6000 Purge System
User Manual

Type X and Ex pxb Purge and Pressurization System

Your automation, our passion.

PEPPERL+FUCHS

The latest version of the General Terms of Delivery for Products and Services in the Electronics Industry set out by the German Electrical and Electronic Manufacturers' Association (ZVEI) and the "Extended Reservation of Proprietorship" supplementary clause apply to this document.

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1. Introduction

1.1. Content of this Document

This document contains information required to meet the safety and protection requirements for systems with explosion protection in equipment Group II, Zones 1 or 21, Class I/II, Division 1 when installing, commissioning, and using the 6000 control unit and its components. This important information will help you use the 6000 purge and pressurization system safely and correctly.

This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Maintenance and repair
- Disposal

Knowledge of the basic safety regulations and additional training and experience in the area of explosion protection are essential for the safe handling and failure-free operation of the 6000 series purge and pressurization system.

These operating instructions contain important data and information to ensure the safe use of the 6000 system in hazardous areas and to meet the requirements of Directive 2014/34/EU. This manual, particularly the safety information, must be followed by all personnel who work on the system.

WARNING!

Failure to follow these instructions may impair the safety protection and function of the equipment.

Note

For complete information on this product, see further documentation at www.pepperl-fuchs.com.

Information about individual components can be provided on request.

The documentation comprises the following parts:

- This document
- Safety instruction manual
- Datasheet

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In addition, the documentation may comprise the following parts, if applicable:

- Manufacturer declaration of conformity
- EU declaration of conformity
- Control drawings
- Additional documents

1.2. Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting of the 6000 series lies with the plant operator. Personnel working on this system must:

- be familiar with the regulations about safety and accident prevention and briefed in handling of the component.
- be trained to work on explosion protection equipment.
- know the appropriate instructions and rules for the installation, handling, and maintenance of explosion-protection equipment.

The operator and/or installer must also ensure that:

- the 2-wire RTDs for temperature sensors are suitable for the area classification Class I/II, Division 1 and Zone 1, or Zone 21, Class I, Zone 2. Maximum length is 3m.
- the bypass switch is suitatble for the area classification Class I/II, Division 1 and Zone 1 or Zone 21, Class I, Zone 2.
- the intrinsically safe aspects of the system are installed in accordance with manufacturer's control drawing number 116-B026.
- that the 6000 system is used as a purge controller and not protected by purging and pressurization
- all electrical, mechanical, and pneumatic connections have been made in accordance with this manual and any other applicable standards and laws.

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1.3. Symbols Used

This document contains symbols to identify warning messages and information messages.

Warnings

You will always find warning messages whenever hazards could result from your actions. It is essential that you observe these warning messages to ensure your personal safety and to prevent property damage.

Warning messages are shown in descending order according to the risk level, as follows:

DANGER!

This symbol warns you of an immediate and present danger.

If you do not observe this warning message, there is a risk of personal injury and even death.

WARNING!

This symbol warns you of a potential fault or hazard.

If you do not observe this warning message, there is a risk of personal injury or severe property damage.

CAUTION!

This symbol warns you of a potential fault.

Failure to observe this warning message may result in the malfunctioning or complete failure of the product or any systems and plants connected to it.

Information Symbols and Messages

Note

This symbol draws your attention to important information.

Action instructions

This symbol highlights an action. You are prompted to perform an action or sequence of actions.

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1.4. Pertinent Laws, Standards, Directives, and Further Documentation

NEC, CEC, and other national and local laws, standards, or Directives that are applicable to the intended use and installation location must be observed. In relation to hazardous areas, Directive 1999/92/EC must be observed.

The corresponding datasheets, EU Declaration of Conformity, EU Type Examination Certificates, NEC/NFPA and CEC certificates, and control drawings, if applicable (see datasheet), are an integral part of this document. You can find this information at www.pepperl-fuchs.com.

Due to constant revisions, documentation is always subject to change. Please refer only to the most up-to-date version, which can be found at www.pepperl-fuchs.com.

1.5. Declaration of Conformity

All products were developed and manufactured under observance of the applicable European standards and guidelines.

Note

A Declaration of Conformity is included with these instructions and can be requested from the manufacturer or obtained online at www.pepperl-fuchs.com. Additional documentation can also be provided for individual components.

The product manufacturer, the Pepperl+Fuchs Group, 68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.

ISO9001

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2. Product Description

2.1. The 6000 System

2.1.1 Purpose

The purpose of the Pepperl+Fuchs 6000 series Type X & Ex px, Class I/II, Division 1 / Zone 1/21 enclosure protection system is to allow the use of general purpose or non-rated electrical or electronic devices located in general purpose enclosures instead of explosionproof/flameproof, Type 7 or 9 / Ex d enclosures or other means of protection for the rated area. Other purposes include heat, moisture, and dust contamination prevention.

2.1.2 Description

The 6000 series Type X & Ex px purge and pressurization system protects general purpose equipment mounted in a standard enclosure. This allows the enclosure to be located and the equipment operated in a hazardous area. The hazardous area classification can be Class I, Class II, Division 1 / Zone 1, Zone 21. The 6000 series operates by controlling and monitoring compressed instrument air or inert gas through the protected enclosure(s) so as to remove and prevent the accumulation of flammable gas, vapors, or dust.

The 6000 series system features these main parts:

• Electronic processor (EPCU) housed in an explosionproof enclosure

• I.S. electrical/pneumatic manifold assembly

• I.S. user interface for programming and monitoring the system

• 316L stainless steel (UNS S31603) type 4X IP66 enclosure for EPCU and connections (not included with component kit)

• Intrinsically safe pressure relief vent with flow and pressure monitoring at the exhaust.

The user interface allows programming of up to 4 switch inputs, temperature modules, enclosure power contacts, 2 auxiliary outputs, and various operational functions. Through the user interface menus, configuration of the standard information for setup and operation of a system (purge time, flow rates, pressures, enclosure size, etc.) are easily programmed. Additional features allow inputs for system bypass, enclosure power on/off, temperature overload and activation of rapid exchange flow for cooling or auxiliary relay for separate cooling source, delay power shutdown, and more. The two auxiliary contact outputs can be configured to activate on most of the input switches or any of the configured alarm states for pressure, flows, and temperature.

The power for the solenoid valve on the manifold unit, inputs, the user interface

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controller (UIC), and EPV-6000 vent are provided by the EPCU through the internal galvanically isolated intrinsic safety barrier. No additional I.S. barrier is required.

The adjustable mounting bracket and the universally mountable vent make the 6000 system easy to install horizontally or vertically onto the enclosure. A component kit is available for custom installations that fit specific customer needs.The 6000 control unit can monitor multiple enclosures and control and accept inputs from two (2) EPV-6000 vents. The 6000 series provides a complete system for purging and pressurizing enclosures for hazardous location operation.

Note

One operations copy of this manual must be studied and retained by the system operator in addition to one permanent file copy. Users' agents are responsible for transferring this manual to the user/operator prior to startup.

2.2. Control Unit

2.2.1 Parts List

Control unit with housing

(1) 6000 control unit
(1) bracket for mounting control unit
(1) EFC-6-SS
(2) 3/8" stainless steel tube
(1) 3/8" male ferrule fitting
(4) ¼-20 slot-head screws for mounting control unit to bracket
(4) ¼-20 round head
(4) Type 4X seal washer
(4) ¼-20 bolts
(1) enclosure warning nameplate
(1) Installation/operation manual

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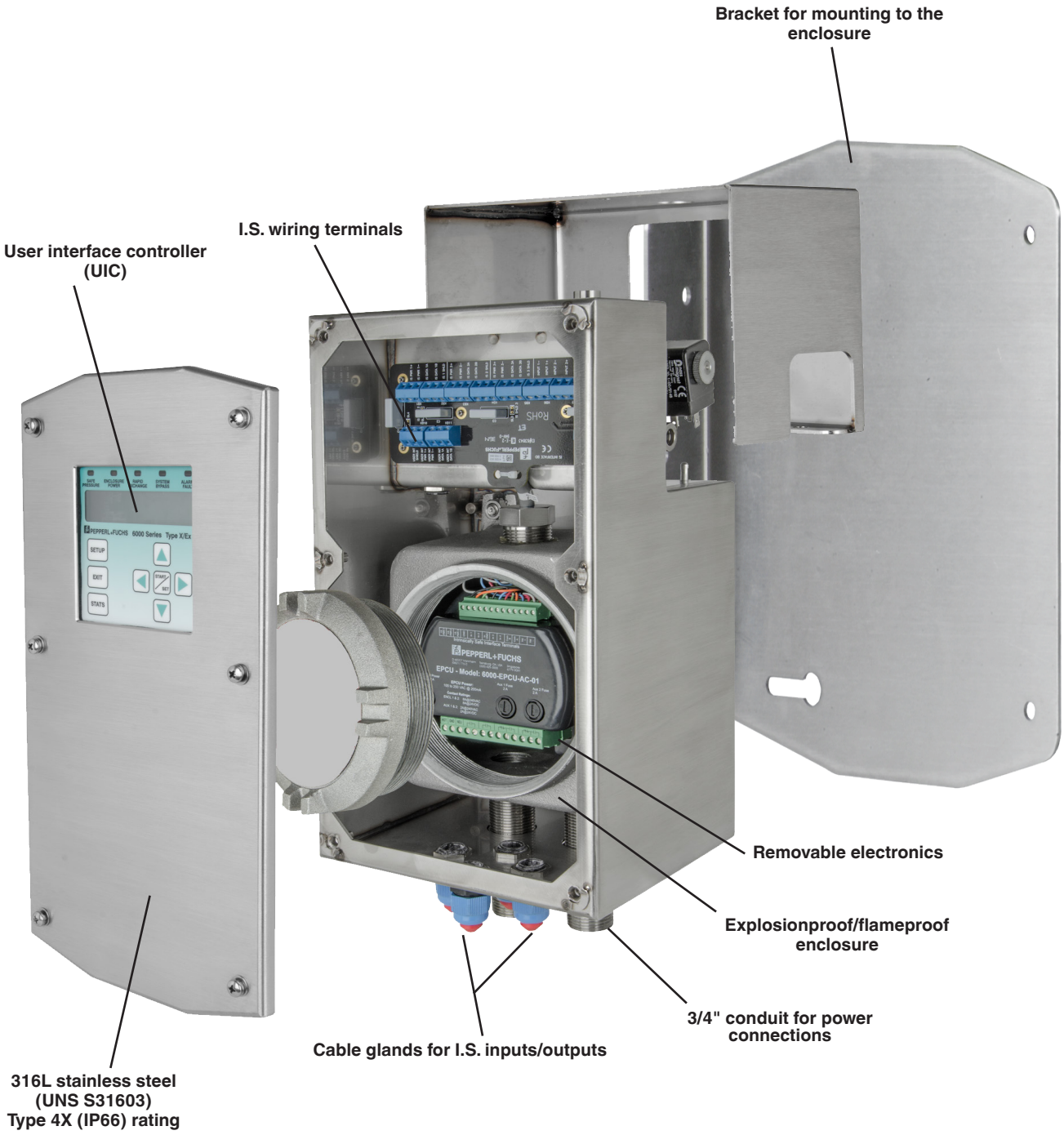
2.2.2 Images

Control Unit



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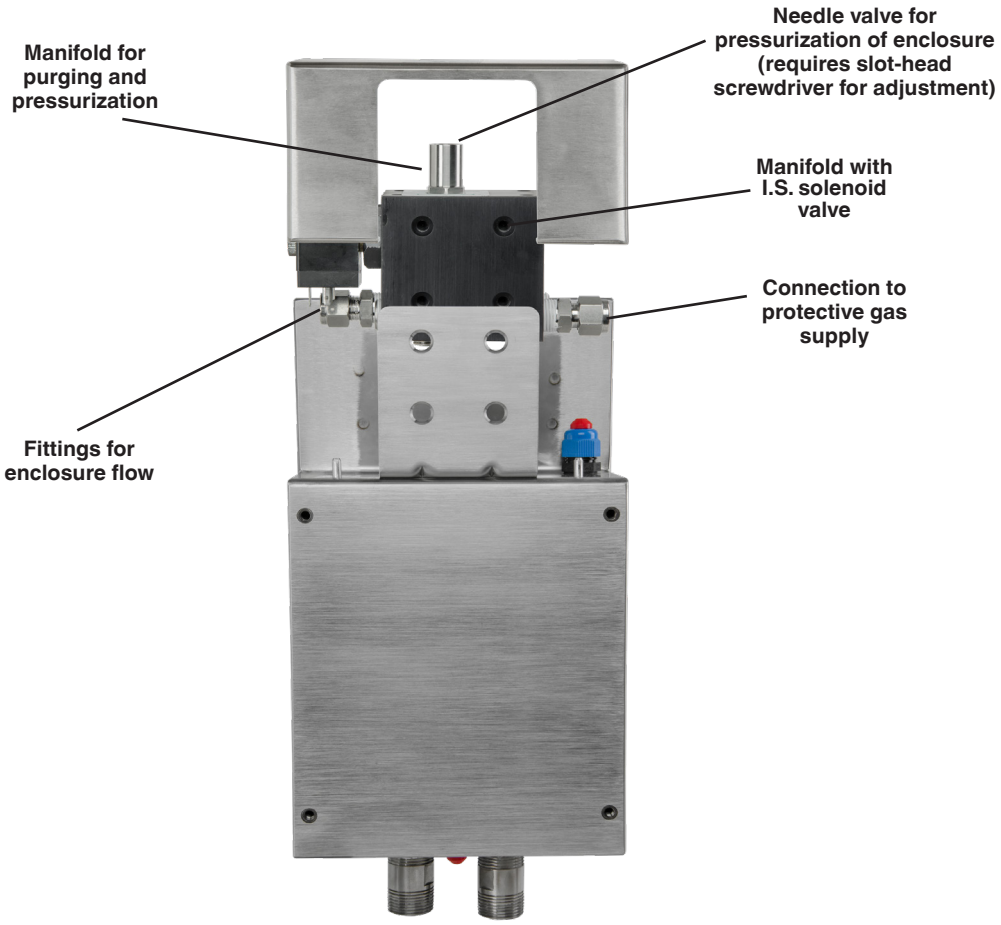
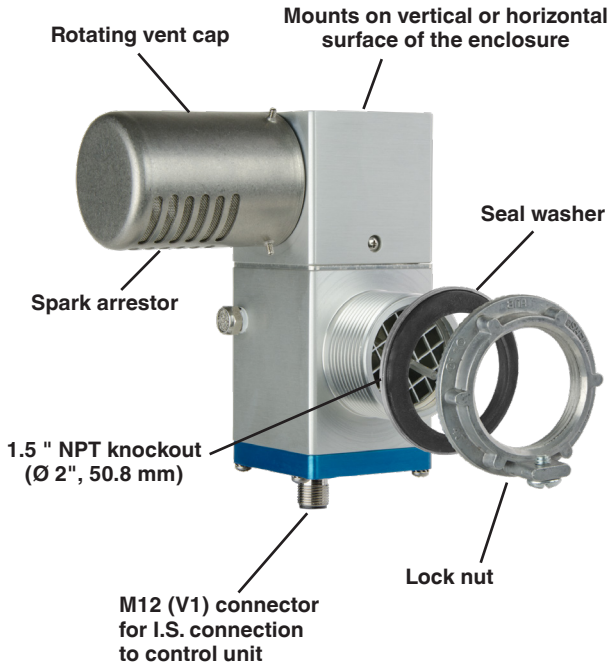
Manifold



Vent



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Accessories (sold separately.)

I.S. temperature hub

I.S. temperature sensor

Conduit plug

2.2.3 Technical Data

Item	Value
General specifications	
Enclosure volume	28.3 m^3 (999 ft^3) max.
Number of volume exchanges	4 to 19
Hazardous environment	Gas, dust, or both
STD	Manually ON and OFF
SA	Manually ON, automatically OFF
FA	Automatically ON and OFF
Electrical parameters	
6000 series control unit	
Power requirement:	
AC version	100 ... 250 V AC; 50 ... 60 Hz / 0.2 A
DC version	20 ... 30 V DC; 0.6 A Overvoltage category II
Fuse replacement—power:	
AC version	3.15 A Slo-Blo fuse, 5 x 20 mm size
DC version	2.0 A Slo-Blo fuse, 5 x 20 mm size
Type of fuse	UL recognized, JDYX2 / JDYX8 type
Outputs:	
ENC_1, ENC_2	
Protected enclosure contacts	8 A @ 240 VAC, resistive load
(Dry contacts (2) SPST N.O.)	8 A @ 24 VDC
AUX1 (Output 1)	
Auxiliary 1 contact output	2 A @ 240 VAC, resistive load
(Dry contacts (2) SPDT)	2 A @ 24 VDC

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AUX2 (Output 2)	
Auxiliary 2 contact outputs	2 A @ 240 VAC, resistive load
(Dry contacts (2) SPDT)	2 A @ 24 VDC
Fuse replacement, AUX contacts	
AUX1, AUX2	2.0 A Slo-Blo fuse, 5 x 20 mm size
Inputs:	
Inputs 1, 2, 3, 4:	Contact input 5 VDC @ 2 mA, intrinsically safe
Temperature inputs:	6000-TEMP, intrinsically safe
Vent(s) EPV-6000	Intrinsically safe connection via a 4-pin M12 connector Up to 2 vents can be connected
User interface module	Intrinsically safe connection via M8 (V31) connector 2x20 LCD backlight screen for menu-driven setup and operation
LED Indication	
Safe pressure	BLUE: safe pressure is achieved
Enclosure power	GREEN: power on RED: power off
Rapid exchange	BLUE: when purging is running
System bypass	YELLOW: when bypass is activated
Alarm fault	RED blinking: any alarm input detected RED solid: 6000 series system fault
I.S. solenoid valve output	Refer to drawing 116-B027A
Operating conditions	
Indoor/outdoor use Can be installed in environments up to pollution degree 4	
Operating temp	
6000 control unit:	-20 °C to +60 °C (-4 °F to +140 °F)
EPV-6000 vent:	-20 °C to +60 °C (-4 °F to +140 °F)
Relative humidity	up to 85 % non-condensing
Altitude	max. 2000 m
Pneumatic parameters	
Protective gas requirement	Instrument grade air or inert gas
Pressure requirement	1.4 ... 8.3 bar (138 ... 827 kPa / 20 ... 120 psig) (Filter and regulator not provided)
Safe pressure minimum	
Gas	0.625 mbar (62 Pa) (0.25” wc) (6.4 mm wc)
Dust	1.6 mbar (162 Pa) (0.65” wc) (16.5 mm wc)
Gas+Dust	1.6 mbar (162 Pa) (0.65” wc) (16.5 mm wc)

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Purging flow rate increment and minimum enclosure pressures at flow rate. Minimum purge time is one minute.	
EPV-6000-XX-01, 02	141 l/min (5 scfm) @ 3.7 mbar (1.5 in. w.c.) 340 l/min (2 scfm) @ 5.0 mbar (2.0 in. w.c.) 565 l/min (20 scfm) @ 6.7 mbar (2.7 in. w.c.) 850 l/min (30 scfm) @ 10.2 mbar (4.1 in. w.c.)
EPV-6000-XX-03, 04	141 l/min (5 scfm) @ 5.2 mbar (2.1 in. w.c.) 340 l/min (12 scfm) @ 6.5 mbar (2.6 in. w.c.) 565 l/min (20 scfm)@ 10.2 mbar (4.1 in. w.c.) 850 l/min (30 scfm) @ 13.2 mbar (5.3 in. w.c.)
EPV-6000-XX-05, 06	141.6 l/min (5 scfm) @ 4.1 mbar (1.64 in. w.c.) 339.8 l/min (12 scfm) @ 5.5 mbar (2.20 in. w.c.) 566.3 l/min (20 scfm) @ 14.9 mbar (6.00 in. w.c.)
Maximum flow rate measurement for enclosure size:	
Enclosure volume:	Flow rate:
< 0.57 m^3 (20 ft^3)	141, 340 l/min; (5, 12 SCFM)
0.57 to 0.85 m^3 (20 to 30 ft^3)	141, 340, 565 l/min; (5, 12, 20 SCFM)
> 0.85 m^3 (30 ft^3)	141, 340, 565, 850 l/min; (5, 12, 20, 30 SCFM)
Flow rate for leakage compensation	Depends on enclosure seal
EPV-6000-xx-01, -02	10.0 l/min (0.35 scfm) @ 0.63 mbar (0.25 in. w.c.) 28.0 l/min (1.0 scfm) @ 1.9 mbar (0.75 in. w.c.)
EPV-6000-xx-03, -04	6.2 l/min (0.22 scfm) @ 0.63 mbar (0.25 in. w.c.) 16.4 l/min (0.58 scfm) @ 1.9 mbar (0.75 in. w.c.)
EPV-6000-xx-05, -06	Less than 1.0 l/min (0.35 scfm) @ 0.63 mbar (0.25 in. w.c.) Less than 1.0 l/min (0.35 scfm) @ 1.9 mbar (0.75 in. w.c.)
Inlet fitting to manifold	3/8” ferrule fitting
Outlet fitting from manifold	3/8” ferrule fitting
Inlet fitting to enclosure	3/8” bulkhead fitting
Mechanical specifications	
Storage temperature	
6000 control unit (all versions):	-30 °C to +80 °C (-22 °F to +176 °F)
EPV-6000 vents:	-30 °C to +80 °C (-22 °F to +176 °F)
6000-TEMP hub:	-20 °C to +70 °C (-4 °F to +158 °F)
6000-TSEN sensor:	-20 °C to +100 °C (-4°F to +212 °F)
6000-ISB-01:	-20 °C to +60 °C (-4 °F to +140 °F)
6000-DPE-...-:	-20 °C to +60 °C (-4 °F to +140 °F)
Operation temperature	
6000-XX-S2-UN-WH-XX:	-20 °C to +50 °C (-4 °F to +122 °F) For Dust application -20 °C to +60 °C (-4 °F to +140 °F) For Gas application
6000-XX-S2-UN-CK-XX:	-20 °C to +60 °C (-4 °F to +140 °F)

