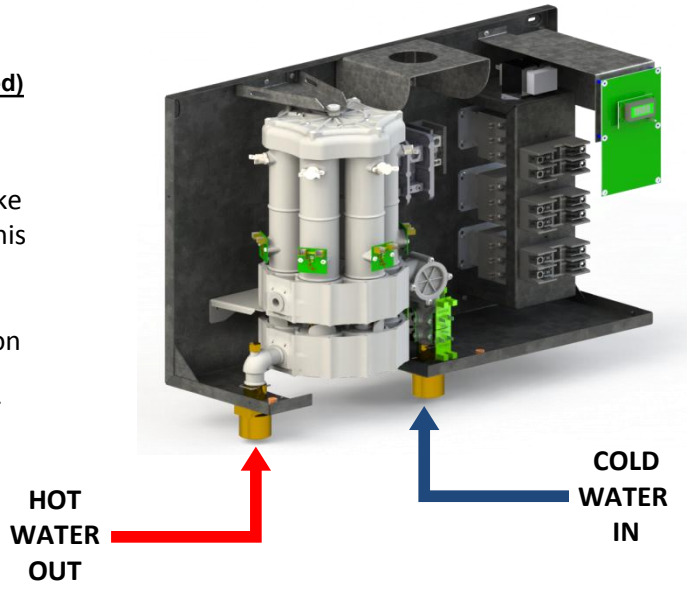
*Check arrester manufacturer's recommendations for proper size and location of arresters. Improperly installed or undersized arrester can cause serious damage to plumbing system/heater.

2) PLUMBING HOOK-UP (continued)

The heater is equipped with NPT brass fittings. Make sure ONLY NPT fittings are used for connection to this heater.

Connect the cold water line with the inlet connection (RIGHT fitting)
Connect the outlet pipe with the outlet fitting (LEFT fitting).

Do not reverse connections.

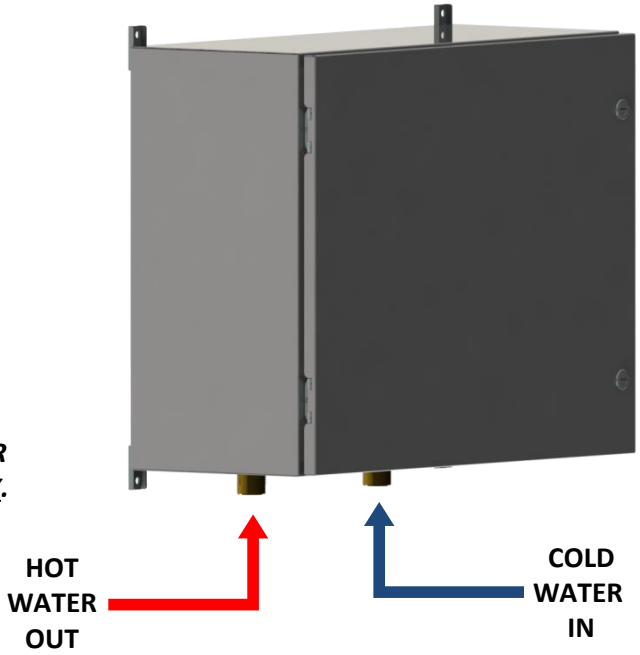


⚠CAUTION

NEVER USE PIPE DOPE WHEN MAKING PLUMBING CONNECTIONS TO THIS HEATER. FOLLOW STANDARD INDUSTRY PRACTICE WITH CAREFUL APPLICATION OF TEFLON TAPE. DO NOT ALLOW TEFLON TAPE TO GET INTO THE HEATER.

⚠CAUTION

NEVER SOLDER ANY PIPE CONNECTIONS WHILE ATTACHED TO THIS HEATER - DAMAGE TO THE HEATER WILL RESULT. DOING THIS WILL VOID THE WARRANTY.



A PRV Vent is located fitting. The PRV Vent is not a code compliant pressure relief valve. Check local codes to see if a code compliant T&P Relief Valve is required in your installation.

3) ELECTRICAL HOOK-UP

Eemax recommends your heater be installed or serviced by a licensed plumber and electrician.

⚠WARNING *BEFORE BEGINNING ANY WORK ON THIS INSTALLATION, BE SURE THAT THE ELECTRICAL BREAKER IS "OFF" AND THAT ALL MOUNTING AND PLUMBING WORK HAS BEEN COMPLETED PER THESE INSTRUCTIONS.*

This heater must have its own independent circuit using insulated, UL listed wire conductors of the appropriate size suitable for up to 90° C and protected by the correctly rated circuit breaker.

See chart on next page.

STOP **Before starting any electrical work VERIFY there is no power at the heater before proceeding !**

The power conductors are to be secured to the L1, L2 and L3 connectors on the terminal block (Fig. 1) or contactor (Fig. 2). The ground is to be secured to the GND connector to the right of the terminal block or below contactor (Fig 3).

Replace the cover. (SpecAdvantage only).

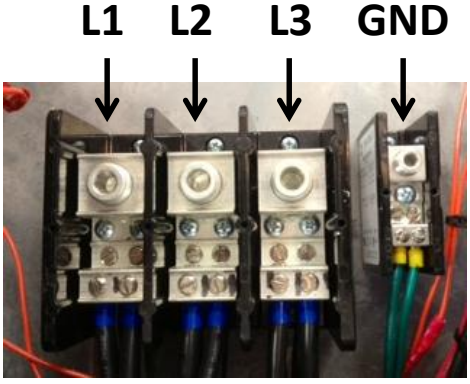


Fig. 1

Fig. 2

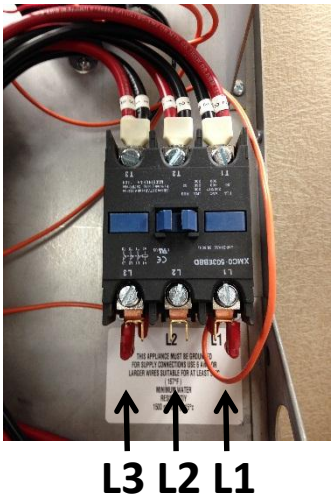
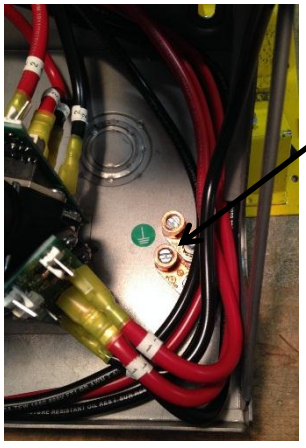