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6000-UIC-01:	-20 °C to +60 °C (-4 °F to +140 °F)
EPV-6000 vents:	-20 °C to +60 °C (-4 °F to +140 °F)
6000-TEMP hub:	-20 °C to +60 °C (-4 °F to +140 °F)
6000-TSEN sensor:	-20 °C to +100 °C (-4°F to +212 °F)
6000-ISB-01:	-20 °C to +60 °C (-4 °F to +140 °F)
6000-DPE-...-:	-20 °C to +60 °C (-4 °F to +140 °F)
6000 Control Unit	
Protection class (all electronics)	Type 4X, IP66 (Device is protected against dust and strong jets of water.)
Weight	11.4 kg (25 lbs)
Power connections	3/4” NPT male pipe (explosionproof seals required)
I.S. input connections	Terminal connections inside 6000 control unit
Material	Enclosure: 316L (UNS S31603) stainless steel Manifold valve: Anodized 6082 aluminum Fittings: 316L (UNS S31603) stainless steel Terminal blocks EPCU: I.S. Board: I.S. board terminal block: Conductors 26–16 AWG (0.13–1.31 mm^2) 0.5–0.6 Nm
I.S. cable glands	M16 x 1.5 (5.5–10 mm) (4)
Wire diameter	5.5 ... 7.0 mm (with both seals) 7.0 ... 10.0 mm (with one seal)
Wire sealing nut torque	1.0 Nm (with both seals) 1.4 Nm (with one seal) for wire diameters 7.0 to 10.0 mm
Enclosure seal torque	3.3 Nm
Terminal blocks, EPCU	Power terminal block: Conductors 26–14 AWG (0.13–2.08 mm^2) Torque 0.5–0.6 Nm I.S. terminal block: Conductors 28–16 AWG (0.08–1.31 mm^2) Torque 0.22–0.25 Nm
I.S. board	Conductors 26–16 AWG (0.13–1.31 mm^2) 0.5–0.6 Nm

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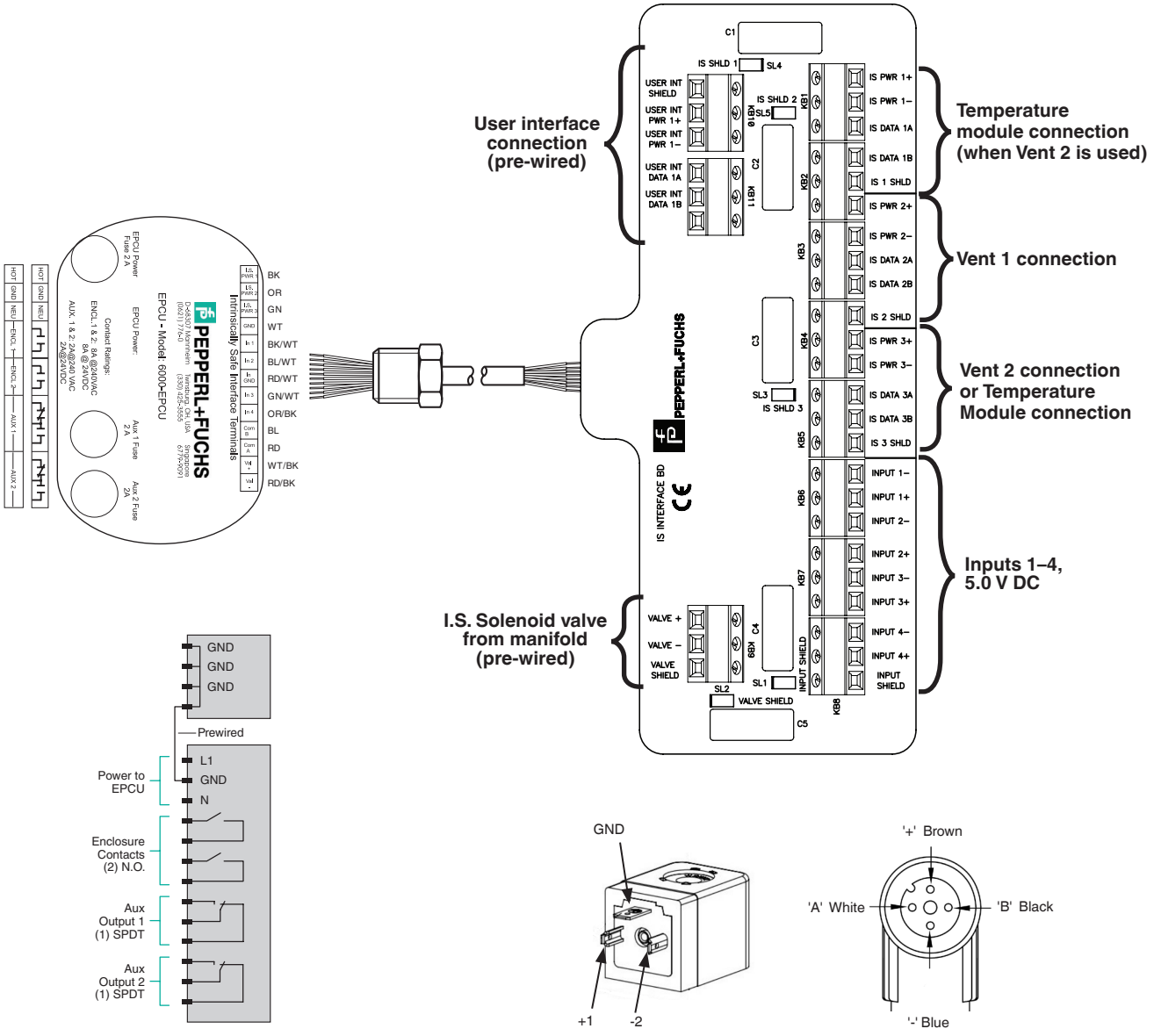
2.2.4 Electrical and Pneumatic Connections

2.2.4.1 Electrical Installation: Power and I.S. Wiring



Connector color code for the user interface, temperature module, and vent:

PWR +	BN (brown)
PWR -	BU (blue)
DATA_A	WH (white)
DATA_B	BK (black)

WARNING!

For Class/Division applications, conduit seals must be installed within 457.2mm (18 inches) of enclosure.

For Zone applications, seals must be installed directly on these conduit extensions.

Disconnect power before servicing.

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Note

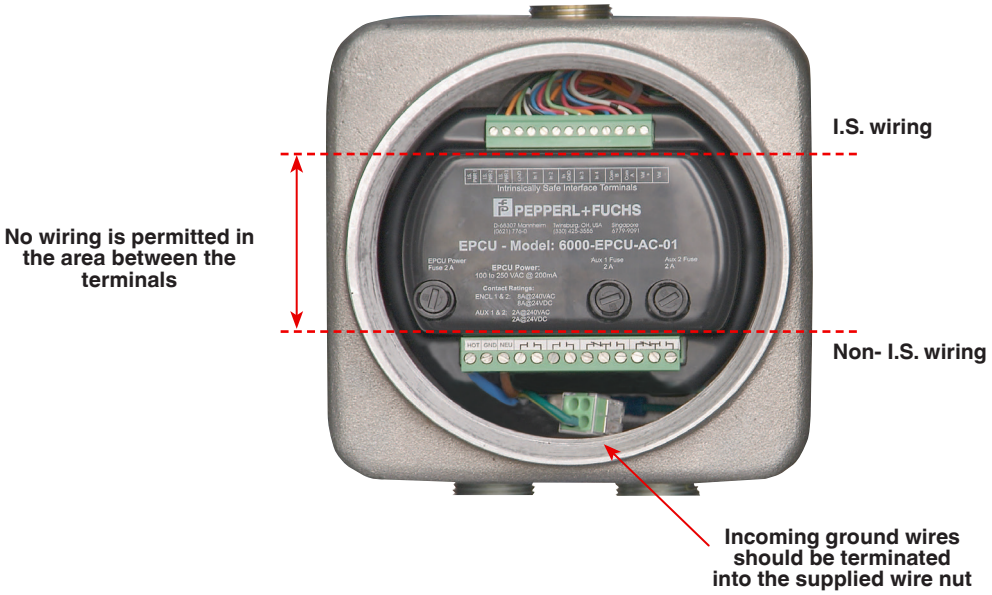
When removing the terminal block from the EPCU stack, place your hand on top of the plastic to support the stack as you are pulling it out.

Note

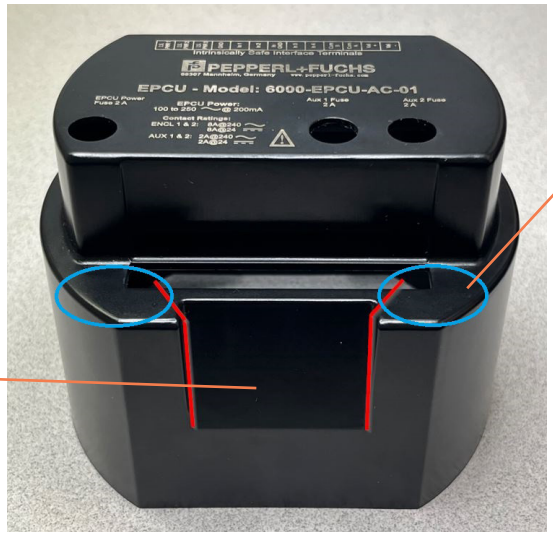
The EPCU is pre-wired to the I.S. terminal board.

Note

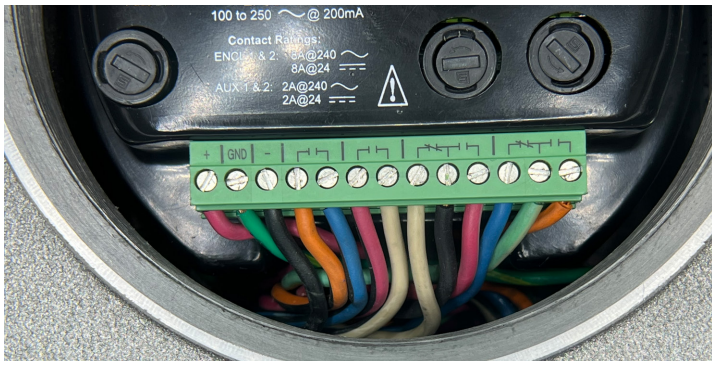
Both enclosure power contacts are switched at the same time.



EPCU inside explosionproof container



EPCU cover



EPCU cover and non-I.S. connections, properly installed

WARNING!

To prevent ignition of the flammable atmospheres, the wiring method must ensure that if any wire is disconnected and extended to the opposite terminal, a 50.8 mm (2”) separation must be maintained.

CAUTION!

Maintain a minimum space of 50.8 mm (2”) between the I.S. wiring and the non-I.S. wiring.

Make sure that the wiring is neatly tucked into the explosionproof housing. Use wire ties if necessary. The non-I.S. wires should be tucked securely within the wire channel and not looped over the shoulders (flat areas) on either side.

No wires are to be in the area between the two terminals, as shown in the above image.

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2.2.4.2 Pneumatic Requirements

Protective gas supply

The protective gas supply to the enclosure system must be a clean, instrument quality compressed air or inert gas filtered to a minimum of 40 microns. It must contain no more than trace amounts of flammable gas, vapor, or dust.

The protective gas supply compressor intake must originate in a nonhazardous location. The suction duct passing through a hazardous location and the protective tubing and piping must be fabricated from noncombustible materials suitable for the prevailing hazardous and environmental conditions.

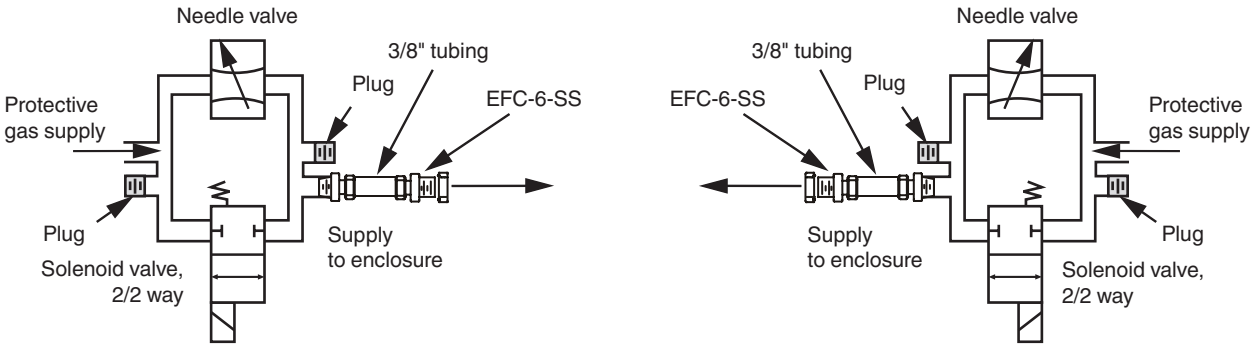
The protective gas supply provided must be able to handle the flow and pressure requirements for purging and pressurization. (See page 26, Establishing Connection Sizes, Lengths, and Bends.)

Pneumatic connections

The 6000 series system requires only two pneumatic connections to the protective enclosure: one for the exhaust for the vent mounting and the other for the protective gas supply for purging and pressurization. The vent requires a single 1½" conduit knockout (Ø 2" [50.8 mm]) hole in the enclosure. A lock ring with gasket for sealing are provided. The control unit for the 6000 series provides a compression fitting with a lock ring and washer connected to a 3/8" tube. All tubing and fittings are 316L (UNS S31603) stainless steel. A single hole into the enclosure as noted on the mounting template will provide the installation for this fitting.

When replacing this tubing, use only 3/8" tubing with wall thickness of 0.9 mm (0.035").

The 6000 series control unit with the manifold can be top, bottom, right- or left-hand mounted on the enclosure. However, the manifold connections may have to be reversed as shown below.



Pressurization adjustment

To adjust, use a slot-head screwdriver inserted into the needle valve of the manifold as shown. Turn clockwise to decrease the flow, counterclockwise to increase the flow. The maximum number of complete rotations allowed is five (5).

Note

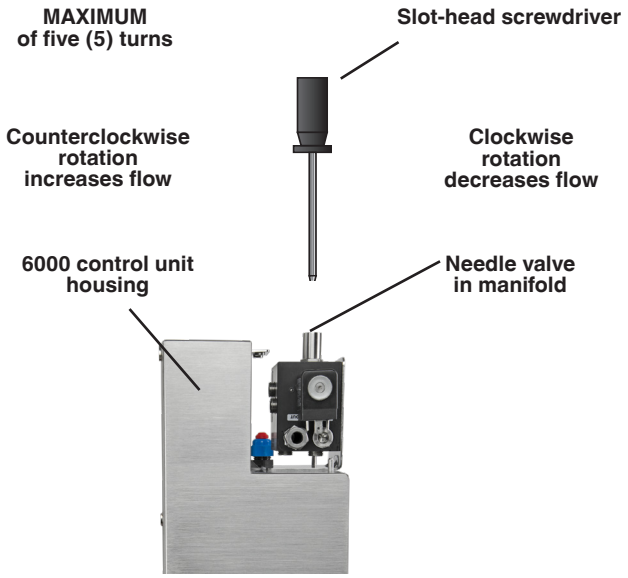
Diagram shown is without plumbing.

Note

Unit must be powered to get a pressure reading.

Note

When delivered, the system is in its default mode (fully automatic [FA]). It may be easier to adjust safe pressure in standard (STD) or semiautomatic (SA) mode so that the system does not automatically begin purging when energized.



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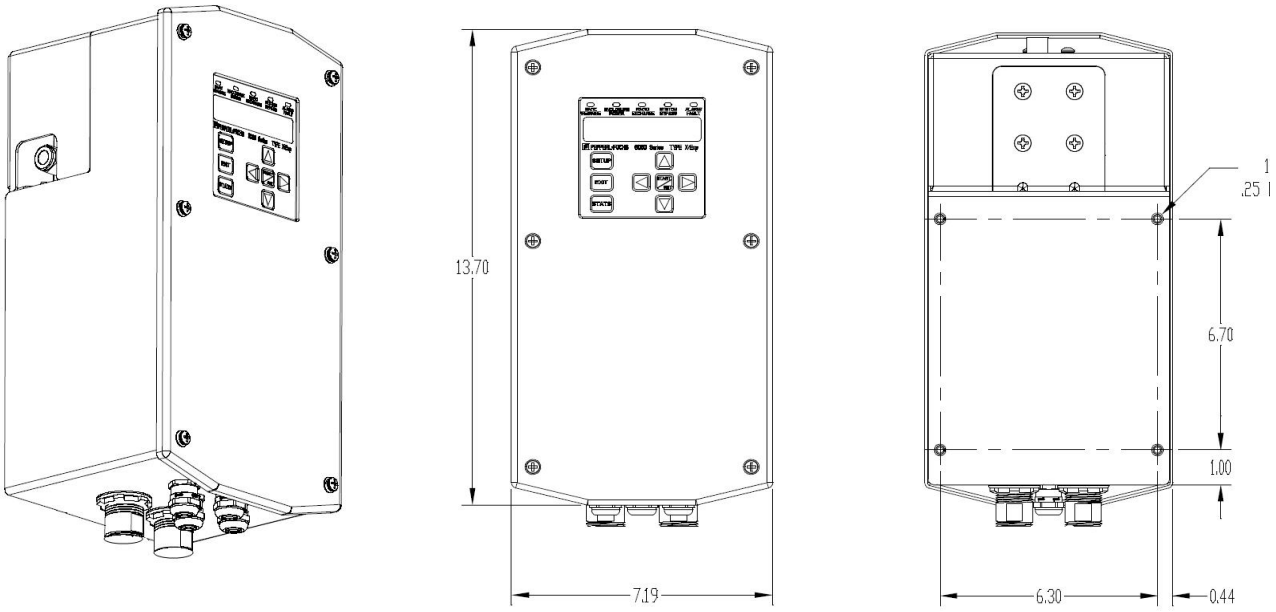
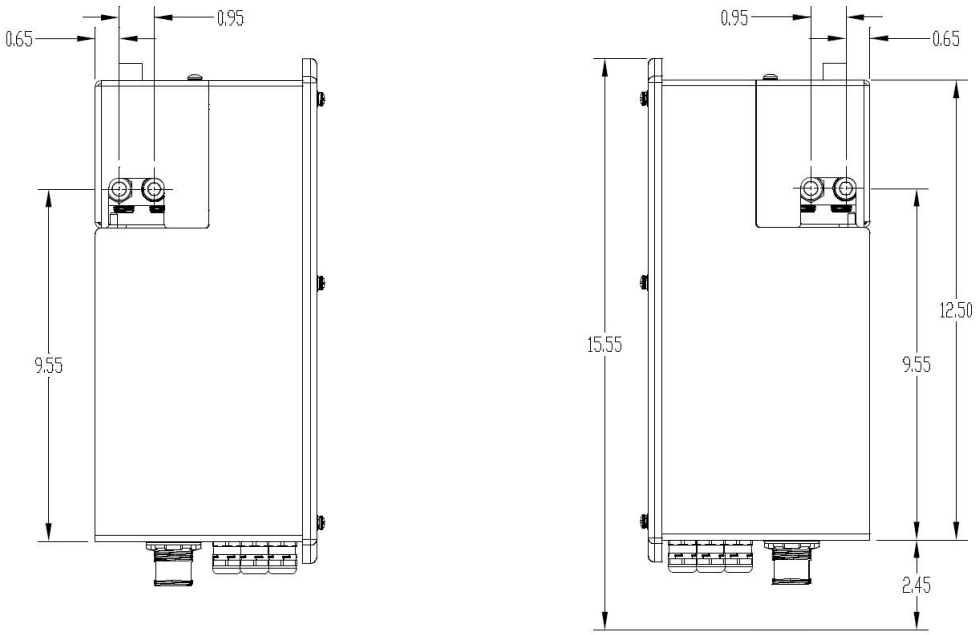
2.2.5 Dimensions

2.2.5.1 6000 Series Control Unit





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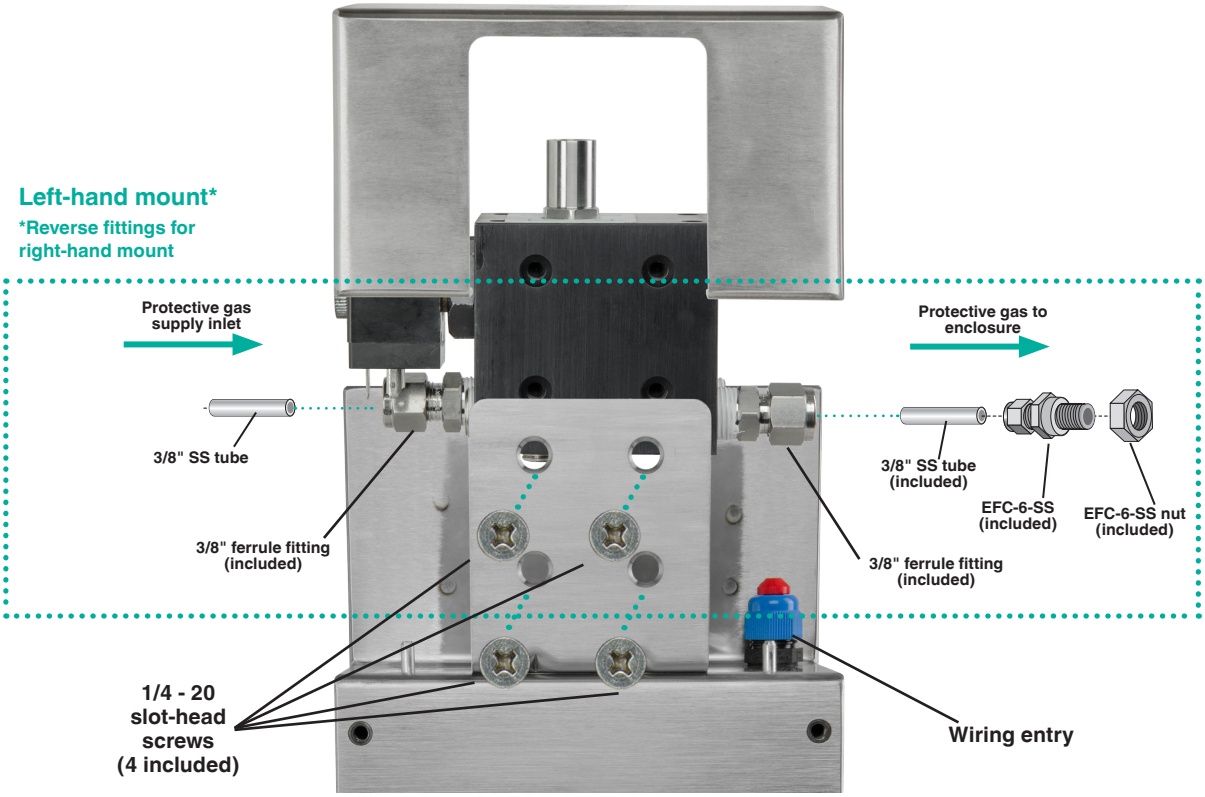
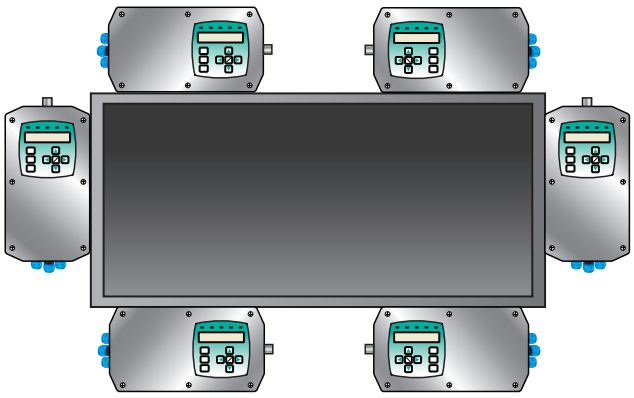
2.2.6 Mounting

Manifold Assembly, Left-Hand or Right-Hand Mount



6000 series mounting patterns



Note

When rotating the UIC display in the housing, always torque adjacent screws at 0.46 Nm (4 in-lb).

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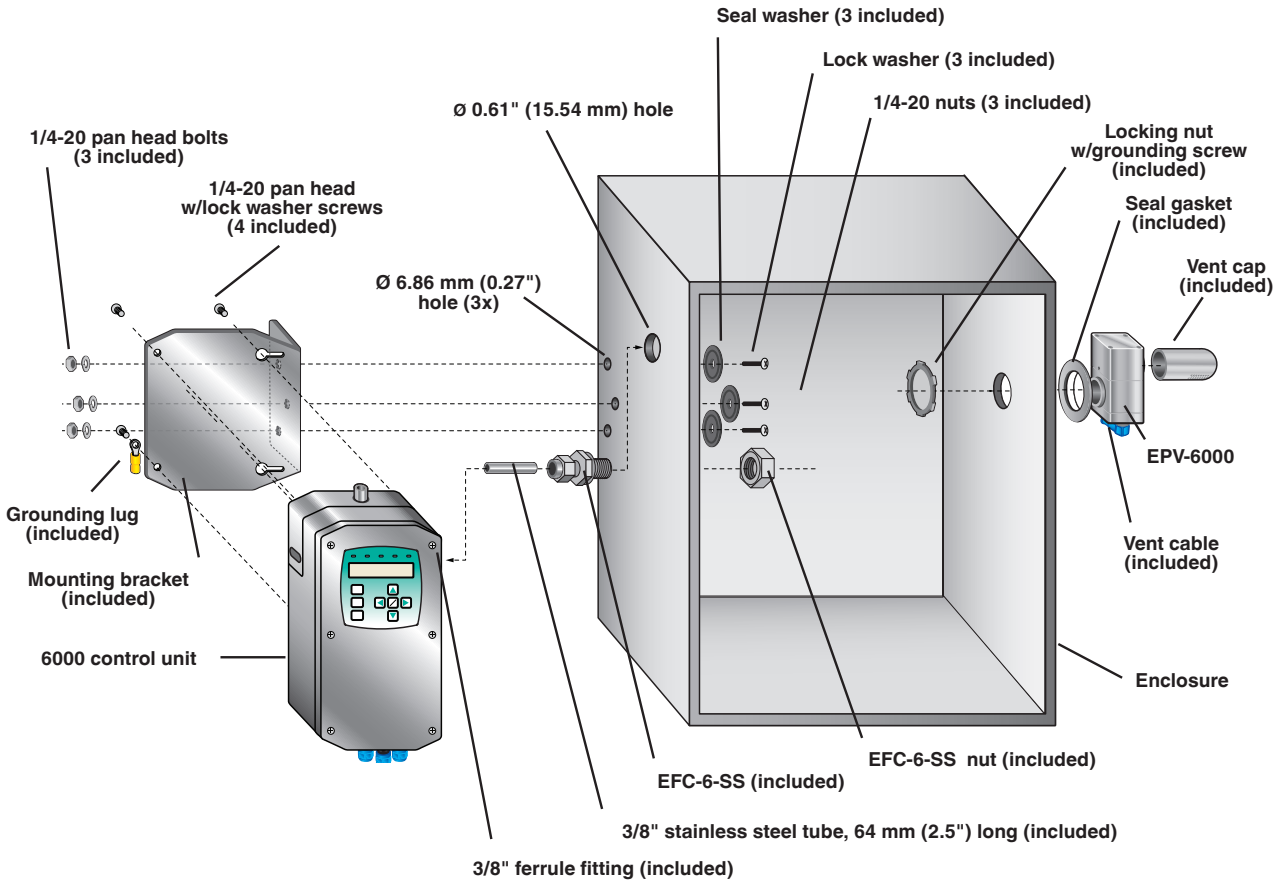
6000 Control Unit with Housing “WH”

Tools:

- Appropriate-sized drill bits or knockout holes.
- 1 1/16” open end box wrench
- Bolts: ¼-20 (provided)

  Hole clearance: 6.86 mm diameter (0.27”)
- EFC-6-SS (provided)

  Hole clearance: 15.54 mm diameter (0.61”)



1. Drill holes using template. Check the scale if printing an electronic version.
2. Assemble tubing and fitting to control unit. Install on the “Out” port of the correct side of the housing.
3. Bolt mounting plate to the enclosure. Type 4X washers must be mounted inside the enclosure. Tighten to 16.38–18.08 Nm (60–80 in-lb).
4. Put two of the mounting screws in the back of the control unit to align with the keyholes in the mounting plate.
5. Hang the control unit onto the plate. Slide the unit toward the enclosure so that the EFC-6-SS fitting is in the proper location.
6. Tighten the two bolts. Put the other two mounting bolts in place and tighten.
7. Place the EFC-6-SS bolt in position and tighten.

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Tightening the Unit Cover Plate

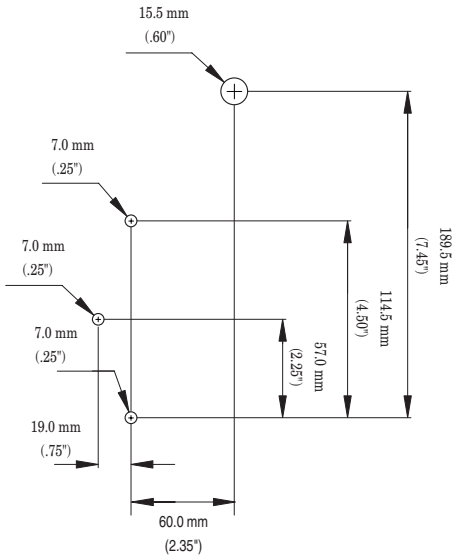
WARNING!

The screws on the unit cover plate must be tightened in the order shown on the diagram above. The cover plate of the main housing has positive stops so that the gasket is not over tightened. Torque screws at 1.36 Nm (12 in-lb).

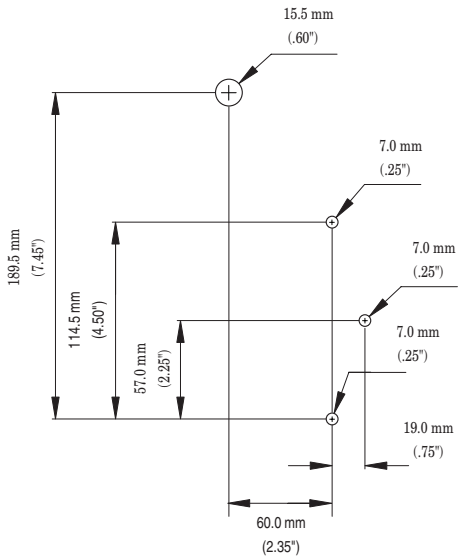
Note

When rotating the UIC, torque down the 4 screws at 0.46 Nm (4 in-lb) using a criss-cross pattern.

Left-hand mounting template



Right-hand mounting template



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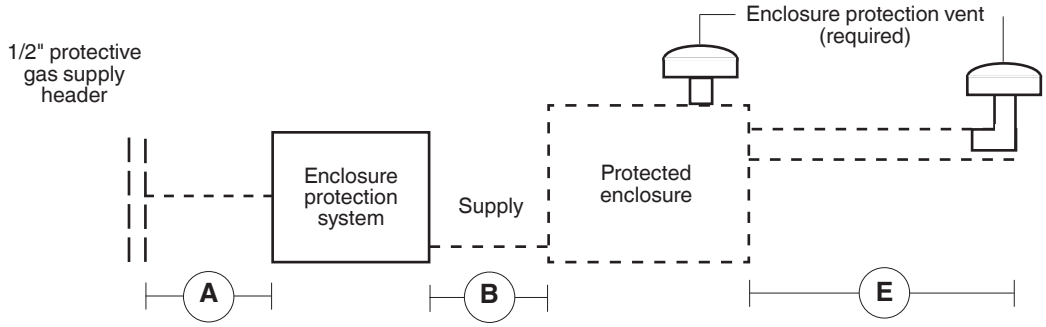
Establishing Connection Sizes, Lengths, and Bends

Typical single protected enclosure connections with vent



	A*	B*	D	E
Model 6000	System supply tubing	Enclosure supply	Multi-enclosure connections	Optional remote venting
*Tubing or pipe diameter Tubing and pipe must be fully reamed	1/2" O.D. tubing or 1/2" I.D. piping	3/8" O.D. tubing	1-1/2" I.D. pipe fully reamed	1-1/2" I.D. pipe fully reamed
Maximum tubing / pipe length and maximum number of bends / elbows	6.1 m (20 feet) 10 bends	6.1 m (20 feet) 5 bends	3.1 m (10 feet) 5 elbows	3.1 m (10 feet) 5 elbows

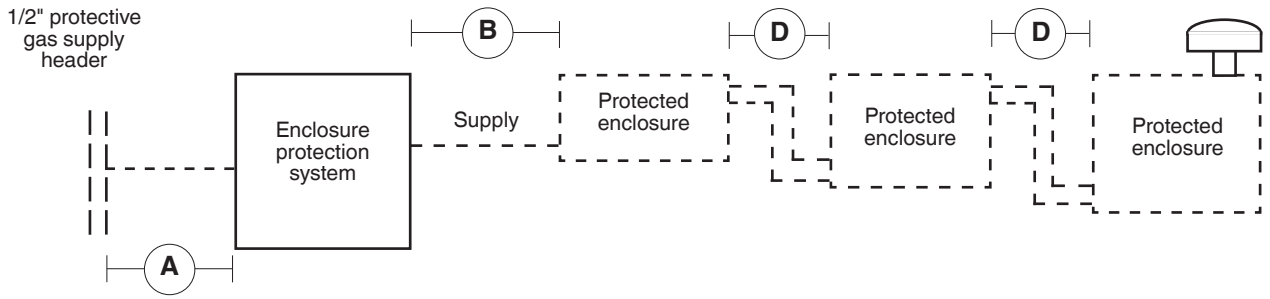
*Smaller tubing and longer lengths allowed but flow will be decreased

Note

Tube and pipe sizes are trade sizes and are NOT equal in inside diameter.

DO NOT substitute tube for pipe with the same trade size.

Typical multiple protected enclosure connections



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 should be connected in series from the smallest to the largest to ensure adequate protective gas flow.

Note

Flow rate will also be dependent on the regulated pressure source.

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2.3. Component Kit

2.3.1 Parts List:

(1) control unit

(1) explosionproof/flameproof enclosure

Bolts for mounting explosionproof/flameproof enclosure

Washers/nuts for mounting explosionproof/flameproof enclosure

(1) 6000-UIC-01 user interface

(1) SMK-6000-CK mounting hardware for 6000-UIC-01

(1) quick disconnect M12 (V1) cable

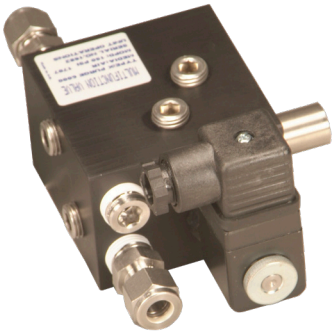
24 AWG (0.20 mm^2), 5 m (16.5 ft.) for 6000-UIC-01

(1) 6000-MAN-DV-01 pneumatic manifold w/solenoid mounting screws for 6000-MAN-DV-01

(1) EFC-6-SS flush mount connector

6000 Series Component Kit
Identification of Components

User interface (Included)
Cannot be mounted in a hazardous dust environment.



Optional pneumatic manifold with solenoid (Included)

Control unit and explosionproof/ flameproof enclosure (Included)

6000 series component kit accessories

6000-ISB-01 (Not Included)
DIN-mounted I.S. termination board.
See datasheet for specifications.

6000-CBLA-ISB-xxxt (Not Included)
Cable assembly for connection from the 6000 EPCU to the 6000-ISB-01.
See datasheet for specific lengths.

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2.3.2 Electrical Connections

General wiring notes for component kit design

For power connections to the control unit and relay contacts:

1. All applicable local and national wiring codes MUST be followed when wiring to the unit.
2. Protective earth wire to be 14 AWG (2.08 mm^2). Strip length of earth to mate with pigtail under wire nut 11.1 mm to 12.7 mm (0.437” to 0.5”).
3. If a single wire is used, the maximum wire gauge to the pluggable terminal block is 14 AWG (2.08 mm^2).
4. If jumpering from one terminal to another at pluggable terminal block, the maximum wire gauge is 16 AWG (1.31 mm^2) for both wires.
5. Minimum wire gauge to the pluggable terminal block is 24 AWG (0.20 mm^2). (Based on connector, not code. Follow all applicable codes.)
6. Strip length of wires terminating into the screw terminals on the pluggable terminal block to 5 mm to 7 mm (0.2” to 0.27”).
7. The torque at the power terminal block is 0.5–0.6 Nm.
8. Add extra wire length of 31.75 mm (1.25”) past top of opening in explosionproof/ flameproof box to pluggable terminal block. (This allows the connector to be moved out of the way when changing electronics and prevents repouring seals.)
9. Wires must be neatly tucked into the box past the lid threads before lid is placed on the unit. Wires must not loop past the highest portion of the plastic cover. Wires are to be routed along the “Wire Channel” and then flare out to access the connector. Wires should not be permitted to rest on the flat areas of the cover on either side of the wire channel due to a potential pinch point that can cause damage to the wires. (See images in 2.2.4.1.) The Ground Wire Nut should be tucked in last. If it is tucked in earlier in the connection process, it may be difficult to access when changing electronics. If shrink wrap/wire labels are used, they should be applied so that they are below the flat areas on either side of the wire channel.
10. If using a single conduit seal, the other conduit on the 6000 control unit will need a cap for the end of the conduit with appropriate hazloc certifications. A standard 3/4” conduit cap is not adequate.
11. For US/Canadian applications, conduit seals or the 6000-CC-3/4NPT plug must be within 457.2 mm (18”) of internal explosionproof/flameproof box, or within 387.3 mm (15.25”) from the end of the conduit supplied with the 6000 unit. For ATEX/IECEx Zone applications, the conduit must be sealed directly at the wall of the explosionproof/flameproof enclosure or immediately at the end of the conduit supplied with the 6000 control unit.
12. When wiring to the terminal plug, it is easier to remove the plug, terminate the wires, then reconnect the plug.
13. When removing the pluggable terminal block, it is recommended that the electronics module be supported by pressing down on top of the EPCU to counteract the lifting force required to remove the connector.
14. Wire should be copper only, rated 90 °C minimum.
15. The minimum wire strand in a stranded wire should have a diameter of 0.1 mm or

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greater.

16. The 6000-CC-3/4NPT plug is certified to be used only with the 6000 control unit's ¾" nipples coming out of the housing. This plug is not certified to be used on any other hazardous location equipment.
17. Ensure that electrical, mechanical, and pneumatic connections and requirements are met to operate this system. Please refer to this manual and applicable standards/codes, including current edition of the EN/IEC 60079-14. Electrical supply to the purge system shall be supplied through a switch or circuit breaker and suitably located and easily reached and must be marked as the disconnect for the equipment.
18. Power must be removed from the system when the Ex d enclosure cover is off, unless the area is known to be non-hazardous.

I.S. wiring notes

For wires going to the explosionproof/flameproof box on the I.S. side:

1. The wire strip length is to be between 5 mm and 7 mm (0.2" and 0.27").
2. The torque at the I.S. terminal block is 0.22–0.25 Nm.
3. The wire's gauge depends on the number of connections. Fewer wires allow for heavier gauge and will still meet the conduit seal fill requirement. See the applicable standards for fill requirement.
4. The terminal blocks are rated for a wire size of 16 AWG (1.31 mm^2) to 28 AWG (0.08 mm^2).
5. If multiple wires need to lead to a single terminal (e.g., the RS-485 bus), these wires must be either crimped to a single pin or grouped in an external junction box with one wire going in to the terminal. All applicable local and national wiring codes MUST be followed when wiring to the unit.
6. The wires must have a minimum insulation thickness of 0.25 mm (0.01").
7. Add extra wire length of 31.75 mm (1.25") past top of opening in explosionproof/ flameproof box to pluggable terminal block. (Allows connector to be moved out of the way when changing electronics. Prevents repouring seals.)
8. For US/Canadian applications, the conduit seal on I.S. wiring side must be within 457.2 mm (18") of the explosionproof/flameproof box. For ATEX/IECEx Zone applications, the conduit must be sealed directly at the wall of the explosionproof/ flameproof enclosure.
9. Wire should be copper only, rated 90 °C minimum.
10. The minimum wire strand in a stranded wire should have a diameter of 0.1 mm or greater.

For wires going to the I.S. interface board in the main housing or to the DIN-rail-mount I.S. board:

1. The wire strip length is to be between 4 mm and 6 mm (0.16" and 0.24").
2. The terminal blocks are rated for a wire size of 16 AWG (1.31 mm^2) to 26 AWG (0.081 mm^2)
3. The only terminals that might have multiple connections are the shield connections. These must be crimped to a single pin before connection to the board.

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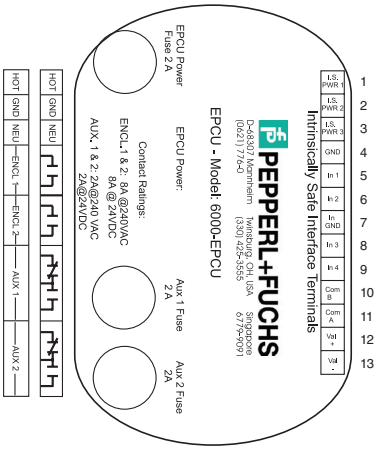
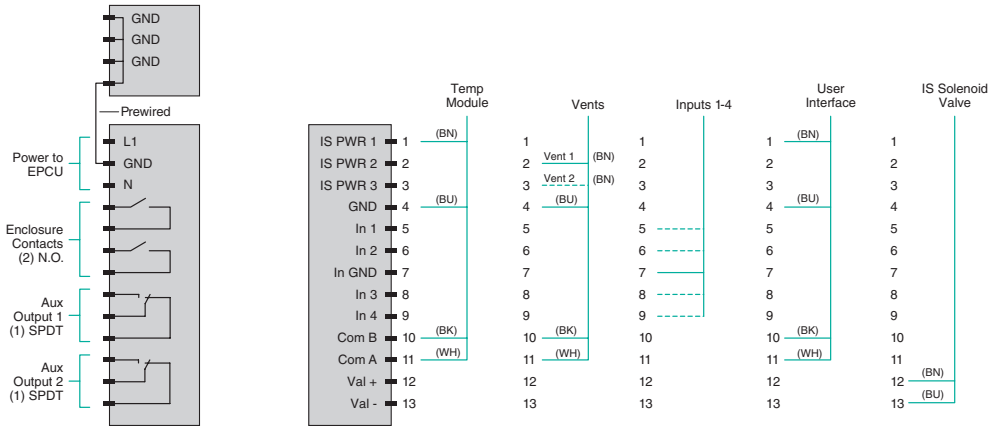
4. If cables are used (recommended for connections to the vents and UIC), it is recommended that the cables be shielded.
5. The wires must have a minimum insulation thickness of 0.25 mm (0.01”).
6. Wire should be copper only, rated 90 °C minimum.
7. The minimum wire strand in a stranded wire should have a diameter of 0.1 mm or greater.
8. The torque at the I.S. terminal block is 0.5–0.6 Nm.

WARNING!

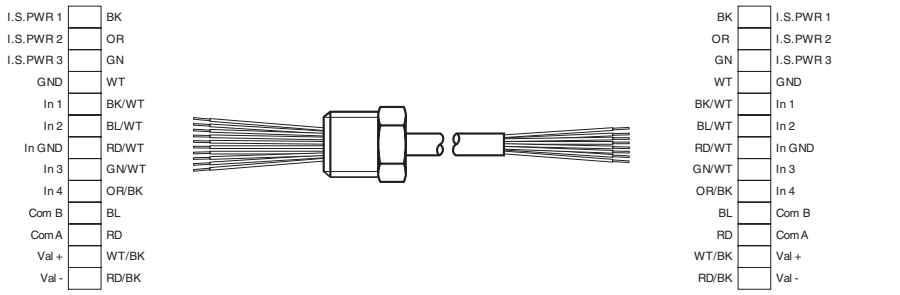
WARNING: The 6000-ISB I.S. termination board and 6000-TEMP are not certified to operate in dust-hazardous locations. The 6000-DPE is a dust-proof enclosure designed only to house either or both the I.S. termination board and 6000 temperature hub. No other devices are allowed in the enclosure. This does not apply to the 6000 control unit with housing, a complete unit.

Power and I.S. Wiring





Connections from EPCU to field devices



EPCU I.S. connector

I.S. Termination board connector

Connection of the 6000 EPCU to the 6000-ISB-01 DIN-mounted I.S. termination board

WARNING!

Requires standard explosionproof seals to explosionproof/flameproof enclosure at a maximum distance of 457.2 mm (18 in).

Note

When removing the terminal block from the EPCU stack, place your hand on top of the plastic to support the stack as you lift.

Note

The maximum distance between the control unit and the termination board is 3 meters.

Note

Corresponding wire numbers must be connected on the EPCU terminal and the I.S. termination board terminal.

WARNING!

6000-ISB-... must be installed within an IP20 enclosure. See “Specific Conditions of Use” when mounting in a dust environment.