Fig. 3



⚠WARNING ***FAILURE TO GROUND THE SYSTEM MAY RESULT IN SERIOUS INJURY, DEATH AND/OR PROPERTY DAMAGE.***

ELECTRICAL SPECIFICATIONS

MODEL	VOLTS 3-PHASE DELTA	Kw	AMPS PER PHASE	RECOMMENDED WIRE SIZE (CU) 90° C
AP032208	208	32	89	1 AWG
AP036208	208	36	100	1 AWG
AP041208	208	41	114	1 AWG
AP054208	208	54	150	2/0
AP064208	208	64	178	3/0
AP036480	480	36	44	8 AWG
AP039480	480	39	47	8 AWG
AP048480	480	48	58	6 AWG
AP054480	480	54	65	4 AWG
AP063480	480	63	76	3 AWG
AP072480	480	72	86	3 AWG
AP096480	480	96	116	1 AWG
AP108480	480	108	130	1/0
AP126480	480	126	152	2/0
AP144480	480	144	173	3/0
AP130600	600	130	130	1 AWG
AP150600	600	150	144	1/0

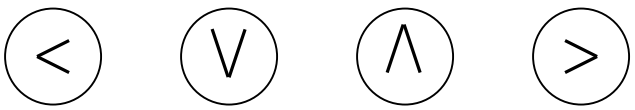
4) COMMISSIONING THE HEATER

⚠CAUTION ***BEFORE SWITCHING THE ELECTRICAL BREAKER "ON", MAKE SURE THE INLET AND OUTLET BALL VALVES ARE FULLY OPEN AND WATER IS FLOWING THROUGH ALL POINTS OF USE FOR A MINUTE OR TWO UNTIL THE FLOW IS CONTINUOUS AND FREE FROM AIR POCKETS.***

⚠CAUTION ***DO NOT SWITCH THE BREAKER "ON" IF THERE IS ANY POSSIBILITY THE WATER IN THE HEATER IS FROZEN.***

After verifying the heater has been purged of air (see above) turn the circuit breaker/disconnect "ON" and observe the start-up sequence on the display. The LCD screen will display the SETPOINT TEMPERATURE in degrees F.

Below the display are 4 push buttons that are used to control the function of the heater. Press the UP or DOWN buttons to establish your desired temperature. Refer to the CONTROL FEATURES section of this manual for additional information.



The heater is fully installed and ready for use.

TEMPERATURE RISE AT SPECIFIED FLOW RATE, DEGREES F:

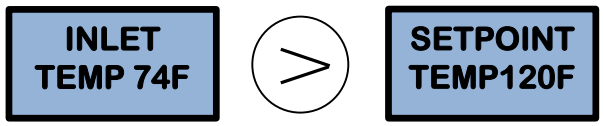
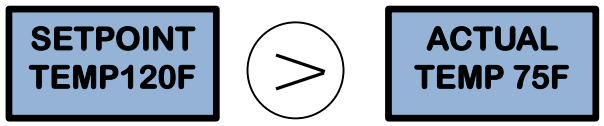
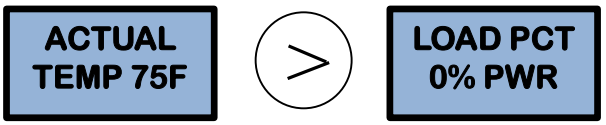
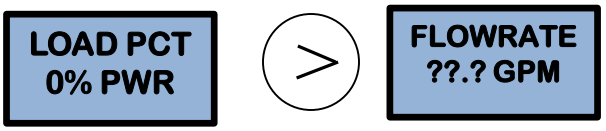
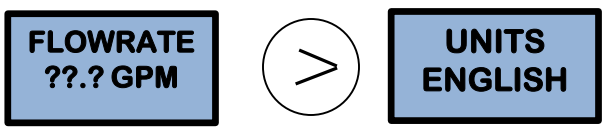
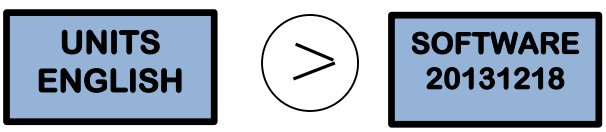
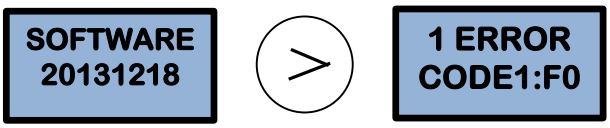
MODEL	TURN-ON GPM	3.0 GPM	4.0 GPM	6.0 GPM	8.0 GPM	12.0 GPM	20.0 GPM	25.0 GPM	30.0 GPM
AP032208	1.0	73	55	36	27	18	10	8	7
AP036208	1.0	82	61	41	29	20	12	9	8
AP041208	1.0	93	70	47	35	23	13	11	9
AP054208	1.5	123	92	61	46	31	18	14	12
AP064208	2.5	146	109	73	55	36	22	17	15
AP036480	1.0	82	61	41	31	20	12	9	8
AP039480	1.0	89	67	44	33	22	13	11	7
AP048480	1.0	109	82	55	41	27	16	13	11
AP054480	1.5	123	92	61	46	31	18	14	12
AP063480	2.5	143	108	72	53	36	22	17	14
AP072480	2.5	147	123	82	61	41	25	20	16
AP096480	2.5	*	*	109	82	54	33	26	22
AP108480	2.5	*	*	99	92	61	37	30	25
AP126480	2.5	*	*	143	107	72	43	34	29
AP144480	2.5	*	*	*	122	82	49	40	34
AP130600	2.5	*	*	*	111	73	44	35	30
AP150600	2.5	*	*	*	128	85	52	40	35

5) CONTROL FEATURES

⚠CAUTION ***BEFORE USING THIS CONTROL, MAKE SURE ALL PRIOR INSTALLATION STEPS HAVE BEEN PROPERLY COMPLETED, ELECTRICAL POWER IS ON AND WATER IS PRESENT IN THE HEATER.***

PUSH BUTTON FLOW CHART

1) The SETPOINT TEMP or ACTUAL TEMP screen can be selected for display as the home screen. Either of these screens will remain on the display when the backlight timer expires.	SETPOINT TEMP120F OR ACTUAL TEMP 75F
2) There is a 5 minute time delay built into the control. Regardless of which screen is being displayed, after 5 minutes of inactivity, the display will revert to the SETPOINT TEMP screen.	SETPOINT TEMP120F
3) The 4 push buttons are used to control the operation of the heater. The LEFT and RIGHT buttons shift the display from one screen to another. The DOWN and UP buttons may change the values within selected screens.	< V ^ >
4) As an example, when the screen displays SETPOINT TEMP, the desired hot water temperature will increase 1 degree for each press of the UP button and decrease 1 degree for each press of the DOWN button. Note that minimum and maximum setpoint temperatures are established at the factory.	V SETPOINT TEMP120F ^