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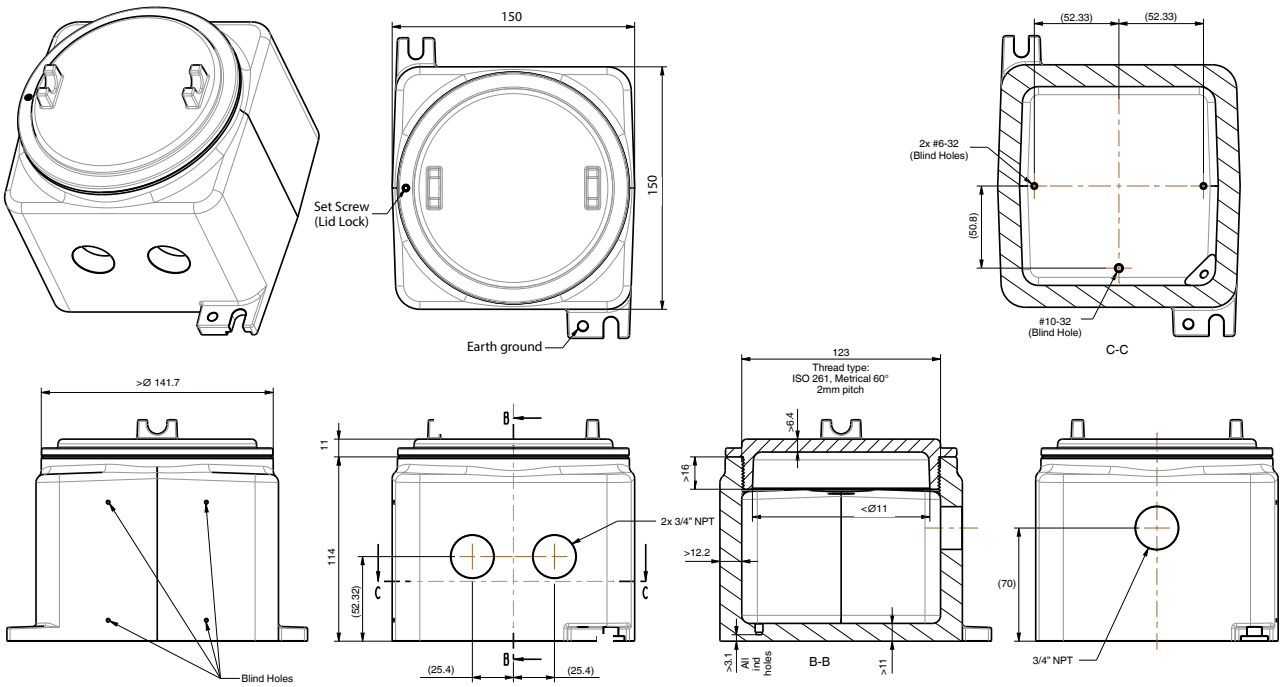
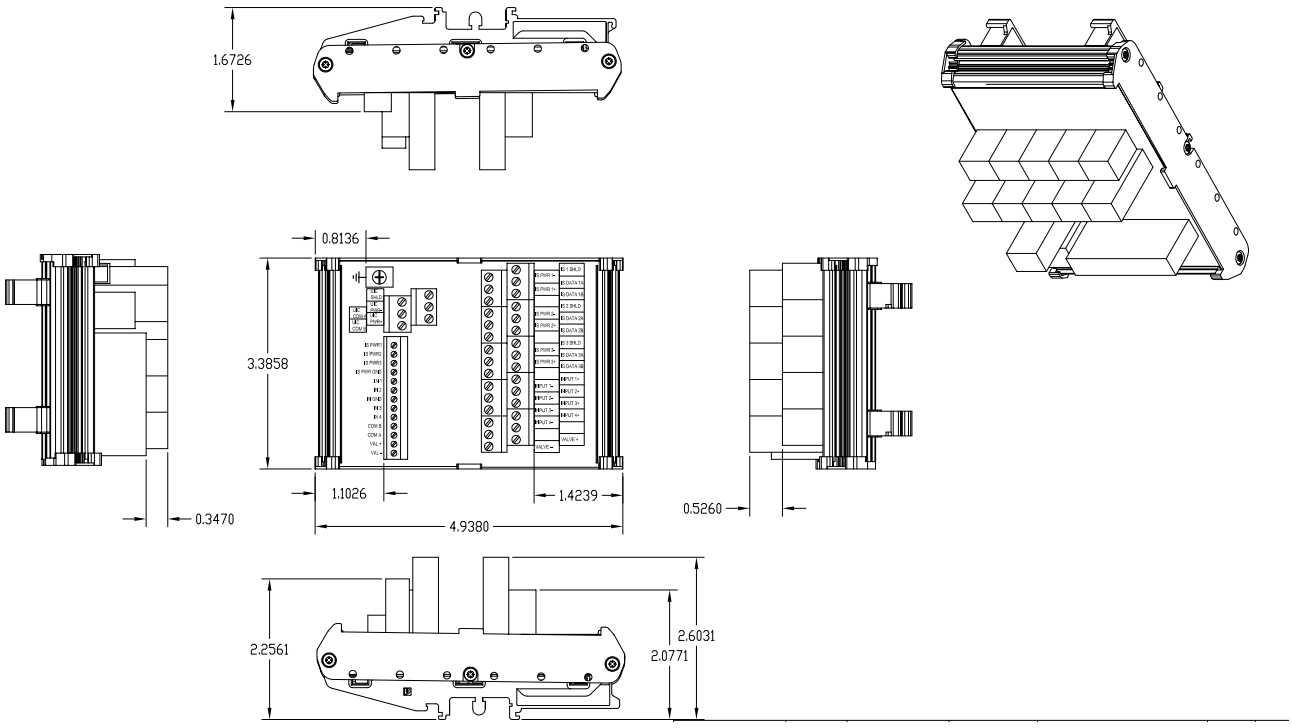
2.3.3 Dimensions

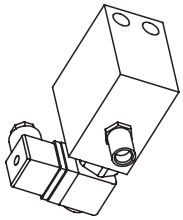
EPCU with Ex Enclosure

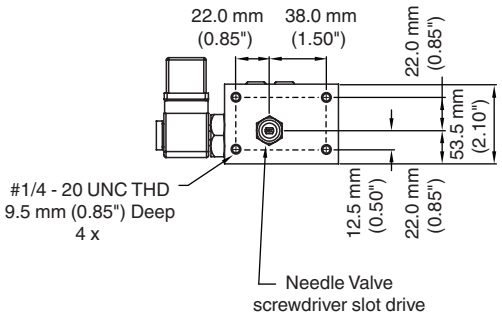


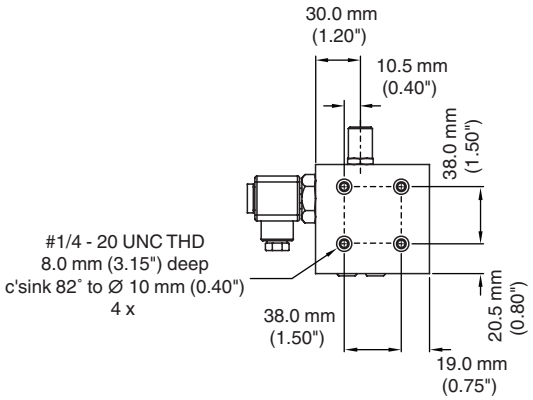
6000-ISB-01, I.S., termination board, DIN mount

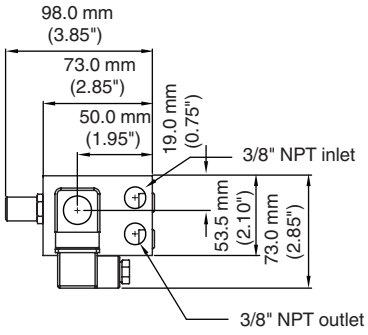


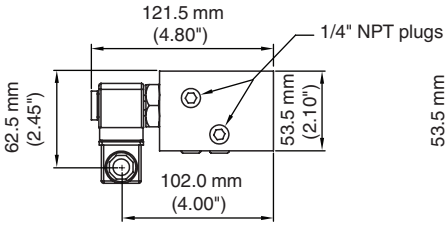
6000 Manifold

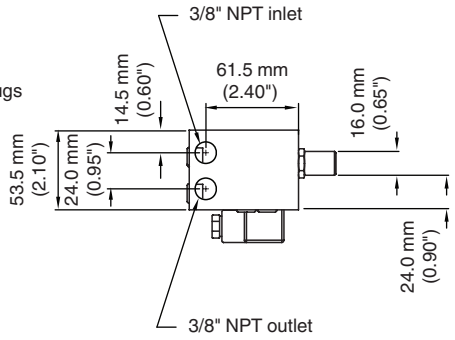


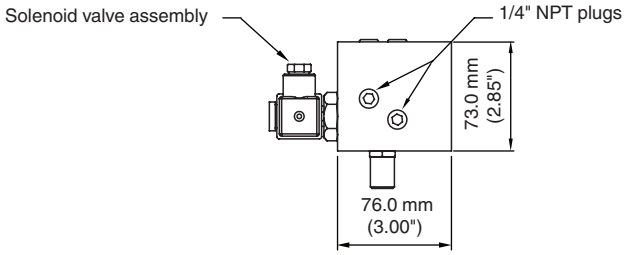












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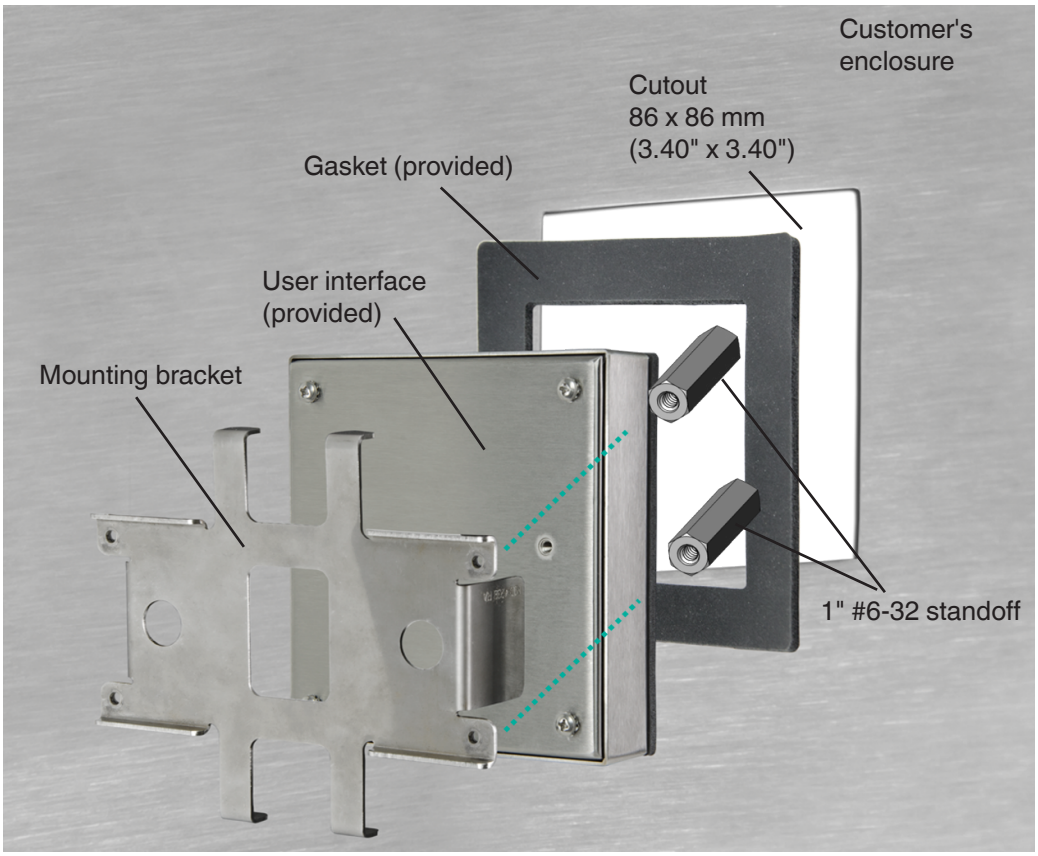
2.3.4 Mounting

User Interface

Panel mount (internal), for hazardous area installation
Not for use in dust (Class II/Zone 21) areas



Note

Use a crisscross pattern to tighten the screws for the UIC bracket. Tighten bolts 0.4 Nm (3 to 4 in-lb). For a good seal, ensure that the bracket bottoms out on the enclosure.

Mount the explosionproof enclosure and valve as desired. Follow all applicable electrical codes as appropriate.

Note

When installing panel mount configuration, the installation must be evaluated for Type 4X rating by a third party NRTL-authorized certification agency.

WARNING!

Enclosure must be made of metal and grounded.

WARNING!

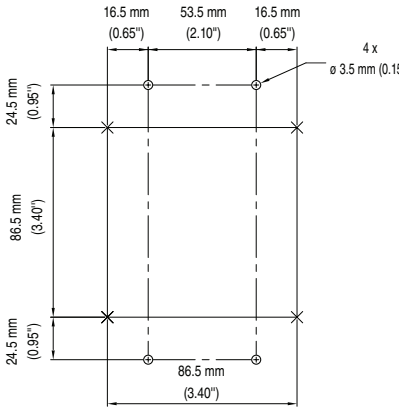
Cutout must be no larger than dimensions specified in the drawing shown above.

Note

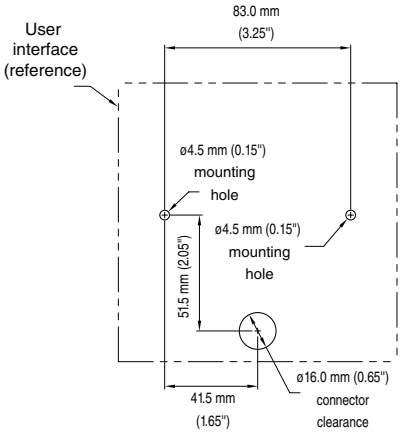
The user interface must be mounted inside the pressurized enclosure to maintain the environmental ratings.

2.3.4.1 Mounting templates

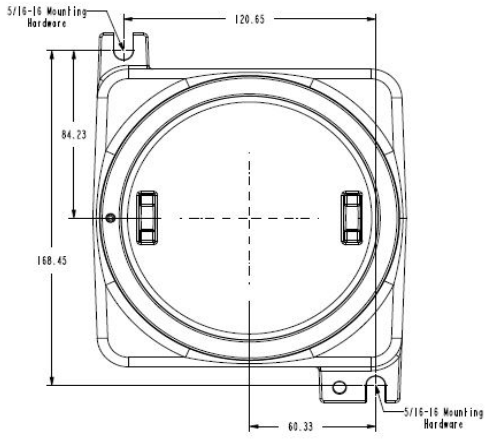
User interface mounting template (panel mount)



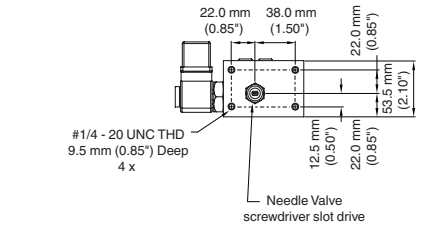
User interface mounting template (external mount)

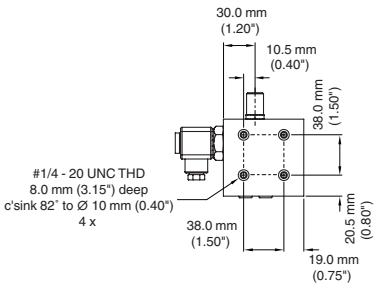


EPCU mounting template



Solenoid mounting template





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2.4. EPV-6000 Vent

2.4.1 Parts List

EPV-6000

Atmospheric reference kit (6000-ACC-514482) for mounting vent inside the enclosure

2.4.2 Technical Data

Item	Value
General specifications	
Flow rate measurement (increments)	141, 340, 565, 850 l/min & dynamic (5, 12, 20, 30 SCFM & dynamic)
Protection class	Vent electronics: Type 4X, IP66 Mounting gasket: Type 4X, IP66
EPV-6000-...-05, -06	Ingress protection from vent to pressurized enclosure, Type 4X
Weight	1.4 kg (3 lb)
Power connections	M12 (V1) pin connector, intrinsically safe (Mating connector with cable comes with vent for connection to the control unit.)
LED indication	GREEN: Power to EPV vent AMBER: Second vent address for two vent/one EPCU system
Maximum cable length	22 AWG (0.33 mm^2) wire = 5 m (16.5 ft) Maximum run length 18.3 m (60 ft)
Mounting	Mounting can be any orientation to the enclosure. Not dependent on gravity.
Mounting hole	1½" NPT knockout (Ø 2", 50.8 mm) hole, mounting with sealed nut
Material	
EPV-6000-AA-...:	
Cap	Marine grade anodized 5053 aluminum
Body	Marine grade anodized 6061 aluminum
EPV-6000-SS-...:	
Cap	316L (UNS S31603) stainless steel
Body	Marine grade anodized 6061 aluminum
Spark arrestor assembly	Protected with 304 (UNS S30400) stainless steel spark arrestor screen. Cap is movable so that opening can be positioned downward.

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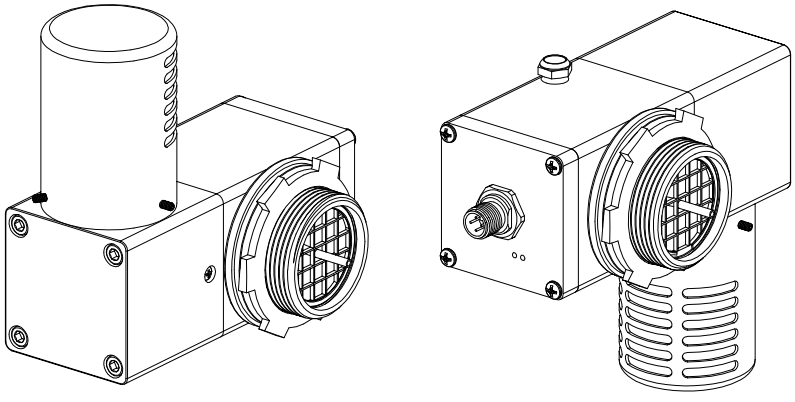
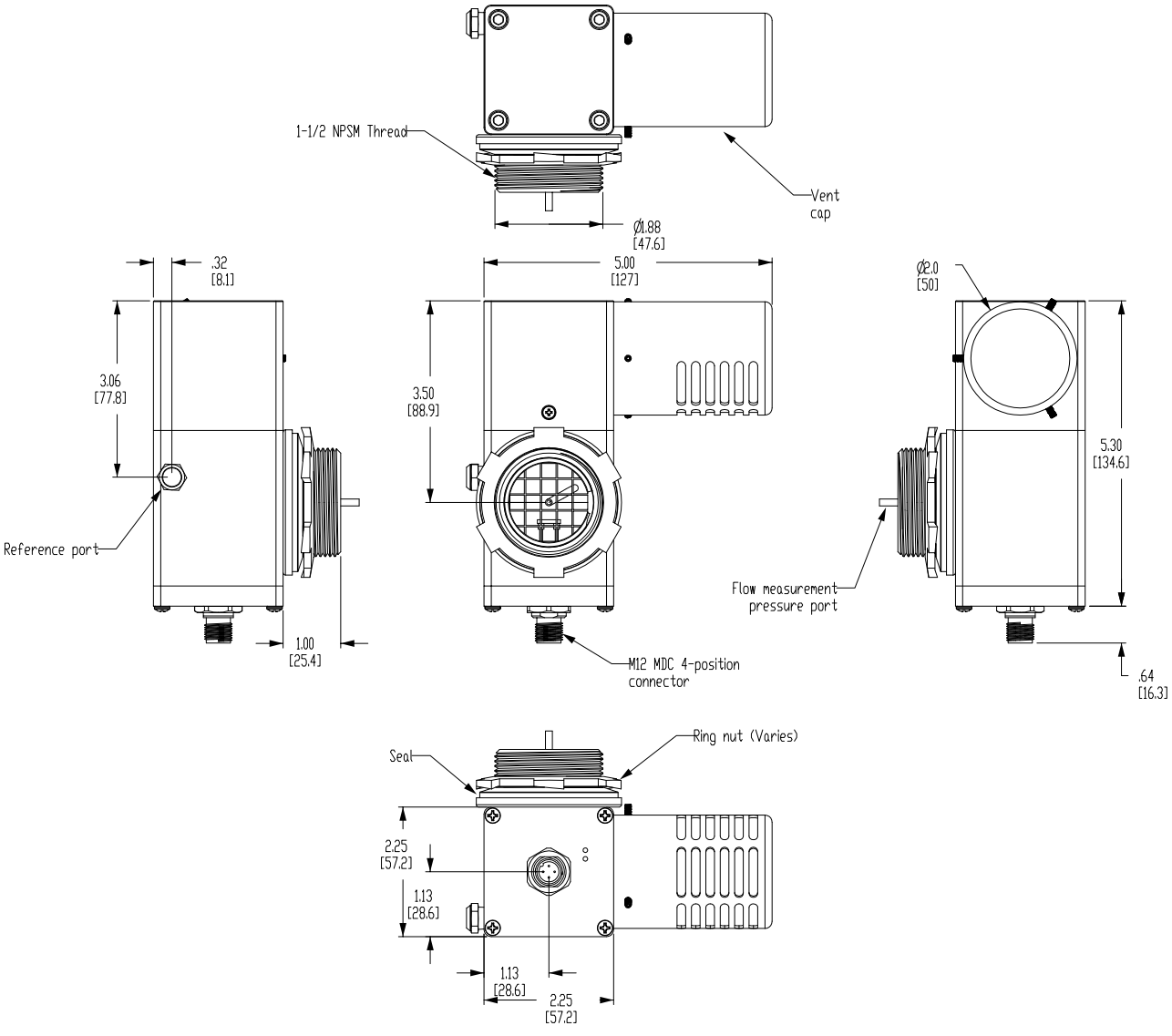
2.4.3 Dimensions

Dimensions shown in mm (in) and are for reference only.





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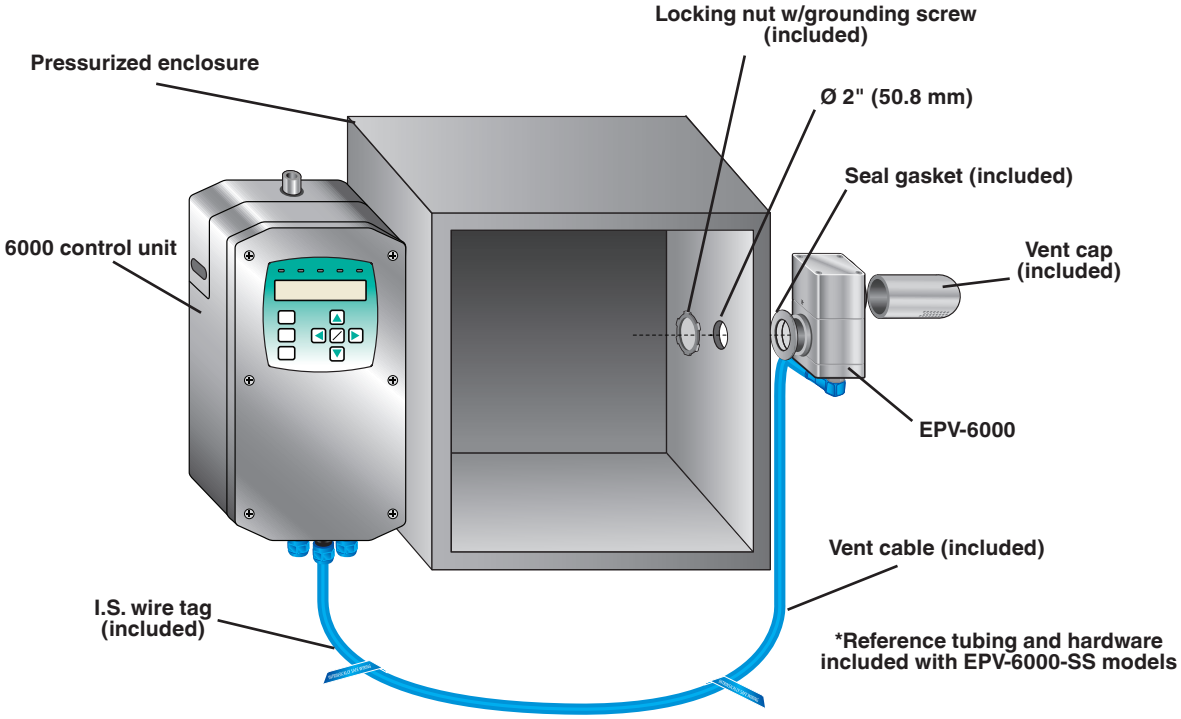
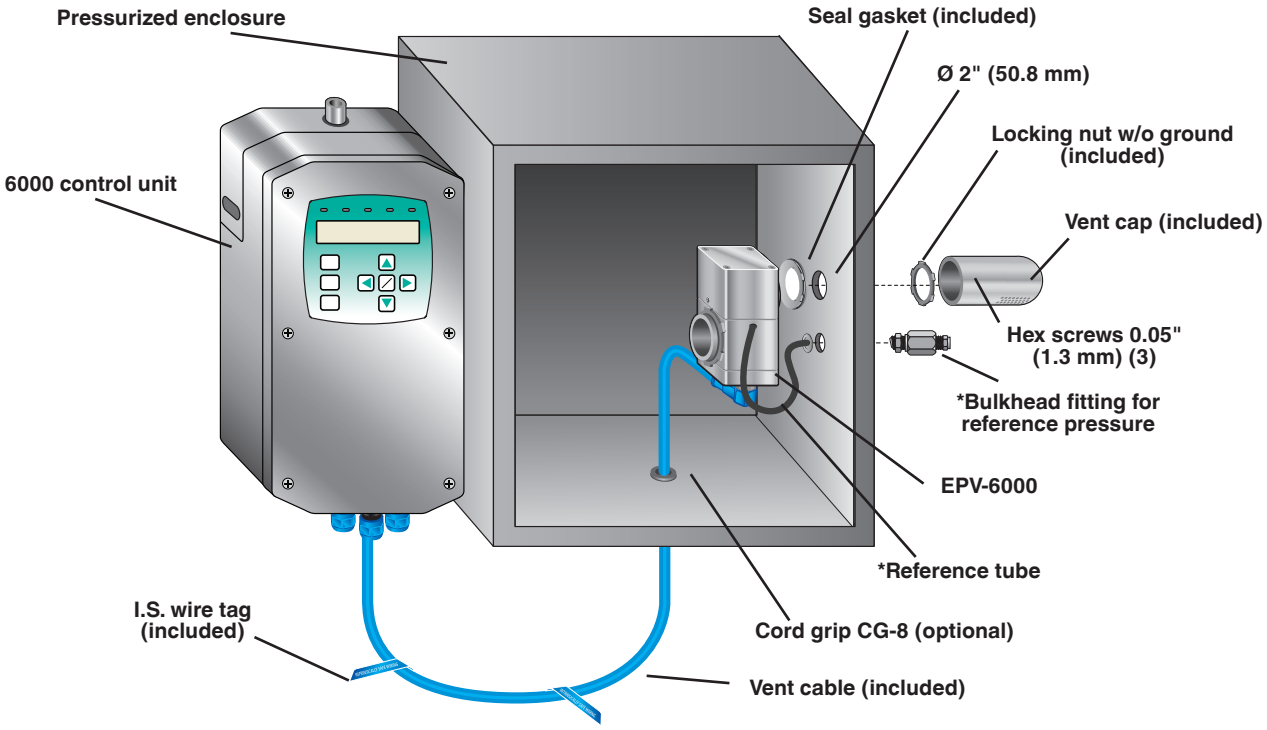
2.4.4 Mounting the EPV-6000

Tools: 1½" NPT knockout (Ø 2" (50.8 mm) hole) for vent

Vent mounted on the outside of the enclosure



Vent mounted on the inside of the enclosure



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Note

Vent is not gravity sensitive and can be installed in any orientation.

WARNING!

Cable to the vent is I.S. and must be properly isolated from other wiring.

Torque Requirements (EPV-6000)

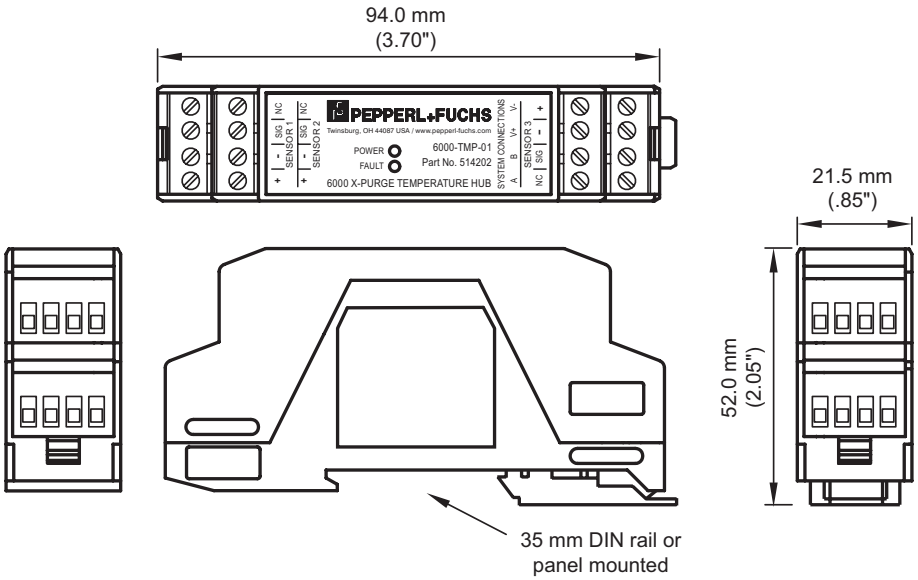
Hardware	Torque
Sealing washer and nut	0.25–1 turns past finger tight. Do not over tighten.
Set screws	Secure vent cap by evenly threading in set screws. Do not over tighten.

2.5. 6000 Series Accessories

2.5.1 6000-TEMP-01, Temperature Hub

EPV-6000

Atmospheric reference kit (6000-ACC-514482) for mounting vent inside the enclosure



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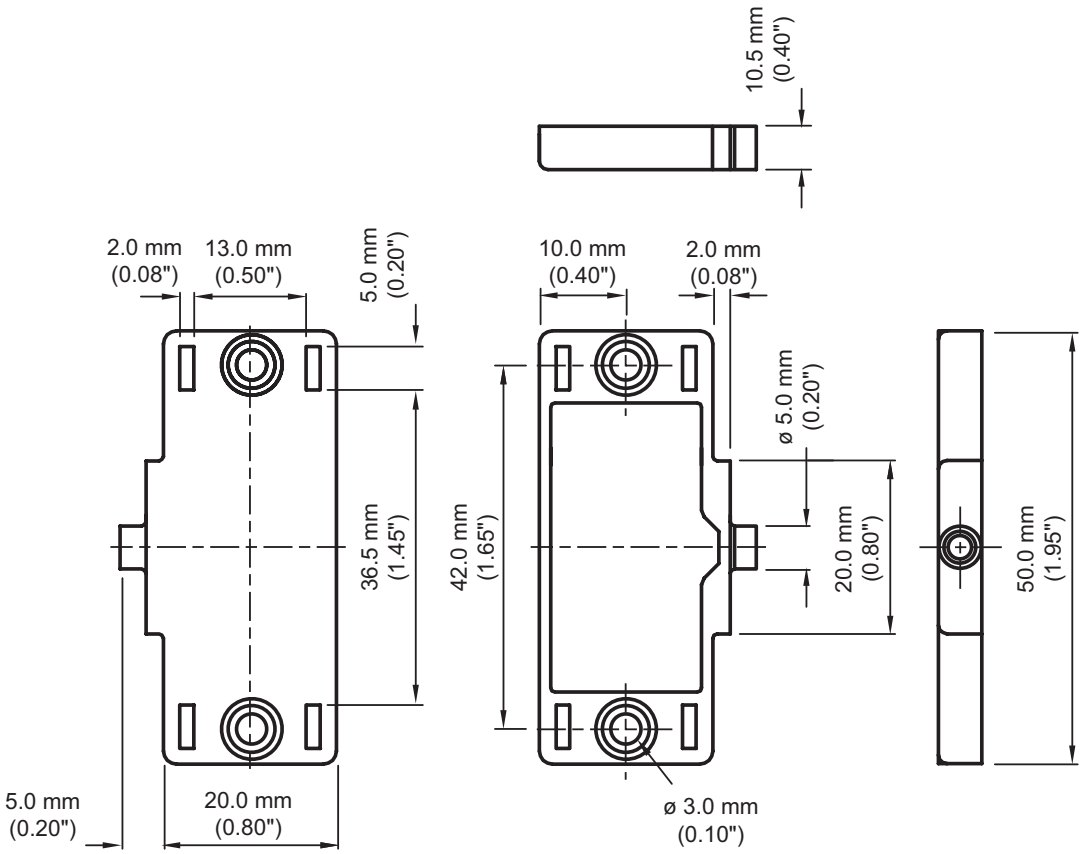
PEPPERL+FUCHS

2.5.2 6000-TSEN-01, Temperature Sensor

(Must be used with the 6000-TEMP-01 temperature hub.)



2.5.3 Additional Accessories

Model number	Description
EFC-6-SS	Flush-mount connector (included with unit)
CG-8	½” cable gland
HR-SW00	Key switch (removable in one position)
SRM-6000	Short circuit, open circuit resistor module
6000-MAN-DV-01	I.S. manifold kit with solenoid valve
EWN-1	Warning metal tag
ETW-15	Temperature warning metal tag (1) EWN tag comes with every system ordered
6000-COUPLER-3/4-M20	3/4” NPT female to M20 female coupler for conduit, Ex de rated, nickel
6000-COUPLER-3/4-M25	3/4” NPT female to M25 female coupler for conduit, Ex de rated, nickel
6000-DCK-01	Explosionproof conduit seals for power EPCU and power to enclosure (½” NPT). Sealing material included.
6000-JCK-01	Explosionproof conduit seals for power EPCU and power to enclosure with junction box (3/4” NPT). Sealing material included.
6000-UIC-02	6000 user interface controller with bracket and cable
6000-ACC-514478	3/8” stainless steel tubing for manifold connection 64 mm (2.5”) long, 2 pcs
6000-ACC-514479	Mounting bracket with mounting screws for 6000 control unit
6000-ACC-514480	Mounting bolts for bracket to enclosure and control unit to bracket (4 pcs)
6000-ACC-514481	3/8” filter and regulator with fitting for connection to 6000 series manifold
6000-ACC-514482	Atmospheric reference kit for mounting EPV-6000-AA vent inside enclosure
6000-ACC-514483	1½” locknut with ground and gasket for EPV-6000 vent mounted outside enclosure
6000-ACC-514484	1½” locknut without ground and gasket for EPV-6000 vent mounted inside enclosure
6000-ACC-514485	M12 vent cable for EPV-6000 with 4 I.S. tags
6000-TEMP-01	Temperature hub
6000-TSEN-01	Temperature sensor
6000-DPE-01-ISBC	Dust-proof enclosure for 6000-TEMP and/or 6000-ISB-01
6000-ISB-01	I.S. termination board, DIN mountable
6000-CBLA-ISB-XXXX	Cable harness for 6000-ISB-01 termination board

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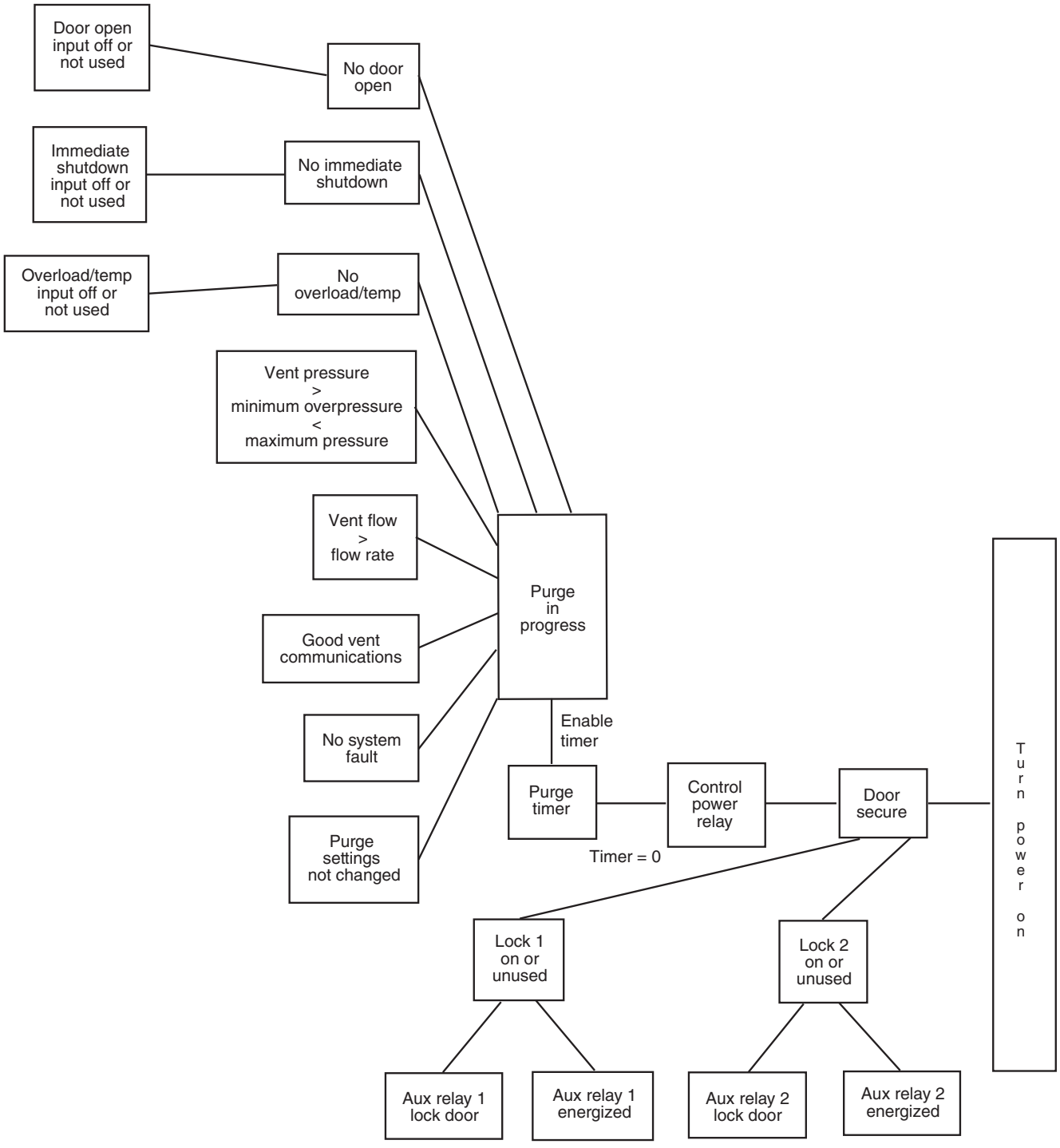
3. Operation

3.1. Sequence of Events

3.1.1 Turning on Power to the Enclosure



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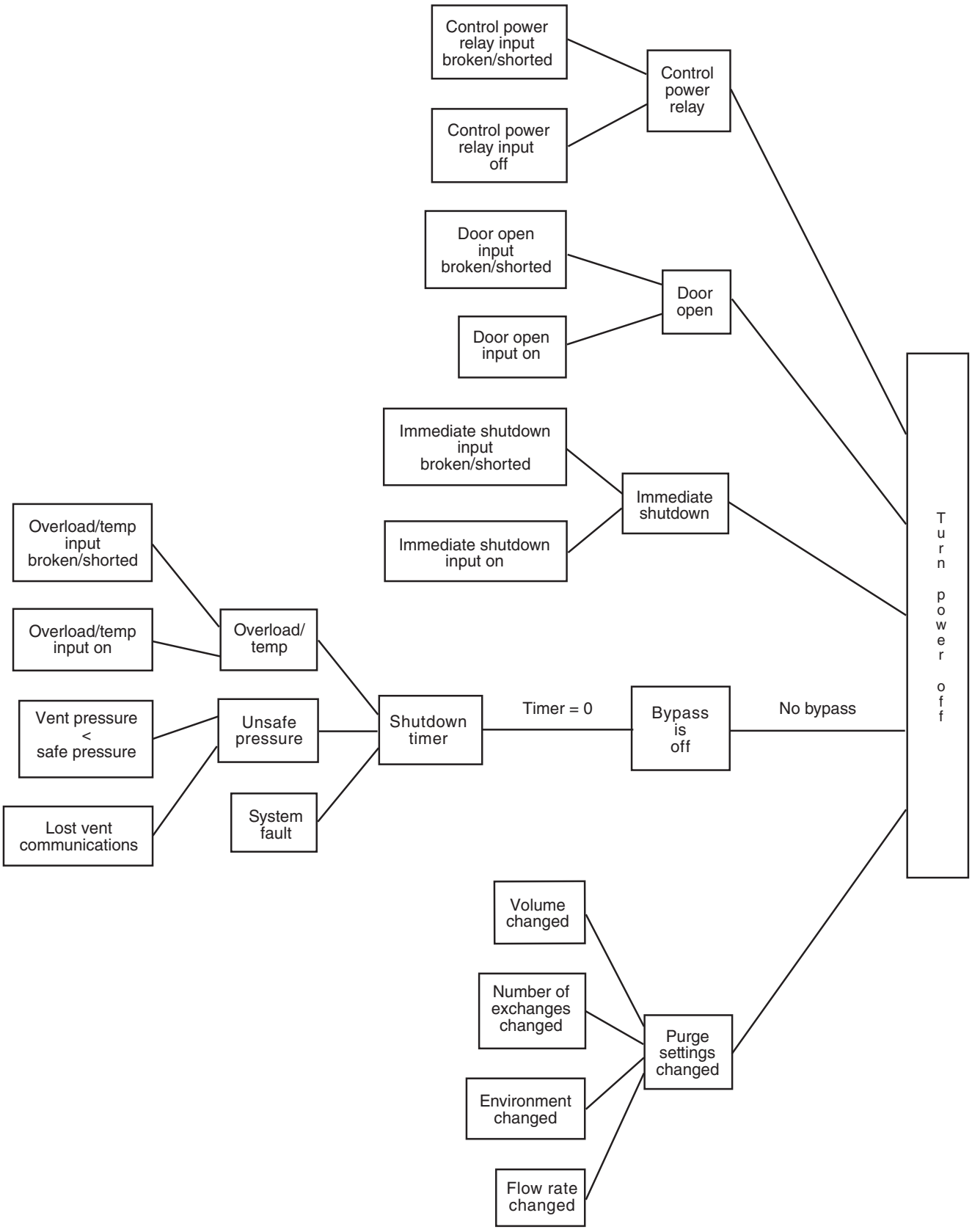
3.1.2 Turning off Power to the Enclosure



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3.2. Operation of the 6000 Series and Component Kit

Operation

The 6000 series consists of the control unit and user interface mounted in a 316L (UNS S31603) stainless steel Type 4X (IP66) enclosure with the pneumatic solenoid valve mounted on the unit. The EPV-6000 series relief vent is separate and is mounted to the enclosure. The 6000 series control unit is also available as a kit. The kit consists of the key components of the system, the control unit, and the user interface. It does not include the enclosure. The manifold is an optional item. The user interface includes a panel-mount bracket so that it can be panel mounted to the customer's enclosure. The pneumatic valve for the protective gas can be supplied by the customer. The EPV-6000 relief vent is still required.

The components of the 6000 series control unit, with '-WH-' housing, are listed below:

- EPCU mounted in an explosionproof/flameproof enclosure
- I.S. user interface with display and cable
- I.S. termination board (Not included with the component kit)
- Manifold with I.S. solenoid valve (Not included with the component kit)
- Flush mount Type 4X IP66 fitting for protective gas supply to enclosure with tube attached
- Type 4X cable glands for I.S. wiring to I.S. inputs, vents, and temperature modules
- 3/4" pipe nipples for power wires
- 316L (UNS S31603) stainless steel Type 4X enclosure for the 6000 series controller. (Not included with the component kit.)

The components of the EPV-6000 vent:

- EPV-6000 vent with stainless steel spark arrestor screen
- 1½" lock nut with grounding lug and gasket for attachment of vent to customer's enclosure
- One 5 m (16.4 ft.) quick disconnect cable; for connection to I.S. termination board inside 6000 series control unit.

Note

If ordering a stainless steel vent, an atmospheric reference kit is included for internal mount.

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The components of the 6000 series component kit are listed below:

- Control unit and explosionproof/flameproof enclosure
- 6000-UIC-01 user interface
- SMK-6000-CK mounting hardware for 6000-UIC-01
- One 5 m (16.5 ft.) quick disconnect cable for 6000-UIC-01
- 6000-MAN-DV-01 pneumatic manifold w/ solenoid (optional)
- EFC-6-SS flush mount connector

The 6000 series control unit and vent can be universally mounted to the customer's enclosure. Top, bottom, right-, or left-side mounting can be completed with only one control unit and vent. Mounting configuration does not need to be designated when ordering. One unit is used for enclosure sizes up to 12.7 m^3 (450 ft^3).