5) The LEFT and RIGHT buttons shift the display from one screen to another. From the INLET TEMP screen, one press of the RIGHT button will shift the display to the SETPOINT TEMP screen. INLET TEMP shows the actual temperature of the water entering the heater.	
6) From the SETPOINT TEMP screen, one press of the RIGHT button will shift the display to the ACTUAL TEMP screen. This shows the actual temperature of the water leaving the heater.	
7) From the ACTUAL TEMP screen, one press of the RIGHT button will shift the display to the LOAD PCT screen. This shows the electrical power consumption as a percentage of full power.	
8) From the LOAD PCT screen, one press of the RIGHT button will shift the display to the FLOWRATE screen. This shows the rate of flow of water through the heater.	
9) From the FLOWRATE screen, one press of the RIGHT button will shift the display to the UNITS screen. This shows the units of measure in either the ENGLISH or METRIC systems. ENGLISH units are degrees Fahrenheit and gallons per minute. METRIC units are degrees Celsius and liters per second. Use the UP and Down buttons to select the desired units of measure.	
10) From the UNITS screen, one press of the RIGHT button will shift the display to the SOFTWARE REVISION screen. This shows the revision level of the software in the control.	
11) From the SOFTWARE REVISION screen, one press of the RIGHT button will shift the display to the ERRORS screen. This shows the error history of the heater. "0 ERRORS" means that no errors have occurred. If the heater has an error history of 4 errors; this history will be displayed on the screen as shown. "CODE 1:E0" refers to the first error and indicates it to be an E0 error. One press of the UP button will show the second error as "CODE 2:E0" and having the same E0 error. Continued pressing of the UP or Down buttons will scroll through each of the errors in the history (in this case a total of 4). ERRORS indicate an undesirable condition but will not shut down the operation of the heater.	

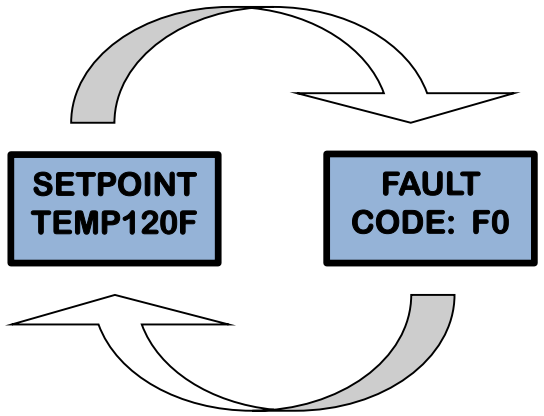
ERROR CODES:

E0: Excessive water flow detected

Corrective action: Using the OUTLET BALL VALVE, slowly reduce water flow until the desired temperature is achieved. The temperature is proportional to the flow through the heater; the lower the flow, the higher the temperature and vice versa.

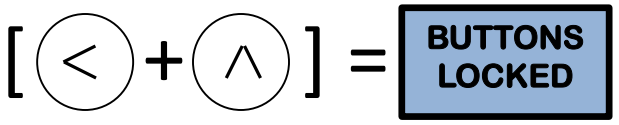
⚠CAUTION Keep the INLET BALL VALVE fully "OPEN". NEVER RESTRICT THE WATER FLOW USING THE INLET VALVE.

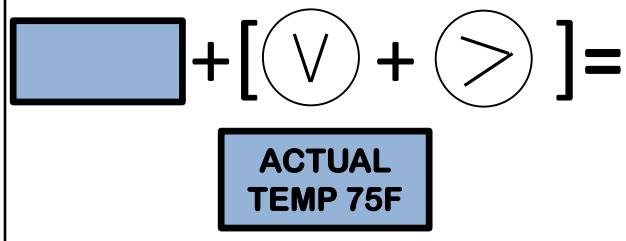
E1: Inlet temperature too hot to generate heat

12) FAULTS are communicated through the LCD display. The display will switch from the SETPOINT screen to the FAULT screen and back again every 3 seconds. FAULTS indicate an undesirable condition and will immediately shut down the operation of the heater. If faults are appearing on your heater call Eemax Technical Support for assistance.	

FAULT CODES:

F0: Outlet thermistor out of range
F1: No change in water temperature detected
F2: Dry fire detected - Optical Sensor Tripped
F3: Excessive dry fire occurrences detected
F4: Inlet thermistor out of range

13) The security of the heater settings is provided by pressing and holding the LEFT and UP buttons for 3 seconds to lock the buttons. Once locked, the buttons have no function. Press and hold the same LEFT and UP buttons for 3 seconds to unlock the buttons. The security status can be checked at any time by pressing any one button. If the system is locked, the screen will display "BUTTONS LOCKED".	

14) The display can be turned off or on. Press and hold the DOWN and RIGHT buttons for 3 seconds. If the display is off, it can be turned on by pressing and holding the same DOWN and RIGHT buttons for 3 seconds.	

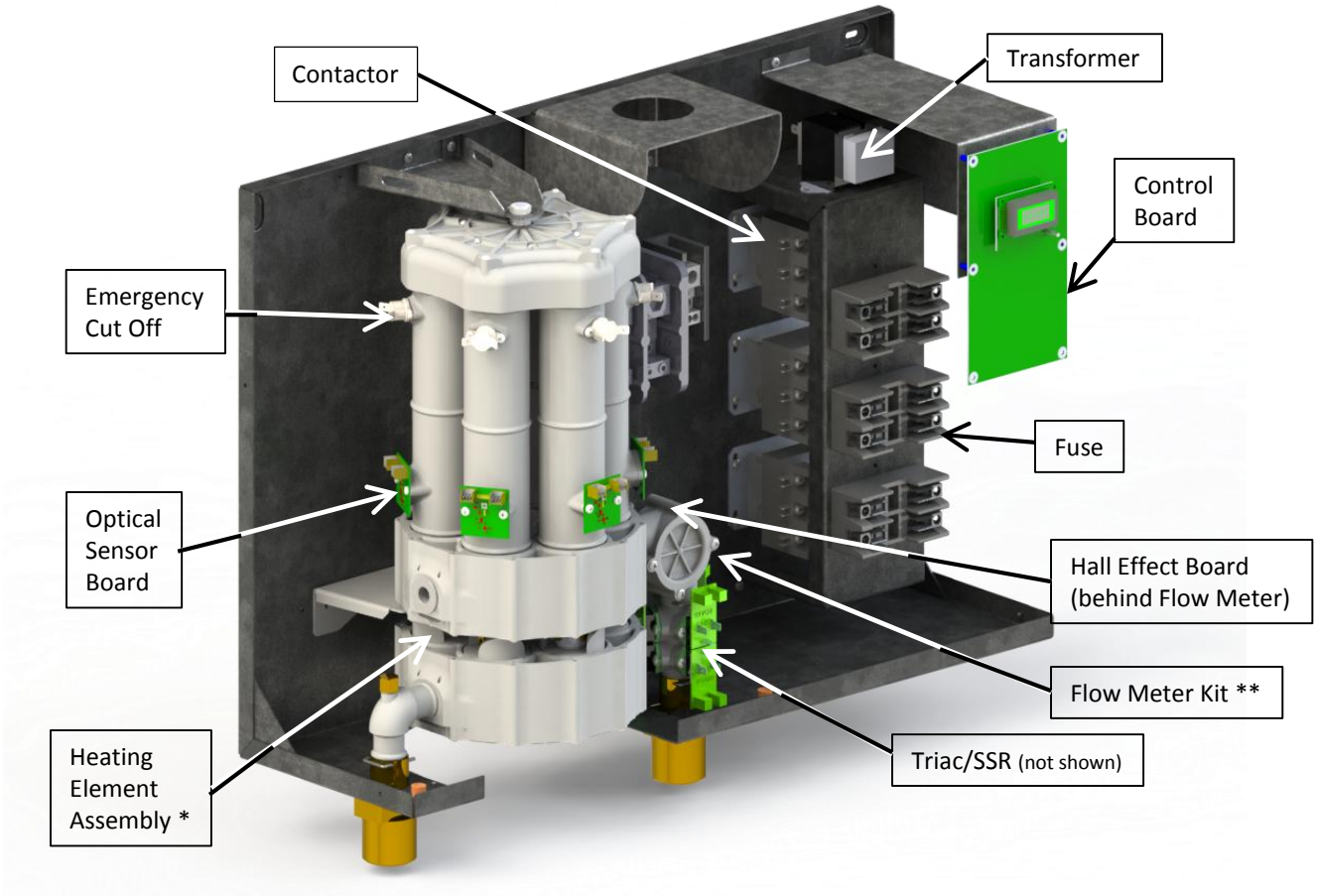
6) REPAIR PARTS

⚠WARNING

Service and repairs are to be performed by licensed electricians or qualified servicemen.

⚠WARNING

BEFORE ATTEMPTING ANY REPAIRS TO THE HEATER, MAKE SURE THAT THE ELECTRICAL BREAKER IS "OFF" AND CONFIRM THAT THERE IS NO VOLTAGE AT THE HEATER.



***** Heating element assembly consists of one heater core and wire element(s) complete.
** Flow meter kit consists of paddle wheel, dowel pin, O ring and 4 mounting screws.

REPAIR PARTS (continued)

Model	Transformer	Control Board	Fuse	Flow Meter Kit	Hall Effect Board
AP032208	EX08303-07	EX08300-00	EX198	EX78000-00	EX08601-00
AP036208	EX08303-07	EX08300-00	EX08200-11	EX78000-00	EX08601-00
AP041208	EX08303-07	EX08300-00	EX08200-11	EX78000-00	EX08601-00
AP054208	EX08303-07	EX08300-00	EX198	EX78000-00	EX08601-00
AP064208	EX08303-07	EX08300-00	EX08200-11	EX78000-01	EX08601-00
AP036480	EX08303-05	EX08300-00	N/A	EX78000-00	EX08601-00
AP039480	EX08303-05	EX08300-00	N/A	EX78000-00	EX08601-00
AP048480	EX08303-05	EX08300-00	N/A	EX78000-00	EX08601-00
AP054480	EX08303-08	EX08300-00	EX08100-07	EX78000-00	EX08601-00
AP063480	EX08303-08	EX08300-00	EX198	EX78000-01	EX08601-00
AP072480	EX08303-08	EX08300-00	EX198	EX78000-01	EX08601-00
AP096480	EX08303-08	EX08300-00	EX198	EX78000-01	EX08601-00
AP108480	EX08303-08	EX08300-00	EX198	EX78000-01	EX08601-00
AP126480	EX08303-08	EX08300-00	EX08200-11	EX78000-01	EX08601-00
AP144480	EX08303-08	EX08300-00	EX08200-13	EX78000-01	EX08601-00
AP130600	EX08303-06	EX08300-00	EX08200-13	EX78000-01	EX08601-00
AP150600	EX08303-06	EX08300-00	EX08200-13	EX78000-01	EX08601-00

Model	Triac/SSR*	Heating Element Assembly	Optical Sensor Board	Emergency Cut Off **	Contactor
AP032208	EX78002-00	EX77000-8.12	EX78001-00	EX278A-KIT	EX08306-02
AP036208	EX78002-00	EX77000-7.20	EX78001-00	EX278A-KIT	EX08306-00
AP041208	EX78002-00	EX77000-6.33	EX78001-00	EX278A-KIT	EX08306-00
AP054208	EX78002-00	EX77000-4.81	EX78001-00	EX278A-KIT	EX08309-00
AP064208	EX78002-00	EX77000-4.06	EX78001-00	EX278A-KIT	EX08309-00
AP036480	EX78002-00	EX77000-19.2	EX78001-00	EX278A-KIT	EX08306-02
AP039480	EX78002-00	EX77000-17.7	EX78001-00	EX278A-KIT	EX08306-00
AP048480	EX78002-00	EX77000-14.4	EX78001-00	EX278A-KIT	EX08306-00
AP054480	EX78002-00	EX77000-12.8	EX78001-00	EX278A-KIT	EX08306-02
AP063480	EX78002-00	EX77000-18.2	EX78001-00	EX278A-KIT	EX08306-02
AP072480	EX78002-00	EX77000-19.2	EX78001-00	EX278A-KIT	EX08306-02
AP096480	EX78002-00	EX77000-14.4	EX78001-00	EX278A-KIT	EX08309-00
AP108480	EX78002-00	EX77000-12.8	EX78001-00	EX278A-KIT	EX08309-00
AP126480	EX78002-00	EX77000-10.97	EX78001-00	EX278A-KIT	EX08309-00
AP144480	EX08200-12	EX77000-9.6	EX78001-00	EX278A-KIT	EX08309-00
AP130600	EX08200-12	EX77000-16.6	EX78001-00	EX278A-KIT	EX08309-00
AP150600	EX08200-12	EX77000-14.4	EX78001-00	EX278A-KIT	EX08309-00