Optional accessories are available to make the component kit easier to install. The 6000-ISB-01 I.S. DIN-mounted termination board and 6000-CBLA-ISB-xxx cable harness allow easy connection to the EPCU of the control unit.

Electronic power control unit–EPCU

The EPCU houses the redundant microprocessors, enclosure power contacts, (2) auxiliary contacts, power supply module, galvanically isolated barriers for the inputs, vent(s), and temperature modules. The EPCU is easy to remove and install into the explosionproof enclosure that houses it.

The EPCU is available in 20 ... 30 VDC or 100 ... 250 VAC units. The enclosure power contacts are force-guided safety relays. The auxiliary contacts can be user configured for different functions, depending on user requirements.

User interface controller–UIC

The 6000 series is user-programmable for many of the configurable options available. This is done with the intrinsically safe user interface on the face of the unit, which can also be remote mounted. The user interface contains a 2 x 20 LCD that allows programming through a set of buttons on the menu-driven unit. All configuration and options are programmed through this unit. There are also (5) LEDs for easy visual indication of operation:

- Safe pressure: This turns on (blue) when safe pressure is achieved inside the enclosure.
- Enclosure power: This is (red) when the enclosure power is off, and (green) when enclosure power is on. The enclosure power can be on only after a successful purge and a safe pressure is achieved. The bypass option allows power to remain on if safe pressure is lost.
- Rapid Exchange®: The rapid exchange or purging flow rate turns on (blue) when the flow rate is measuring proper flow.
- System bypass: This turns on (yellow) when the system bypass is active. This should be used only when the area around the enclosure is known to be safe.
- Alarm fault: The (red) LED blinks when any alarm input is detected and is solid when there is an internal system fault.

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Pneumatic manifold with I.S. solenoid

- Manifold with I.S. solenoid valve: the manifold system is mounted on the 6000 control unit providing a needle valve to set enclosure pressure and an I.S. solenoid valve that is used for purging (Rapid Exchange). Power for the I.S. solenoid valve is provided by the EPCU and is galvanically isolated. Regulated instrument-grade air or nitrogen is required.

The 6000 series unit can be ordered without the manifold so that customers can use their own method or valves for purging and pressurization. If a third-party electronic valve is used, the valve must be certified and installed in accordance with the hazardous location where the unit is operating. The use of the 6000 series manifold unit allows easy and correct installation of the system.

Requirements for purging/pressurization

Certifications allow the 6000 series to be used on enclosures in gas, dust, or both gas and dust hazardous atmospheres. Gas atmospheres require the purging of the enclosure. Dust atmospheres require the physical removal of all the dust that collects inside. Both gas and dust atmospheres require the following: 1) removing the dust, 2) sealing the enclosure, and then 3) purging the enclosure.

After these sequences, the pressure within the enclosure is above the minimum level. The equipment within the enclosure can then be energized.

Purge timing

When using the 6000 series in a gas or gas and dust location, the time for purging an enclosure can be based either on a known purge rate and time (fixed purge time), or based on the flow rate being measured from the vent (dynamic purge time). Both methods base the time on the flow measurement at the vent, and complete the process in steps. The EPCU will take the readings from the vent and use the appropriate reading as the usable flow rate. For example, if the flow rate measurement from the EPV-6000 vent is 198 l/m (7 SCFM), the EPCU will use 141 l/m (5 SCFM) as the flow rate for evaluation. The flow rate measurement steps and corresponding enclosure pressures are provided in Section 2.2.3 Technical Data, with the pneumatic parameters.

Note

The following parameters must be entered for the purge time:

- Enclosure volume
- Number of exchanges

Note

Minimum purge time is one minute.

Fixed purge time

If the purge time must be held to a specific time, then this time is based on the known enclosure volume, number of volume exchanges, and flow rate through the vent. If the flow rate is below the required minimum, then the purging cycle will reset and will not start until the flow rate is above the selected rate. This setup does not allow purge flow to go below the value required and will not recalculate the time for purging if it goes above the required purge rate. The actual time is calculated by the EPCU.

Dynamic purge time

Dynamic purge time allows the purge time to be updated based on the purge flow through the vent. This method is not dependent on a constant flow from the protective gas source. It bases the purge time on the measured flow and not a set flow. This is very useful when the protective gas supply pressure varies throughout the purging cycle or when it may vary from one installation to another.

The purge time will be based on the measurement of the vent and evaluation of this measurement from the EPCU. This allows recalculation of the time based on this measurement. During the dynamic purge time, the user interface will display the purge time as a percentage starting with 0% and ending with 100% (purge time complete).

Purging modes

Purging start-up can be set in three different modes:

• STD – Standard mode requires the operator to engage the manifold solenoid valve manually when purging and manually disengage when a successful purging is complete.

• SA – Semi-automatic mode requires the operator to engage the manifold solenoid valve manually when purging. The EPCU will automatically disengage when a successful purging is complete.

• FA – Fully automatic mode will automatically engage the manifold solenoid valve when safe pressure is detected and will automatically disengage when a successful purging is complete. This is the factory default setting.

The minimum purge time is one minute.

Note

During the purging cycle, when the enclosure pressure reaches 0.625 mbar [(6.4 mm wc), (0.25” wc), (62 Pa)] or higher, there will be a 5 second delay before the rapid exchange solenoid valve is activated. If the flow is enough through the vent to satisfy the required flow rate setting, then the timer will begin after 1 min. The update of the timer is in increments of 1 min in the Fixed Purge Time and % completed in the Dynamic Purge Time.

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Pressure as Input

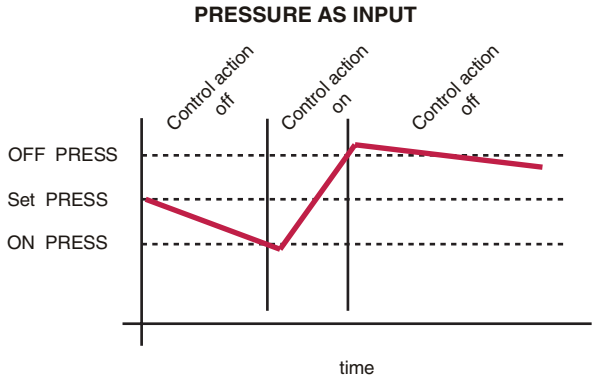
In the programming menu under “INPUT SETTINGS” for the optional pressure control. The pressure control is achieved within the enclosure by opening and closing a digital valve or manifold on the 6000 control unit. These two internal pressure set points can be controlled by the manifold or an outside source for pressure. The pressure function can manage the control outputs 1 or 2, or the control valve (manifold valve).

- The “ON PRESSURE” is the lowest pressure allowed within the enclosure and will start the control action on when pressure goes below this value.
- The “OFF PRESSURE” is when the valve shuts off. When the pressure is between these two values, nothing will happen.
- The “ON PRESSURE” function is active until the “OFF PRESSURE” is reached.

Note

This function only operates after the purging cycle is complete.

The “ON PRESSURE” always has to be lower than the “OFF PRESSURE”. This cannot be reversed.



I.S. Inputs 1–4

There are four (4) intrinsically safe inputs for activation of various outputs and actions by the EPCU. These inputs only accept a dry contact for activation and are supplied by the EPCU's galvanically isolated barrier. The configurations of the inputs for various actions are done through the user interface controller. Only one function can operate per input. The intrinsically safe inputs can be configured through the UIC to activate the auxiliary relays, energize the Rapid Exchange valve, de-energize the enclosure contacts, and shut the system down, as well as other actions and outputs. To monitor wiring, the SRM-6000 (sensor resistor module, not required, ordered separately) can be added to detect shorts or breaks in the inputs' wiring to the contacts.

Outputs

Enclosure 1 and Enclosure 2

There are two (2) normally open dry contacts for the enclosure power that can be energized only after a successful purging and a minimum enclosure pressure is maintained. Loss of pressure will cause the contacts to de-energize unless the shutdown timer is activated or bypass mode is implemented. These contacts operate simultaneously.

Auxiliary 1 and Auxiliary 2

Also available are the Auxiliary 1 and Auxiliary 2 SPDT dry contact outputs. The auxiliary outputs are user configurable using the user-interface controller and can control various inputs or various conditions such as low pressure, loss of pressure, bypass implemented, rapid exchange valve on, enclosure above maximum pressure setting, etc. Both enclosure contacts and auxiliary contacts are forced-guided safety relays for functional safety.

WARNING!

Do not use auxiliary contact for power to enclosure(s).

WARNING!

If powering auxiliary equipment with auxiliary 1 or auxiliary 2 outputs, the wiring methods used must be suitable for the hazardous area.

Temperature Inputs

The 6000-TEMP-01 temperature hub and 6000-TSEN-01 external temperature sensor(s) are designed to work only with the 6000 purge and pressurization system.

An averaging or maximum temperature input reading from the sensor(s) is used to control a solenoid valve or activate the auxiliary relay to cool or heat the enclosure, or warn of temperature problems.

In the programming menu, under "SENSOR SETUP", "EXT SENSOR COUNT", you can configure up to three sensors per temperature hub. The temperature hub has one

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embedded temperature sensor. In the programming menu under “INPUT SETTINGS” you will select the “HUB”. This must be selected if you want to include the hub as a sensor input.

Note

You may not want to include the temperature as an input if the sensor is not located in close proximity to the device or process being tracked.

Once a “CONTROL ACTION” is selected, then select “SETPOINT TYPE” for the “AVERAGE” or “SINGLE PT”.

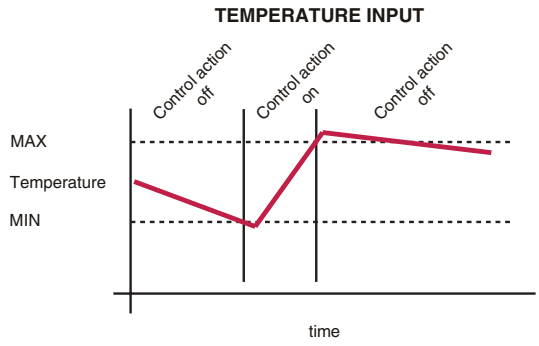
Note

If using more than one (1) sensor, you may want the control action to occur during the peak or average temperature of the sensors.

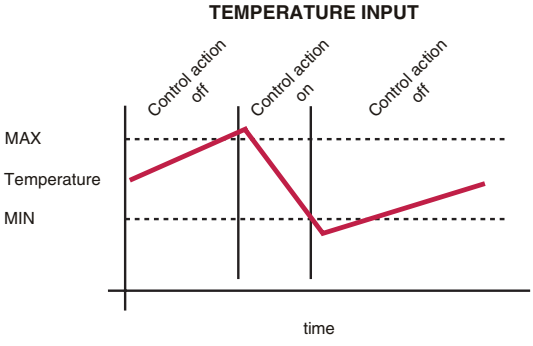
“ON SET POINT” and “OFF SET POINT” are the temperatures for the control action.

Note

The “ON SET POINT” can be greater than the “OFF SET POINT.”



Low Temperature Control



High Temperature Control

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EPV-6000 I.S. Relief Vent

The EPV-6000 vent exhausts excess pressure from the enclosure when the enclosure pressure exceeds the breaking pressure of the vents relief mechanism. This pressure and flow is measured during operation. The 6000 series vent has a pressure transducer and thermal flow sensor that is connected to the 6000 EPCU and is intrinsically safe through the galvanic isolation barrier within the EPCU. The measurement of the flow is always at the exhaust of the pressurized enclosure; therefore, the vent is located on the enclosure(s) such that it is venting to the atmosphere.

When using the complete 6000 series system, the vent is connected to the I.S. termination board using the M12 (V1) connector and cable that come with the vent. If using the 6000 series component kit, the vent is connected to the EPCU as shown in the diagram on page 19. (Brown wire to terminal 2, blue wire to terminal 4, black wire to terminal 10, white wire to terminal 11.) The EPV-6000 vent can be mounted vertically or horizontally and is not gravity dependent. For corrosive environments, the EPV-6000 vent can be ordered with a stainless steel cap so that the body of the vent can be mounted in the enclosure with only the stainless steel cap exposed to the outside environment. The 6000-TEMP-01 temperature hub and 6000-TSEN-01 external temperature sensor(s) are designed to work only with the 6000 purge and pressurization system.

LED for the Vent

LED indication for the vent is green for power and amber for second address vent which is used in two-vent / one-EPCU systems.

3.2.1 Set-up Procedures of the 6000 Series System

1. Ensure that electrical, mechanical, and pneumatic connections and requirements are met to operate this system. Please refer to this manual and standards for explanation of requirements.
2. Apply power to the 6000 series system.
3. (Step 3 is for initial set-up of the system.) The factory default of the 6000 control unit is SA. To adjust the programming of the system, please see page 54 (“Programming Menu”) for instructions.
4. Verify that the “enclosure pressure control valve” stem is closed by turning the needle valve clockwise before applying pressure to the manifold.
5. Turn on the protective gas supply to the 6000 Series System inlet on the manifold. Inlet pressure should be below 120 psig (8.2 bar).
6. Larger cabinets may take longer to pressurize. Put the system in SA or STD mode for this procedure. Select the user interface display so that the enclosure pressure is showing. This should be reading less than 0.25 mbar [(2.54 mm wc), (0.1” wc), (24.9 Pa)]. Slowly open the needle valve until air is detectable venting at the exhaust. Do not exceed 3.75 mbar [(38.10 mm wc), (1.5” wc), (374 Pa)].
7. If air is not exhausting at the vent, check for any obstructions or improper installation.
8. The system is ready to operate.

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3.2.2 Operation of the 6000 Series System

Gas hazardous location

- Follow “Set-up procedures of 6000 series system.”
- Enclosure is sealed.
- Pressure is set to a value above a minimum of 0.625 mbar [(6.4 mm wc), (0.25” wc), (62 Pa)], or the set value from the user input.
- Depending on how the purging mode is selected, purging the enclosure is required.
- After a successful purging, with the pressure in the enclosure above 0. 625 mbar [(6.4 mm wc), (0. 25” wc), (62 Pa)], the enclosure is considered safe, and power to the enclosure can be energized.
- If the safe pressure drops below 0.25” wc [(6.4 mm wc), (.625 mbar), (62 Pa)], power to the enclosure will be disconnected unless a time delay for shutting off power is implemented (see the requirements for time delay of power shut-off).
- To energize the enclosure again, repeat the procedure.

Dust hazardous location

- Enclosure must be cleaned of all combustible dust. Purging cannot be done to clean combustible dust out of enclosure.
- Enclosure is immediately sealed upon removal of combustible dust.
- Pressure is set to a value above a minimum of 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pa)], or the set value from the user input.
- With the pressure in the enclosure above 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pa)], the enclosure is considered safe, and power to the enclosure can be energized.
- If the safe pressure drops below 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pa)], the power to the enclosure will be disconnected, unless a time delay for shutting off power is implemented (see the requirements for time delay of power shut-off).
- To energize the enclosure again, repeat the procedure. Follow “Set-up procedures of 6000 series system.”

Dust and gas hazardous location

- Enclosure must be cleaned of all combustible dust.
- Enclosure is sealed.
- Pressure is set to a value above a minimum of 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pa)], or the set value from the user input.
- Depending on how the purging mode is selected, purging the enclosure is required.
- After a successful purging, with the pressure in the enclosure above 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pascal)], the enclosure is considered safe, and power to the enclosure can be energized.
- If the safe pressure drops below 1.6 mbar [(16.5 mm wc), (0.65” wc), (162 Pa)], the power to the enclosure will be disconnected, unless a time delay for shutting off power is implemented (see the requirements for time delay of power shut-off).
- To energize the enclosure again, repeat the procedure.

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The combination of dust and gas requires the cleaning and sealing of the enclosure to clear out the dust hazard(s) and purging the enclosure to clear out the gas hazard(s). After these sequences, the enclosure can be energized. However, the pressure during operation must be sufficient to keep out the worst-case hazard in the atmosphere/ environment. In this application, that hazard is dust.

Note

Refer to “Specific Conditions of Use”.

Note

The EN60079-2 and IEC 60079-2 do not cover both gas and dust hazardous atmospheres. The 6000 system provides a solution for both at the same time but would have to be evaluated by the certification bodies for approval.

3.2.3 Start-up Label

Model 6000 Type X / Ex px

450 CF / 12.75 CM Maximum Enclosure Volume

System Operation Instructions

1. With Pepperl+Fuchs Purging system air supply on
2. Apply power to the 6000 series control unit.
3. Follow set-up configuration in manual.

   For GAS only areas proceed to step 5
   For DUST only areas proceed to step 4, Omit step 7
   For both GAS and DUST areas proceed to step 4
4. Clean all dust inside of enclosure.
5. With enclosure sealed,
6. Set safe pressure (pressurization) with the control valve.
7. Start the purging by:
   a. FA - Fully automatic will start purging after a safe pressure is set, will automatically stop.
   b. SA - Semi-automatic purging initiated by activating keypad, will automatically stop.
   c. STD - Standard mode, purging starts and stops by activating Keypad.

   After flow rate is met, purging timer will count down until complete.
8. Power to the enclosure can be initiated.
9. Loss of pressure will automatically start the deenergizing of the enclosure power.

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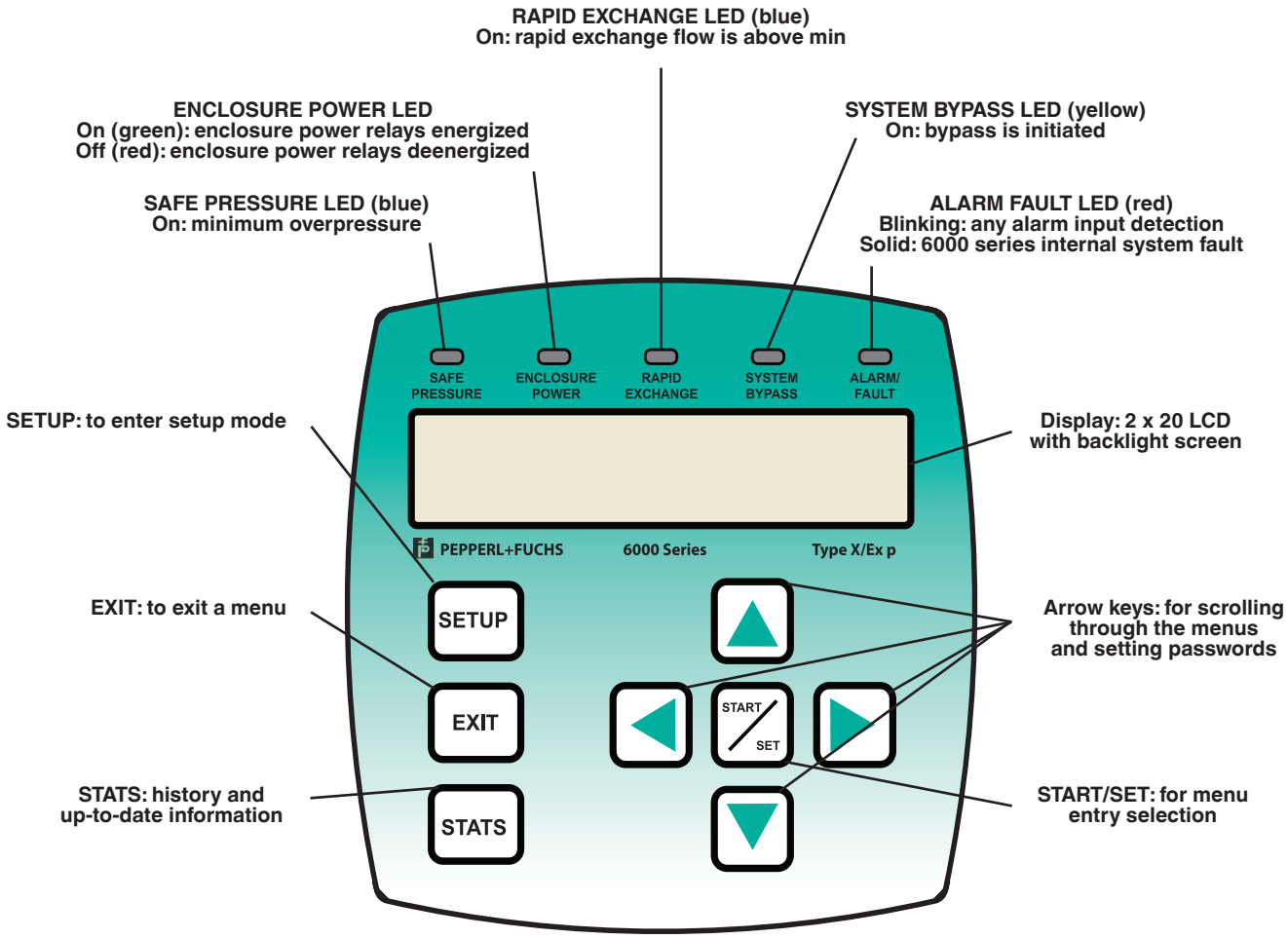
4. Programming

4.1. User Interface



Note

To cycle power to the unit, press the EXIT, Left Arrow, START/SET, and Right Arrow keys at the same time. This will cycle power to the EPCU without physically removing power. This re-cycle feature will de-energize the relays of the EPCU and reset the unit. This feature does not affect any of the settings in the menus of the EPCU.

Note

To turn LCD back light on and off, press the left and right arrow keys at the same time. The setting remains through the power cycles.