* For “S” models use SSR EX08200-12

** Use EX278-A for all models EXCEPT:

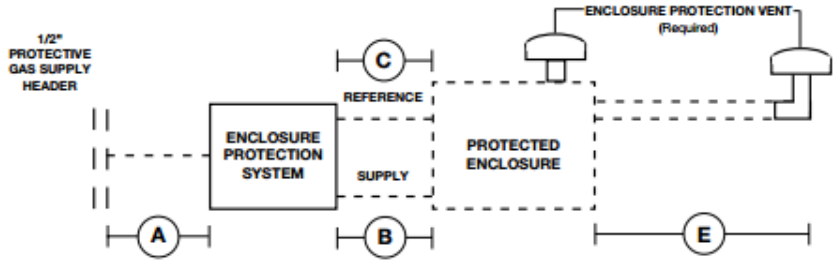
- ‘S’ and ‘DB’ options use EX278D-KIT
- ‘EE’ and ‘EFD’ options use EX278E-KIT

7) OPTIONS

Optional Class 1 Division 2

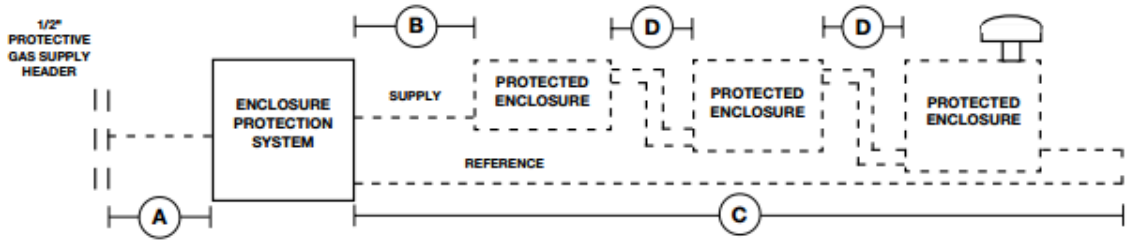
Establishing Connection Sizes, Lengths & Bends

TYPICAL SINGLE PROTECTED ENCLOSURE CONNECTIONS



	A	B	C	D	E
Description	**System Supply Tubing**	**Enclosure Supply**	**Enclosure Reference**	**Multi - Enclosure Connections**	**Optional Remote Venting**
***Tubing or Pipe Diameter Tubing & Pipe Must Be Fully Reamed**	3/8" O.D. Tubing or 1/4" I.D. Pipe	3/8" O.D. Tubing or 1/2" I.D. Pipe	1/4" O.D. Tubing Fully Reamed	1 1/4" I.D. Pipe Fully Reamed	1 1/4" I.D. Pipe Fully Reamed
Maximum Tubing / Pipe Length and Maximum Number of Bends / Elbows	20 Feet 10 Bends	5 Feet 5 Bends	20 Feet 10 Bends	10 Feet 5 Elbows	30 Feet 5 Elbows

TYPICAL MULTIPLE PROTECTED ENCLOSURE CONNECTIONS



*NOTE: TUBE AND PIPE SIZES ARE TRADE SIZES AND ARE NOT EQUAL IN INSIDE DIAMETERS. DO NOT SUBSTITUTE TUBE FOR PIPE WITH SAME TRADE SIZE.

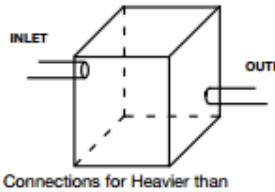
HELPFUL HINTS

To ensure adequate protective gas flow to the protected enclosure(s), all piping and tubing must be fully reamed.

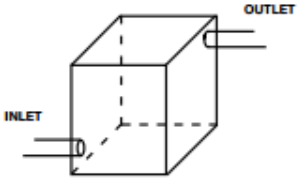
Precautions must be taken to prevent crimping and other damage to protective gas piping and tubing.

When protecting multiple enclosures with a single enclosure protection system, the enclosures must be connected in series from the smallest to the largest to ensure adequate protective gas flow.

Determining Enclosure Inlet & Outlet Connection Locations



Connections for Heavier than Air Gases and Vapors



Connections for Lighter than Air Gases and Vapors

HELPFUL HINTS

If flammable gases are lighter than air, the inlet connection to each enclosure must enter near a bottom corner. The outlet connection, for the required enclosure protection vent or piping to an adjacent protected enclosure, must exit near an extreme opposite top corner.

If flammable gases are heavier than air, inlet and outlet connections must be reversed.

In all cases, the most prevalent gas must determine the location of inlet and outlet connections.

Electrical Supply Requirements

General Wiring Requirements

WARNING

THIS DEVICE CONTAINS ELECTRICAL PARTS WHICH CAN CAUSE SHOCK OR INJURY

All electrical connections, conduit and fittings on the protected enclosure must be suitable for the hazardous location in which they are installed. In addition, all conduit and wire must be installed in accordance with NEC as required and all relevant plant and local codes.

Note: Do not use seals on conduit used as a protected "wireway" to supply protective gas to adjacent protected enclosures. The same conduit can be utilized for both electrical and pneumatic service to an adjacent protected enclosure(s), provided the conduit is oversized to allow a minimum free clearance equal to or larger than the pipe size required between multiple enclosures as stated on page 7, "Getting Started".

Enclosure Power Requirements

The protected enclosure(s) electrical power source must originate from a circuit breaker or fused disconnect suitable for the hazardous location in which it is installed. The switch must be located within fifty (50) (15.2 m) feet of the protected enclosure(s) and the protection system and be properly marked.

Alarm Signal Requirements

The WPSA style pressure switch requires a 120 VAC power supply in addition to the alarm signal. The WPS and WPSA Style system alarm signal may originate from the protected enclosure if the alarm signal is disconnected by the protected enclosure's circuit breaker or fused disconnect as stated in Enclosure Power Requirements above.

The protected enclosure(s) alarm signal power may also originate from outside of the protected enclosure. In this application, the protected enclosure may be used as a "wireway" to pass alarm signal wiring from the power source to the alarm device, if the wiring is isolated and properly labeled. In addition, appropriate conduit seals must be provided outside of the protected enclosure separately.

IMPORTANT NOTE

NFPA 496 requires the use of an alarm or an indicator to detect the loss of safe enclosure pressure. In addition, the NFPA 496 requires that if an indicator alone is utilized, a protective gas supply alarm must also be installed between the last valve in the protective gas supply and the protected enclosure. Therefore, the protective gas supply to all LPS Style systems must be equipped with the above mentioned protective gas supply alarm. Exception: Systems utilizing an EPSK or GPSK enclosure pressure loss alarm switch accessory will satisfy the above mentioned NFPA requirement.

Typical Enclosure Wiring Methods

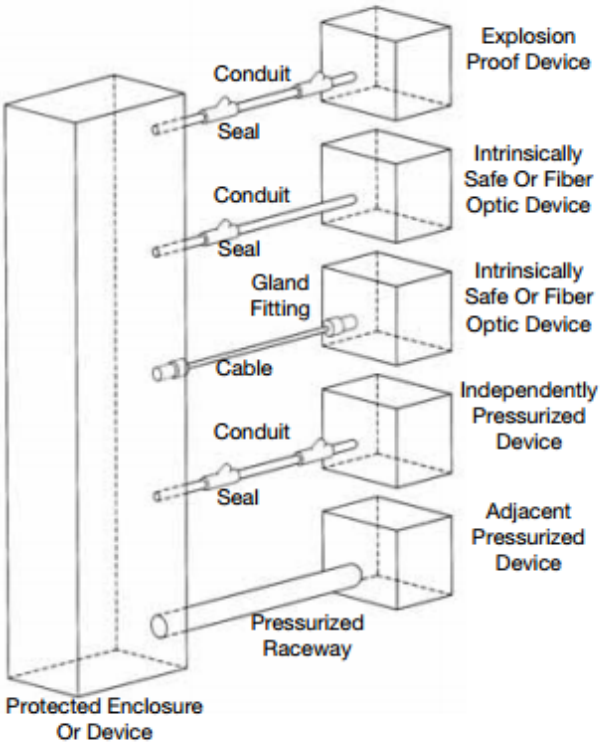
In a general sense, protected enclosures should be wired similar to explosion proof enclosures, in accordance with Article 500 of the National Electric Code - NFPA 70.

Single conductor wiring should be placed in rigid metal conduit, seal-flex conduit or other mediums approved for use in the hazardous location surrounding the protected enclosure. Additionally, NFPA 496 requires the use of approved seals on all pressurized enclosure conduit wiring entries, in accordance with NFPA 70. Furthermore, the use of an approved seal is simply the most practical way to prevent excessive leakage through conduit connections.

However, while explosion proof enclosures require conduit seals on all cable entries, in accordance with NFPA 70. Other methods of sealed cable entries that are suitable for hazardous locations can be used, such as compression glands.

In conclusion, there are two primary goals. First, the installer should ensure that all associated wiring and cable is protected by pressurization or other means, such as explosion proof conduit or intrinsic safety barriers. Secondly, the installer should ensure that all associated conduit and wireways are sealed to conserve protective gas, unless they are used to supply protective gas to other enclosures or devices.

Typical Enclosure Wiring Connections



Conduit Installation

Electrical Conduit

1. Choose the location for the enclosure's electrical conduit connection(s) based on the requirements on page 16, "Electrical Supply Requirements".
2. Drill and deburr enclosure conduit fitting holes in the protected enclosure. Mount the fittings.
3. Determine appropriate route for the enclosure electrical and power alarm signal conduit.
4. Measure, cut and thread conduit, check conduit fit to insure proper seating. Fully ream all conduit.
5. Install conduit and tighten all fittings to fitting manufacturers specifications. Secure conduit to appropriate structural supports as required.
6. Seal all conduit with an approved compound prior to operation of the protection system.

HELPFUL HINT

It may be impractical to pour all electrical conduit seals prior to installation in the field. However, all conduit connections must be sealed for proper testing and operation of the Enclosure Protection System. Therefore, the use of temporary seals such as duct seal or masking tape for bench or shop testing, prior to final field installation may be used.

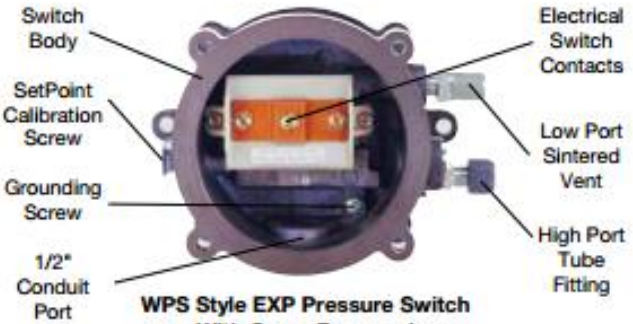
WPS Style Conduit

WPS & WPSA style systems provide electrical contacts for audible or visual alarm devices that signal a loss of protected enclosure pressure. They are calibrated to alarm at 0.15" (3.8 mm) for Class I applications. The switches are suitable for hazardous (classified) outdoor locations. Wiring must be installed with a seal and conduit fittings suitable for the area. Alarm circuit power may be derived from the protected enclosure power source or an intrinsically safe alarm signal source. All associated alarm devices must be protected by suitable means (explosion proof, purged or intrinsically safe).

WPS Style Conduit Connection Parts

Fitting Kits Can Be Bebco Furnished

1. For EXP pressure loss alarm switch connected to an enclosure mounted alarm, one (1) LCK (L fitting Conduit Kit) or equivalent conduit elbow, coupling and seal fittings.
2. For EXP pressure loss alarm switch connected to a remote mounted alarm, one (1) TCK (T fitting Conduit Kit) or equivalent conduit tee, coupling and seal fittings.
3. One (1) lot 150# rating 1/2" galvanized or aluminum pipe.



WPS Style EXP Pressure Switch With Cover Removed

WPSA Style EXP Pressure Switch With Cover Removed

TCK "T" Fitting Conduit Kit

LCK "L" Fitting Conduit Kit

Set-up Procedure

HELPFUL HINTS

"Safe" pressure, for purposes of this manual, is defined as a minimum .25 inch (6.4 mm) of water column.

Regulator may be in the locked position upon arrival. To adjust regulator, pull handle to outward position.

Carefully insert T-bar valve key to align valve stem tip of both valves. Practice locking and unlocking key in the RECV valve stem. Practice and familiarization of this process should ease operation of the system.

To test the vent's operation, gently prod the vent flapper open with a soft pointed object, (example: eraser end of a pencil) ensuring that the vent valve works freely. On vertically configured vents, this can be accomplished from within the protected enclosure. Side mounted -90 configured vents can be tested by removing the conduit plug at the bottom of the mounting tee. Multiple operations require only one test per day if enclosure is not opened or left unattended.