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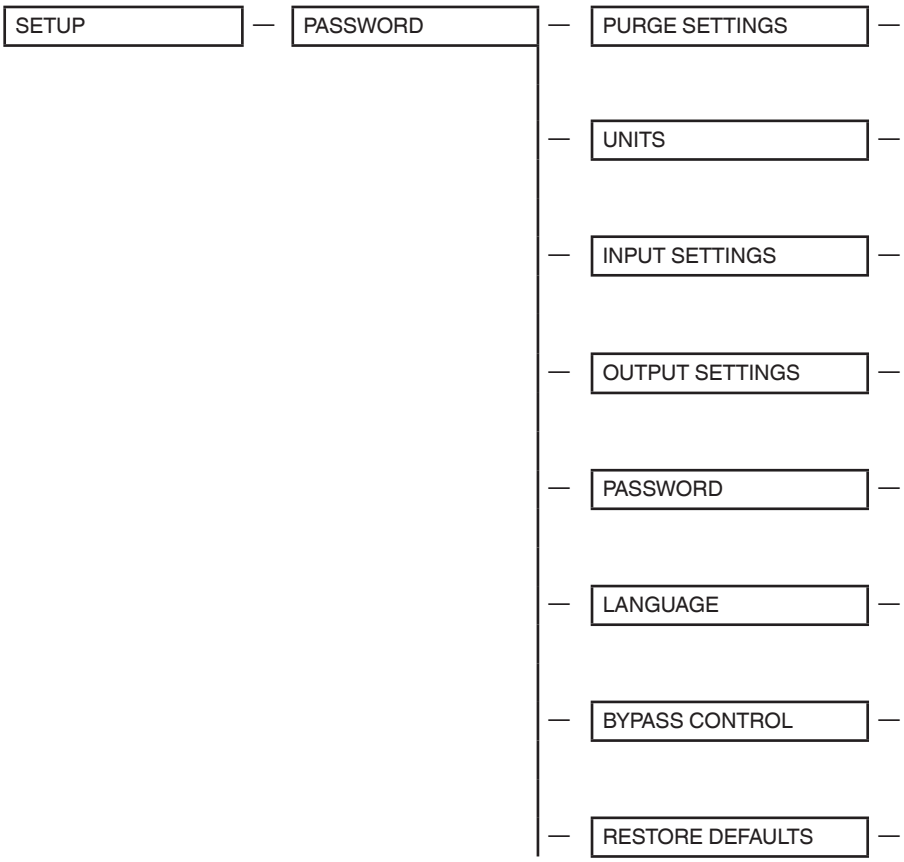
Note

To change the LCD contrast, press the up and down arrow keys at the same time. This will take you to the contrast screen. Then use the up and down arrow keys to adjust the contrast. Once the contrast level is selected, press the START/SET key to save setting. This setting remains through power cycles. Vent is gravity-sensitive and can be installed in any orientation.

4.2. Programming Menu



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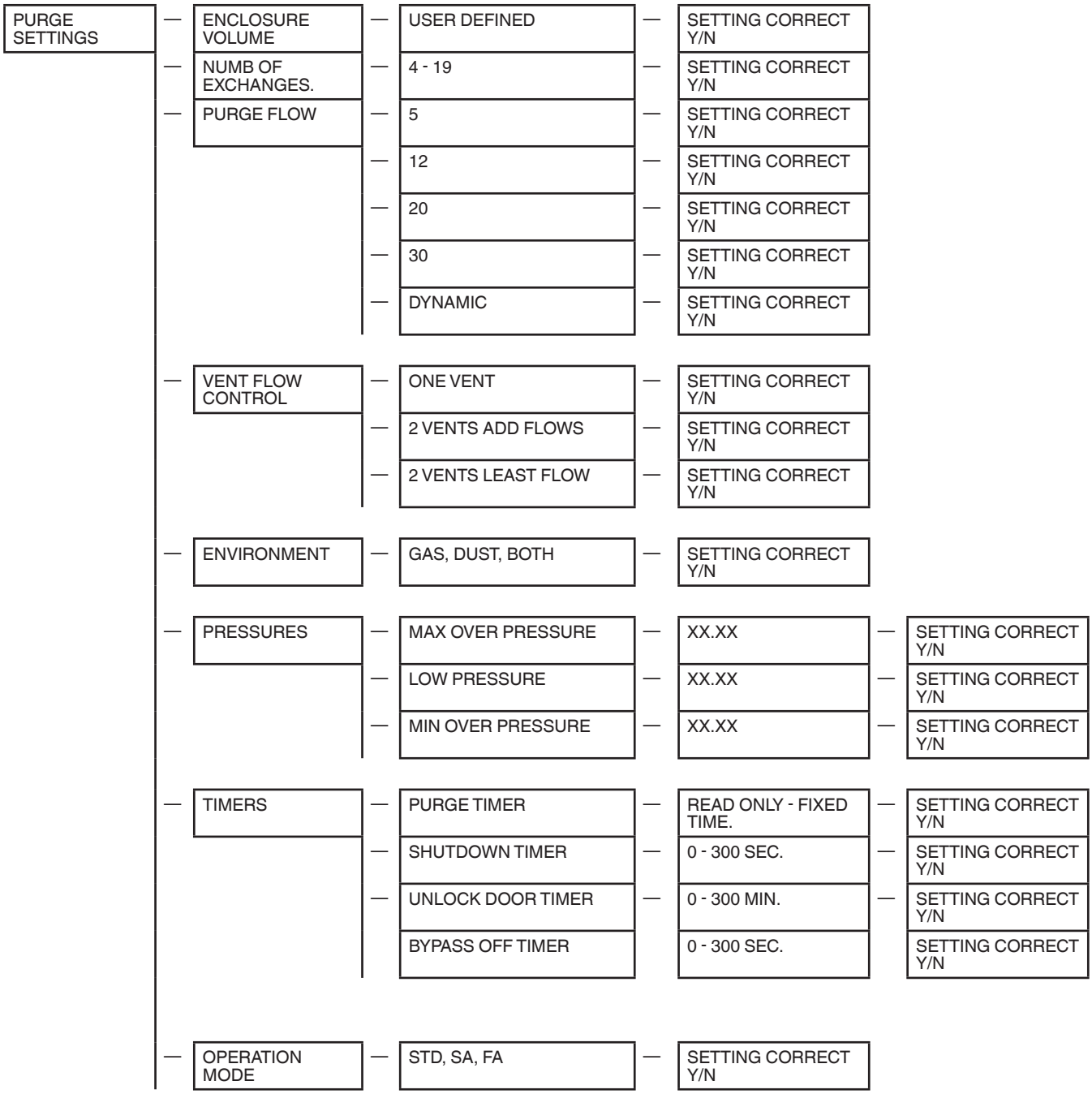
4.3. Purge Settings



4.4. Units

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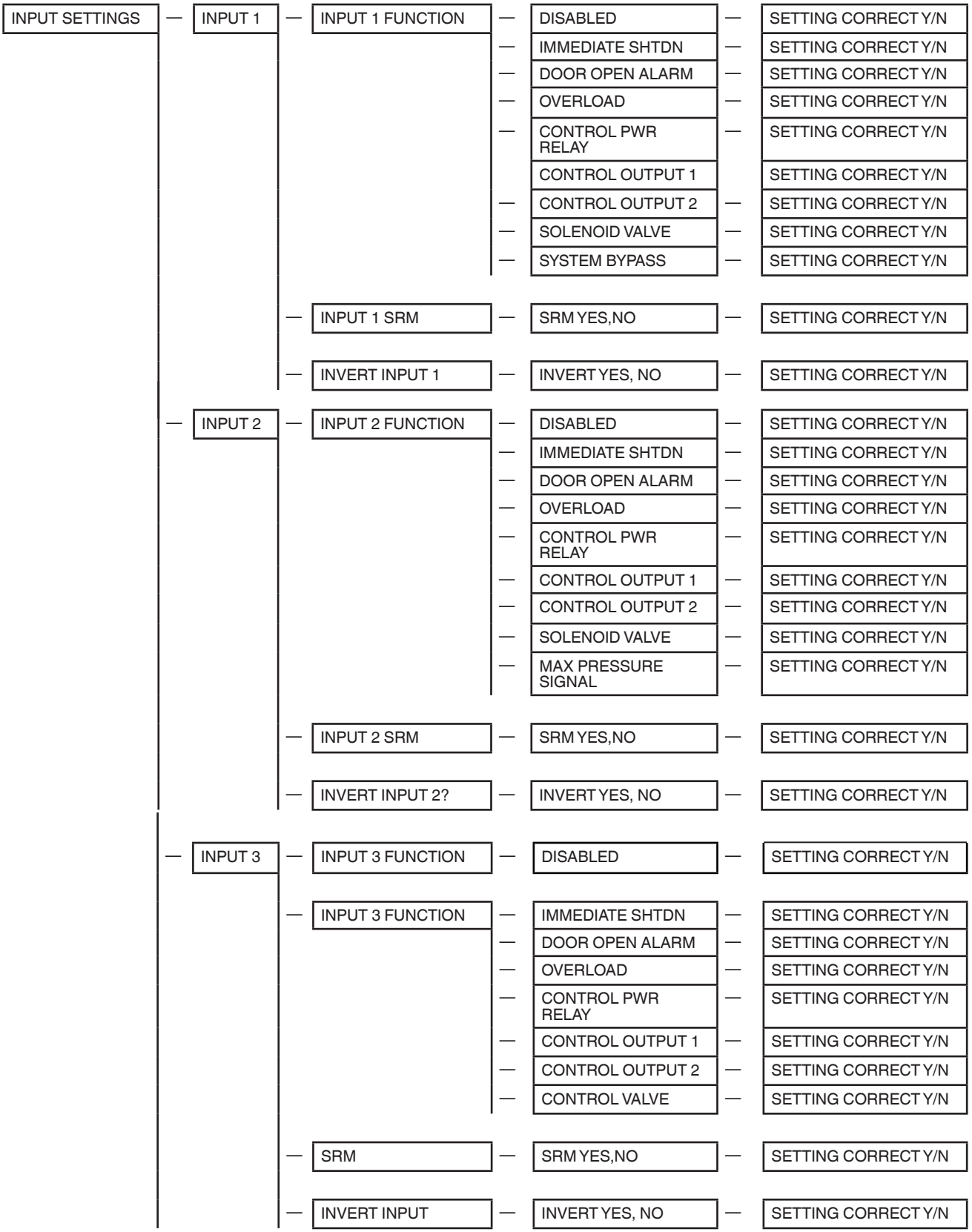
4.5. Input Settings



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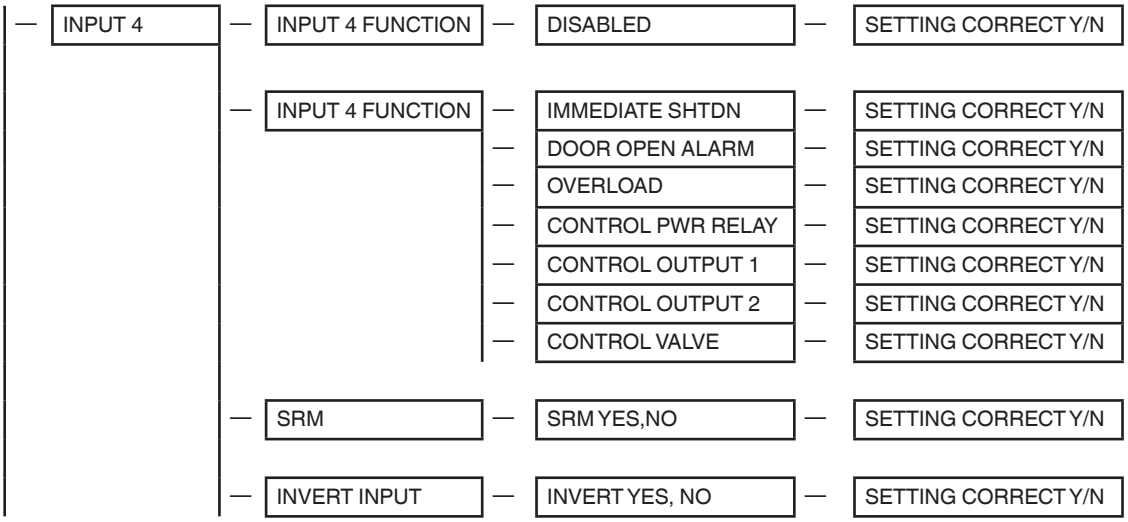

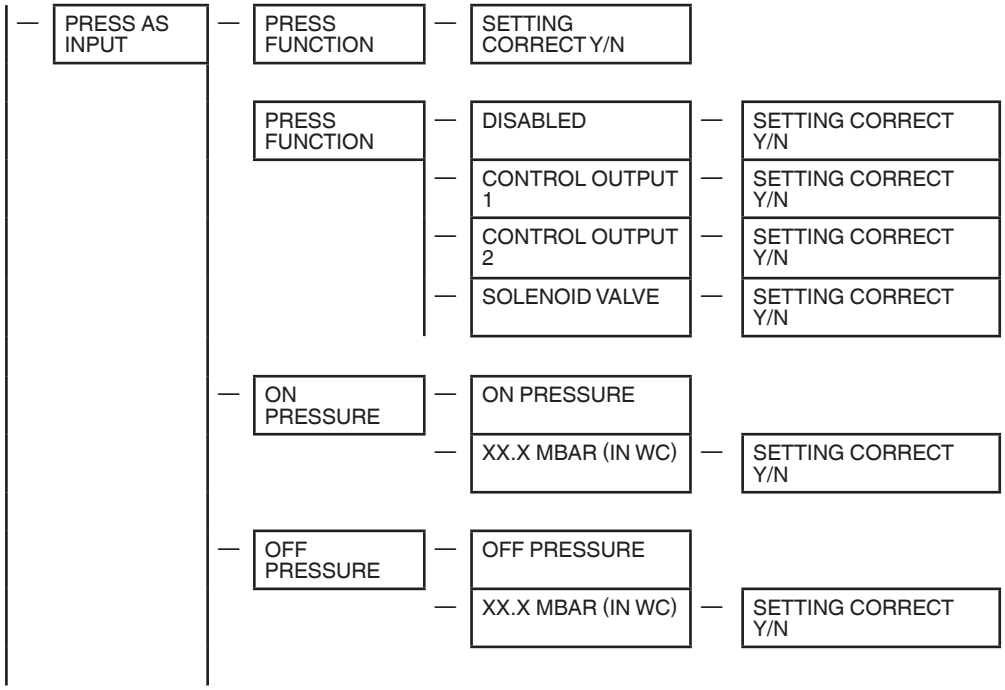

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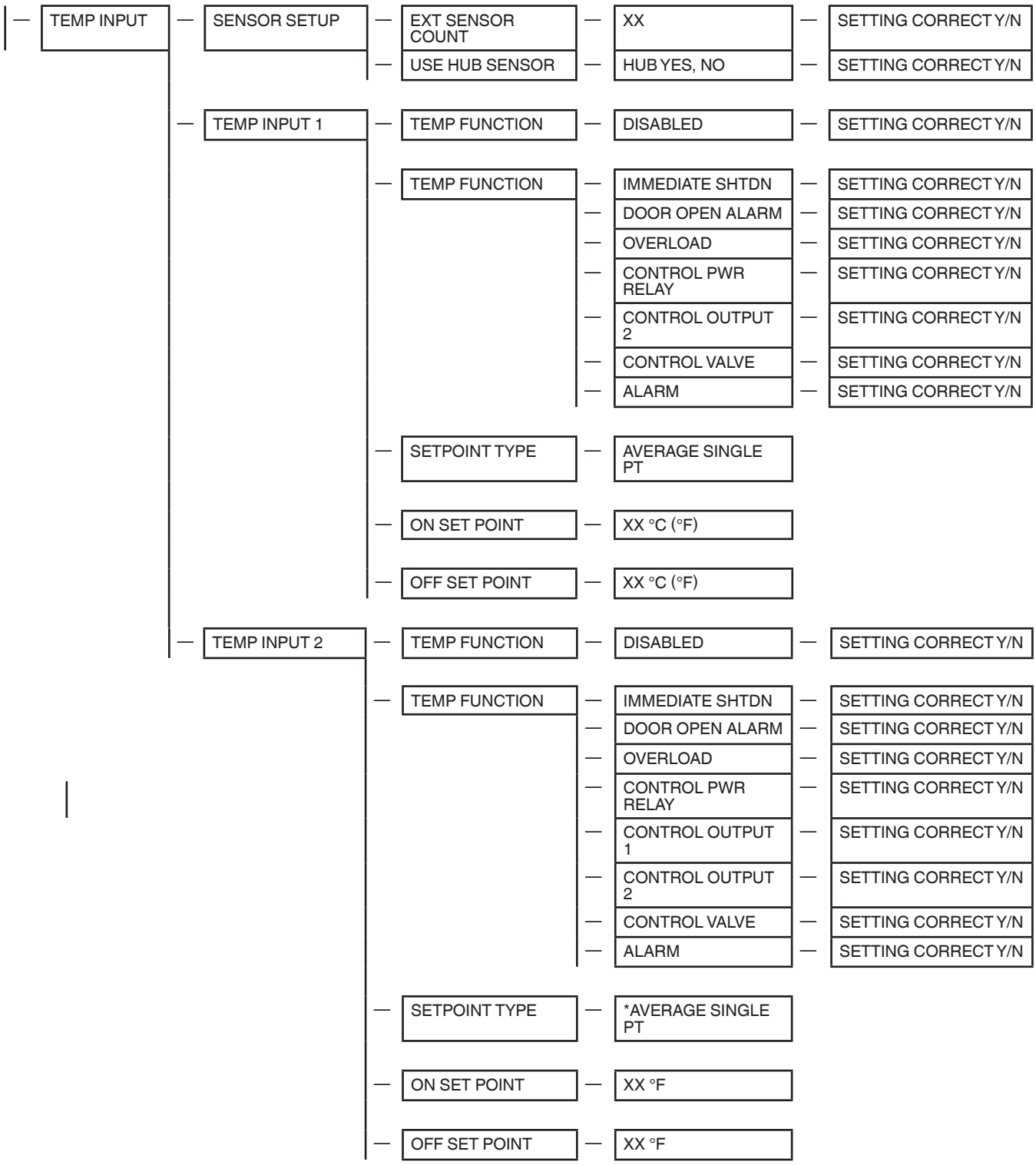

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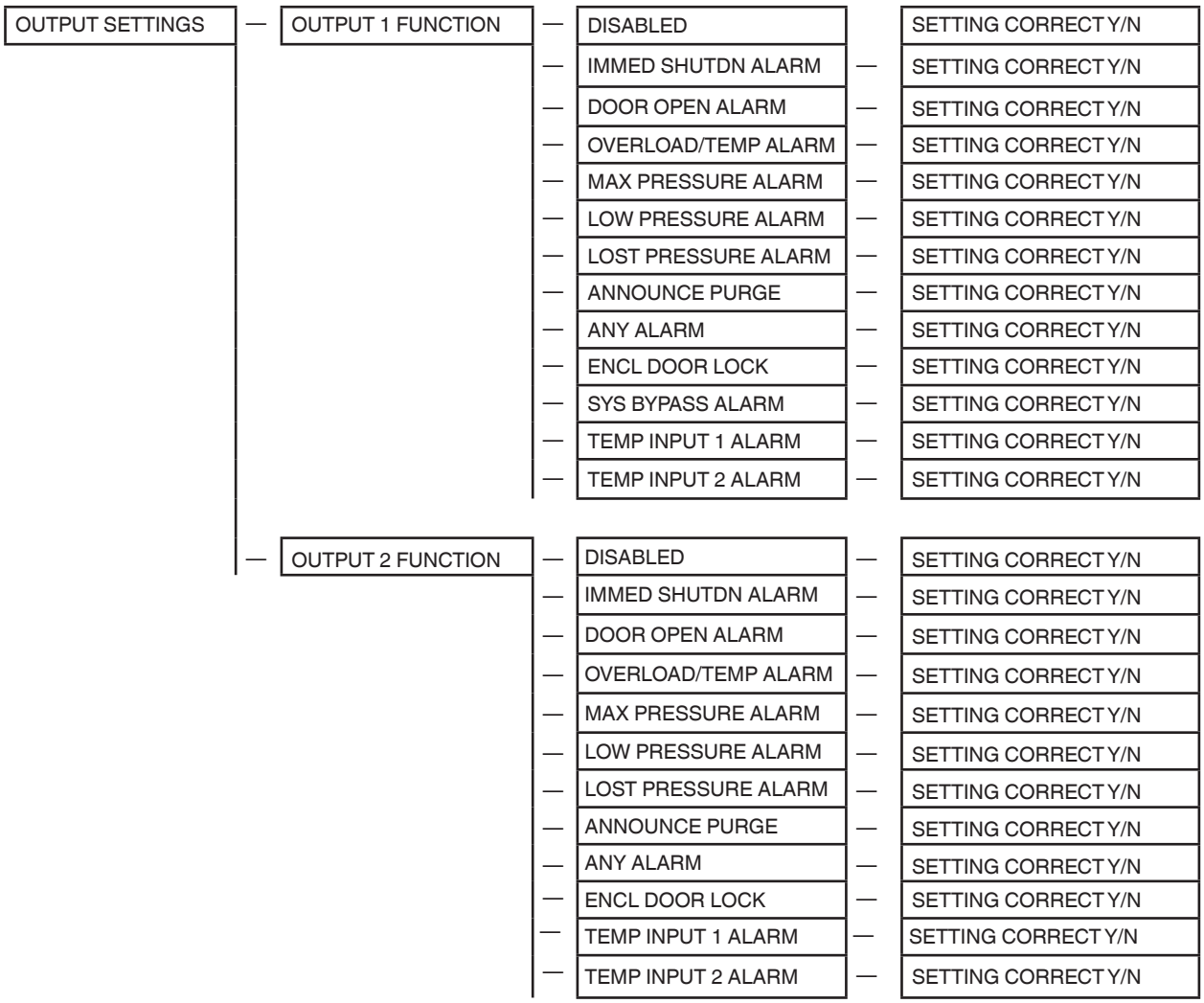
4.6. Output Settings



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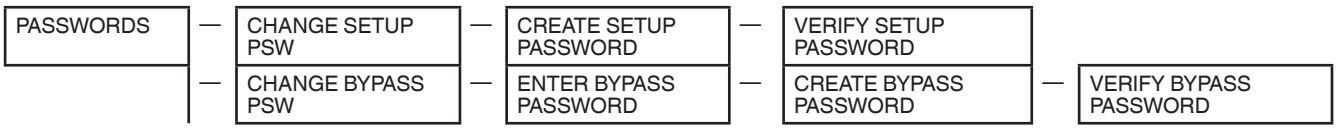
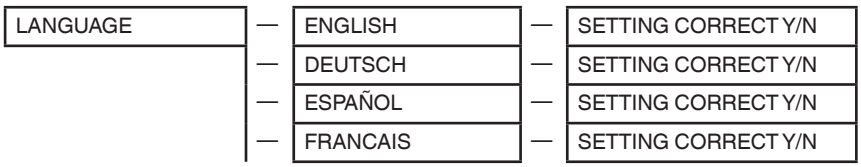
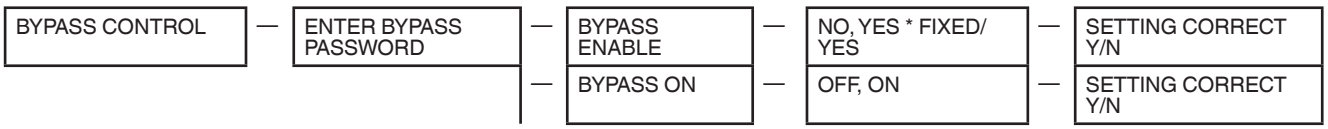
4.7. Password