IMPORTANT NOTES

The Rapid Exchange® Control Valve and the Enclosure Pressure Control Valve are both operated by utilizing the removable T-bar Valve Key supplied with the system. The purge system is shipped with the T-bar Valve Key locked in the Rapid Exchange® Control Valve stem. To remove the T-bar Valve Key, wrap your index and middle finger around the T-Bar and place your thumb firmly against the system face plate. Pull the T-bar Valve Key straight out firmly. This will unlock and free the T-bar Valve Key for use in the Enclosure Pressure Control Valve stem. When Set-Up or Operating procedures are complete, replace the T-bar Valve Key in the Rapid Exchange® Control Valve stem and push in firmly to lock in position. THE T-BAR VALVE KEY LOCKS IN THE RAPID EXCHANGE® CONTROL VALVE STEM ONLY.

Operators must secure wrist or stop watch to manually time Exchange Cycle for all applications.

Pepperl+Fuchs Rapid Exchange Purging Systems are designed to provide a pre-calibrated and certified volume exchange rate. With the Rapid Exchange® pressure gauge set at 60 psi (4.14 bar)minimum, the model 3003 will accomplish the required volume exchanges at a rate of ONE MINUTE PER 3 CUBIC FOOT (85 //min) of enclosure volume.

The volume exchange rate is based on a four (4) enclosure volume exchange. Multiply the required exchange time by 2.5 for applications requiring a ten (10) volume exchange for motors.

Regardless of enclosure volume or system flow rate, Pepperl+Fuchs requires that operators withhold power to the enclosure while inducing the Class I enclosure volume exchange, for at least five (5) minutes. Normal exchange times should be doubled if large obstructions block protective gas flow.

Class I Purging Set-up

READ IMPORTANT NOTES BEFORE PROCEEDING WITH SET-UP

1. Utilizing the T-bar Valve Key supplied with system (see important notes), close Rapid Exchange® Control and Enclosure Pressure Valves fully by turning clockwise (CW).
2. Engage the protective gas supply to the System Supply Inlet and set the Rapid Exchange® Pressure Gauge to 60 psi.
3. Temporarily connect a 0-10 inch (0-254 mm) water column pressure gauge or manometer to the protected enclosure.
4. Check operation of Enclosure Protection Vent as detailed above. (see "Helpful Hint")
5. Seal enclosure(s) and adjust Enclosure Pressure Control Valve, utilizing the T-bar Valve Key, by opening slowly counterclockwise (CCW) to set a "Safe" pressure on the Enclosure Pressure Gauge.

   NOTE: If pressure setting is difficult to stabilize or set, (see page 18, "Trouble-Shooting Procedures").
6. Carefully remove T-bar Valve Key from Enclosure Pressure Control Valve stem. Ensure Enclosure Pressure Gauge "Safe" pressure setting is stable.
7. Utilizing the T-bar Valve Key supplied with system (see important notes above), lock T-bar Valve Key into Rapid Exchange® Control Valve stem. Open valve **fully** by turning 90° CCW and quickly ensure the Enclosure Protection Vent opens. Note: The Enclosure Pressure Gauge should move quickly off scale to the right, this is normal for all Rapid Exchange® purging systems.
8. Readjust the regulator to 60 psi (4.14 bar) minimum, while inducing Rapid Exchange®, until the test gauge reads approximately 3 to 5 inches (76-127 mm) of pressure and does not fluctuate. (insufficient enclosure pressure will cause the Enclosure Protection Vent to "shuttle") DO NOT exceed 10 inches (254 mm) of pressure within the protected enclosure.
9. Close Rapid Exchange® Control Valve fully and ensure T-bar Valve Key is firmly locked in Rapid Exchange® Control Valve stem.
10. Cease testing and remove test equipment.

Operating Sequence

WARNING

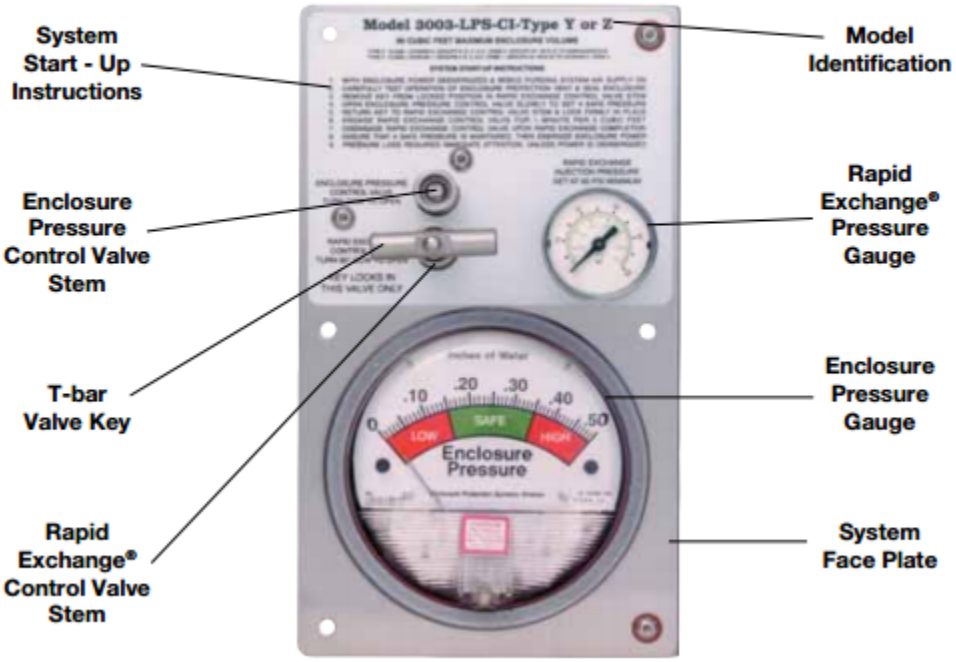
Do not exceed "Safe" pressure with the Enclosure Pressure Control Valve.

Operators must follow step-by-step sequence of the Start-Up Instructions Nameplate on the Protection System.

Class I Purging Operation

With the protective gas supply connected, enclosure power deenergized and alarm system energized (if utilized).

1. Carefully read Start-Up Instructions on system.
2. Check operation of the Enclosure Protection Vent (EPV-3), opening it manually several times, (see page 16, "Helpful Hint").
3. Seal protected enclosure(s).
4. Unlock T-bar Valve Key from the RECV stem and place in the EPCV stem. (see important notes, page 16), open Enclosure Pressure Control Valve, by turning CCW, to set Enclosure Pressure Gauge at "Safe" pressure, the Pressure Loss Alarm Switch (if utilized) should then activate to silence the alarm system.
5. Ensure the Protection System Enclosure Pressure Gauge maintains a "Safe" pressure for one (1) minute.
6. Carefully remove T-bar Valve Key from Enclosure Pressure Control Valve stem. Ensure Enclosure Pressure Gauge "Safe" pressure setting is stable.
7. Utilizing the T-bar Valve Key supplied with system (see important notes, page 16), open Rapid Exchange® Control Valve **fully** by turning 90° CCW and quickly ensure the Enclosure Protection Vent opens. Note: The Enclosure Pressure Gauge should move quickly off scale to the right, this is normal for all Rapid Exchange® purging systems.
8. Standby for the exchange time as specified on the Start-Up Instructions (five minutes minimum), then close the Rapid Exchange® Control Valve fully and ensure T-bar Valve Key is firmly locked in Rapid Exchange® Control Valve stem.
9. Wait for the Enclosure Pressure Gauge to return to a "Safe" pressure and energize the protected enclosure(s) power via the local disconnect switch.
10. Ensure the Enclosure Pressure Indicator maintains a "Safe" pressure before leaving system unattended.



NOTE: LPS MODEL SHOWN

System Maintenance

Regular Maintenance

Drain the Protection System Filter (if utilized) frequently and clean system with non-solvent cleaning agents only.

Long Term Maintenance

Calibrate the enclosure pressure indicator to 0 inches by venting the purge pressure reference port and the protected enclosure to atmosphere and adjusting the calibration screw in the lower center portion of the indicator's face.

Fully open the enclosure pressure control valve, to blow out any deposits around the tip of the valve and to ensure that the enclosure protection vent is operating properly, then carefully readjust system according to the set-up procedure and operating sequence on pages 16 and 17. Replace or tighten stem packing nut as required to prohibit stem packing leakage.

Carefully disassemble the enclosure protection vent by loosening the two bottom hex nuts that hold the unit together.
(DO NOT REMOVE CAP NUTS ON TOP OF VENT BODY)
Carefully clean the flapper valve and vent body seats with warm soap and water, being careful not to extend the vent valve beyond its normal opening point, and being careful not to exert any stress on the valve hinge.

Examine the entire Protection System and the protected enclosure(s), and replace any defective parts during routine shutdown of the protected enclosure(s). Parts are available from Pepperl+Fuchs on immediate notice as required.

MAINTENANCE SCHEDULE

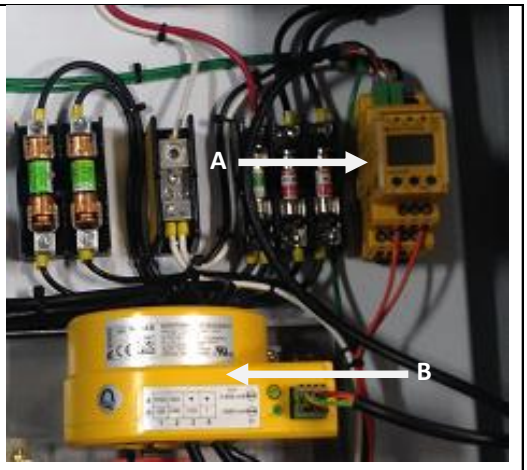
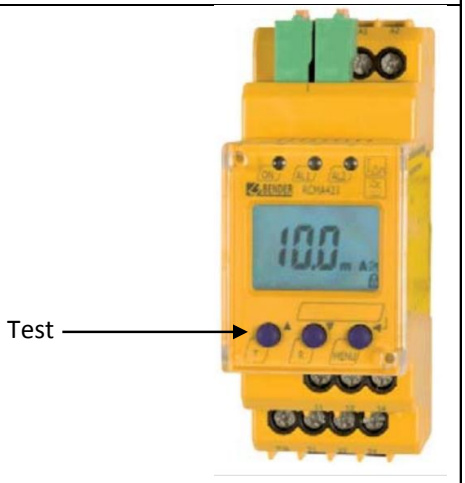
Date	Work Performed	Performed by

Optional Enclosure Heater

1) Attach heat tape and foam insulation to all lengths of inlet and outlet water piping that are exposed to freezing temperatures. We recommend a rating of -30 degrees F at 10 miles per hour wind. Connect the heat tape to an independent source of electrical power. ⚠CAUTION ***FAILURE TO ATTACH HEAT TAPE AND INSULATION TO EXPOSED INLET AND OUTLET PIPES WILL VOID THE WARRANTY.***	
2) Set the thermostat on the enclosure heater, located at the upper left corner in the enclosure, to 40 - 70 degrees F. Note: Heater Fan continuously operates to recirculate air in the enclosure. The heater coil will activate based on thermostat set point.	

Note: Power must be applied to the water heater for the freeze protection system to operate. If power is not applied ensure the system is completely drained. Neglecting to do so will damage the heater and void the warranty.

Optional GFCI

The optional GFCI consist of (A) Control Module and (B) Current Transformer. This control module has a LCD display indicating real-time measurements. The GFCI module is pre-set from the factory to trip at 3.0A.	
Test and reset functions are carried out automatically every 24hrs. To manual test the GFCI press the test button for a min. of 1.5 secs. To reset a tripped GFCI cycle the power of the unit. If equipped with a disconnect handle turn the handle to the “OFF” position then back to “ON”.	

Optional NON-FUSIBLE Disconnect Switch

DISCONNECT SWITCH MODEL	60 A	100 A	200 A
OPERATING VOLTAGE	600 V	600 V	600 V
Max horsepower rating:			
120 Vac 1-Phase	3	--	--
220/240Vac 1-Phase	10	10	10
220/240Vac 3-Phase	20	30	75
440/480Vac 3-Phase	40	75	150
600 Vac 3-Phase	50	100	200
Short circuit rating with fuses	100	200	200
Branch circuit fuse type	J	J	J
Max fuse rating (A)	60	100	200

DISCONNECT HANDLE

Nema Type: 4, 4X	**Color: Red/Yellow**

Optional FUSIBLE Disconnect Switch

DISCONNECT SWITCH MODEL	200 AMP	100 AMP
RATING (A)	200 A	100A
OPERATING VOLTAGE	600 V	600 V
Max horsepower rating/ Max motor FLA current Three phase :		
208 V	50/150	25/78.5
240 V	60/154	30/80
480 V	125/156	60/77
600 V	150/144	75/77
DC 125 V (2 pole in series)	15/112	7.5/58
DC 250 V (3 pole in series)	40/140	20/38
Short circuit rating with fuses	200	200
Branch circuit fuse type	J	J
Max fuse rating (A)	200	100

DISCONNECT HANDLE

Nema Type: 4, 4X	**Color: Red/Yellow**

If you need any assistance from our Technical Service Department, make sure you can identify this water heater by having the
model no: _____
and serial number: _____.

Call 203-267-7890 or toll free: 800-543-6163.

Email: info@eemaxinc.com Web: www.Eemax.com

Eemax Inc., 400 Captain Neville Drive, Waterbury, CT 06705