4.8. Language

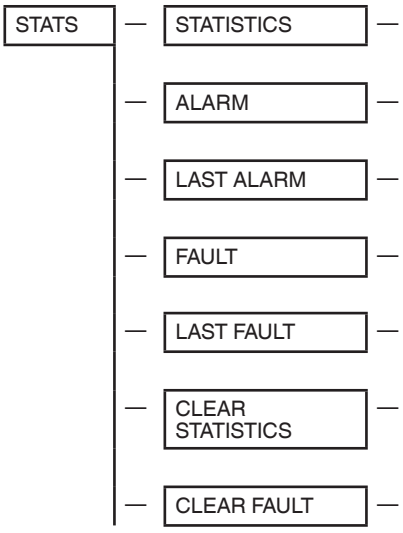


4.9. Bypass Control



4.10. Restore Defaults

4.11. Stats



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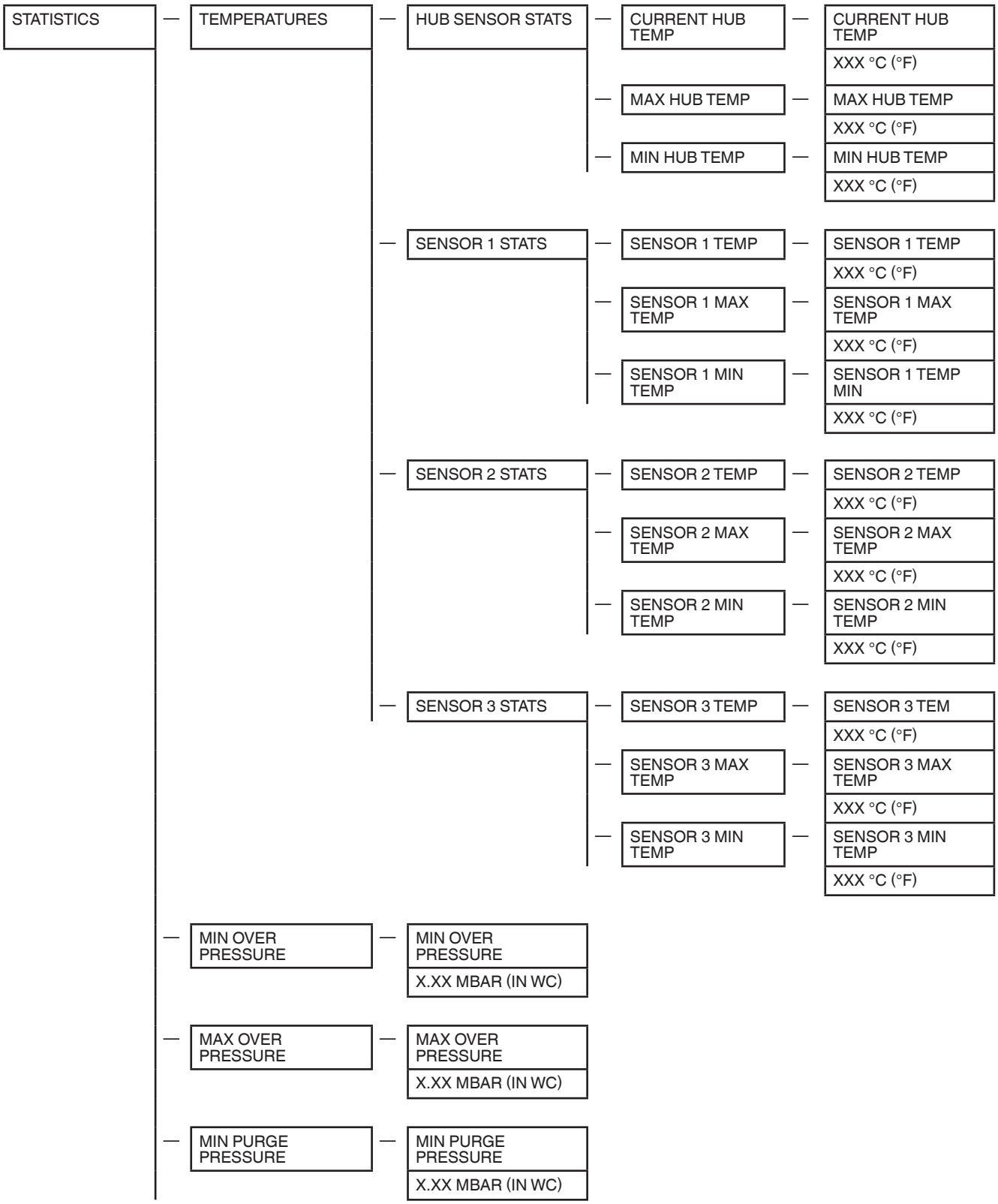
4.11.1 Statistics

This provides system operating information. These fields are read only.



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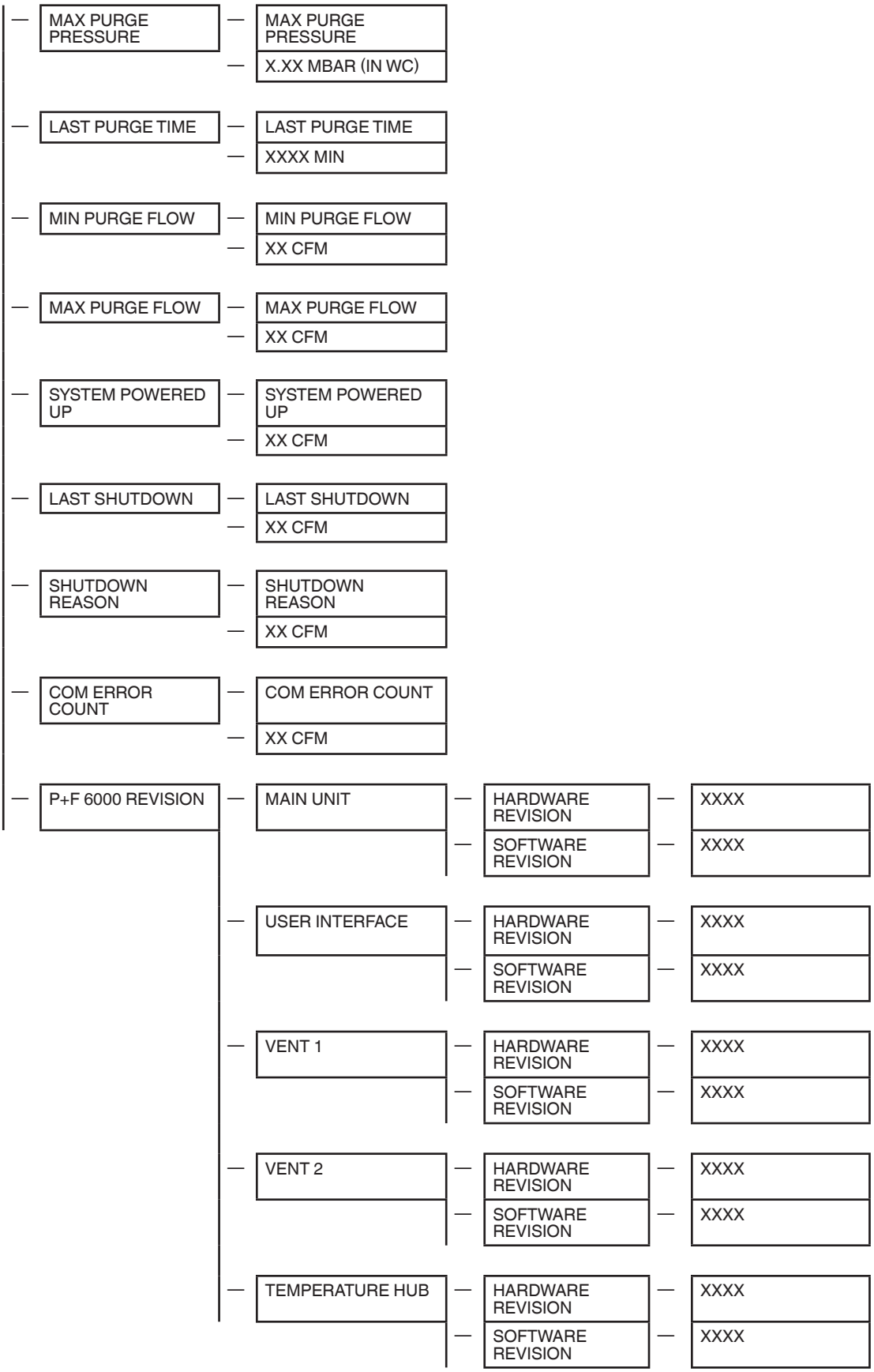

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4.11.2 Alarm

This provides the reason for the last system alarm.

ALARM	—	NONE
	—	NO SAFE PRESSURE
	—	MAX PRESSURE
	—	INPUT 1 BROKE/ SHORT
	—	INPUT 2 BROKE/ SHORT
	—	INPUT 3 BROKE/ SHORT
	—	INPUT 4 BROKE/ SHORT
	—	DOOR OPEN
	—	IMMEDIATE SHUTDWN
	—	OVERLOAD SHUTDWN
	—	LOST FLOW
	—	13 V
	—	9.5 V
	—	TEMP INPUT 1
	—	TEMP INPUT 2
	—	PRESSURE AS INPUT

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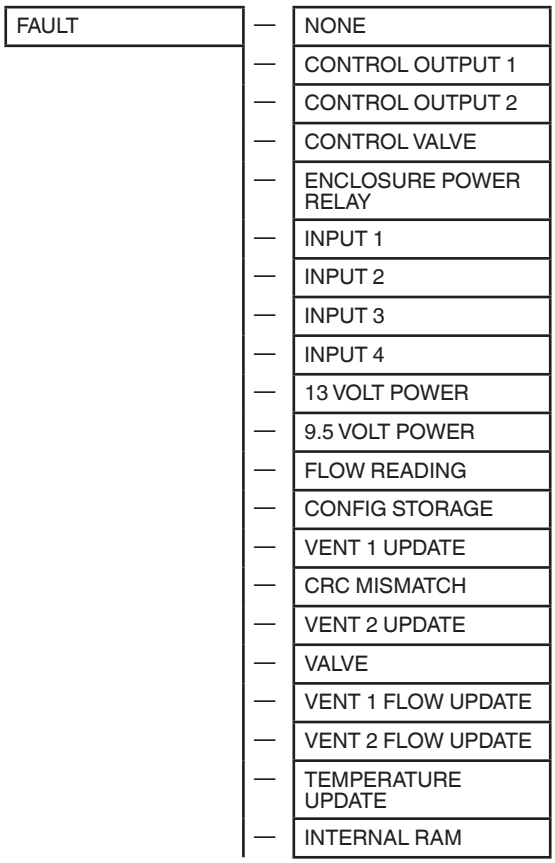
4.11.3 Fault

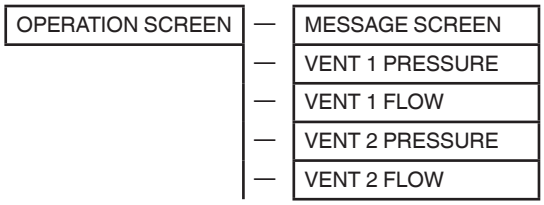
This provides the reason for the system fault.



4.11.4 Clear Statistics

4.11.5 Clear Fault

4.11.6 Operation Screen



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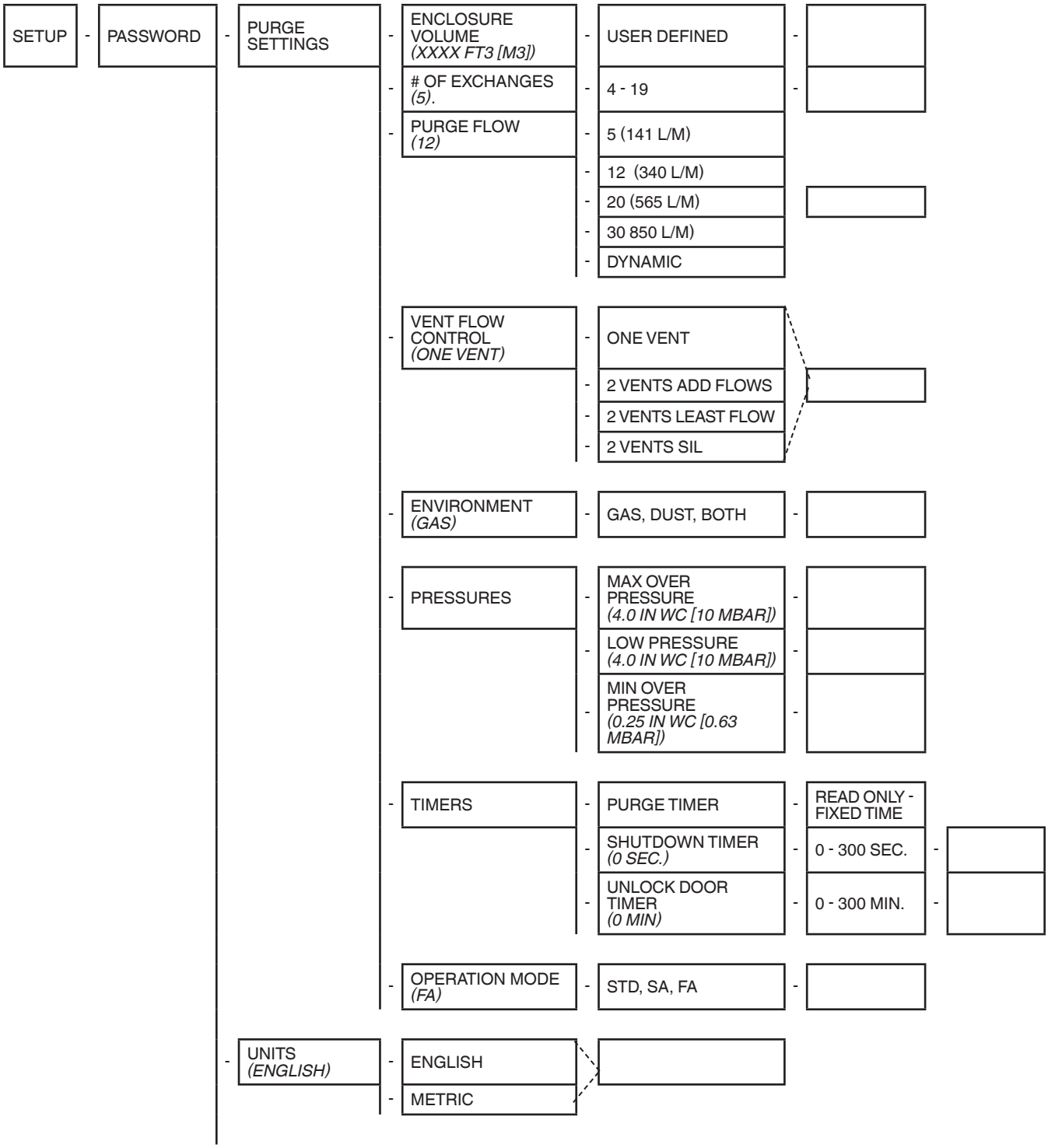
4.12. Programming Worksheet



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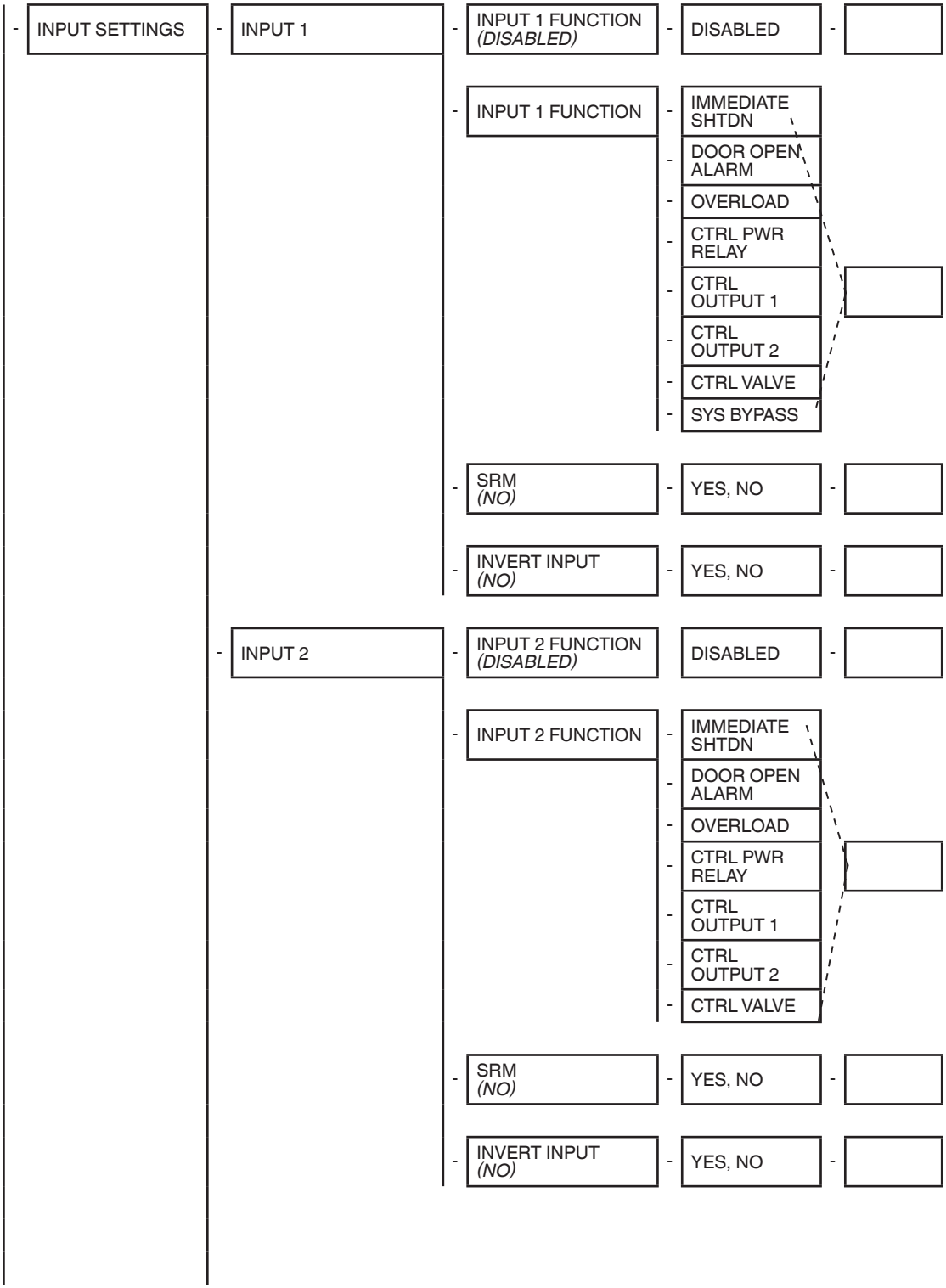

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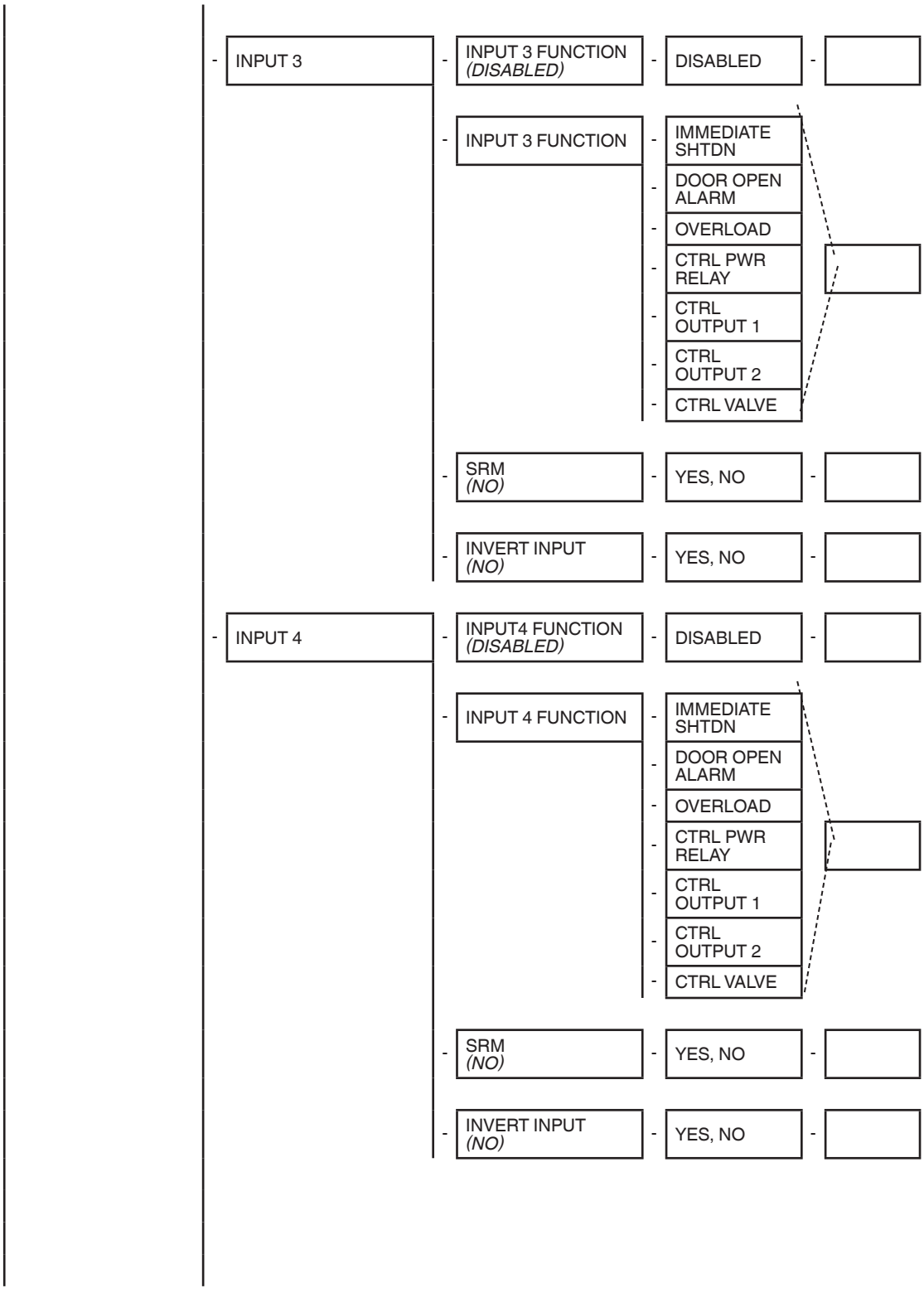

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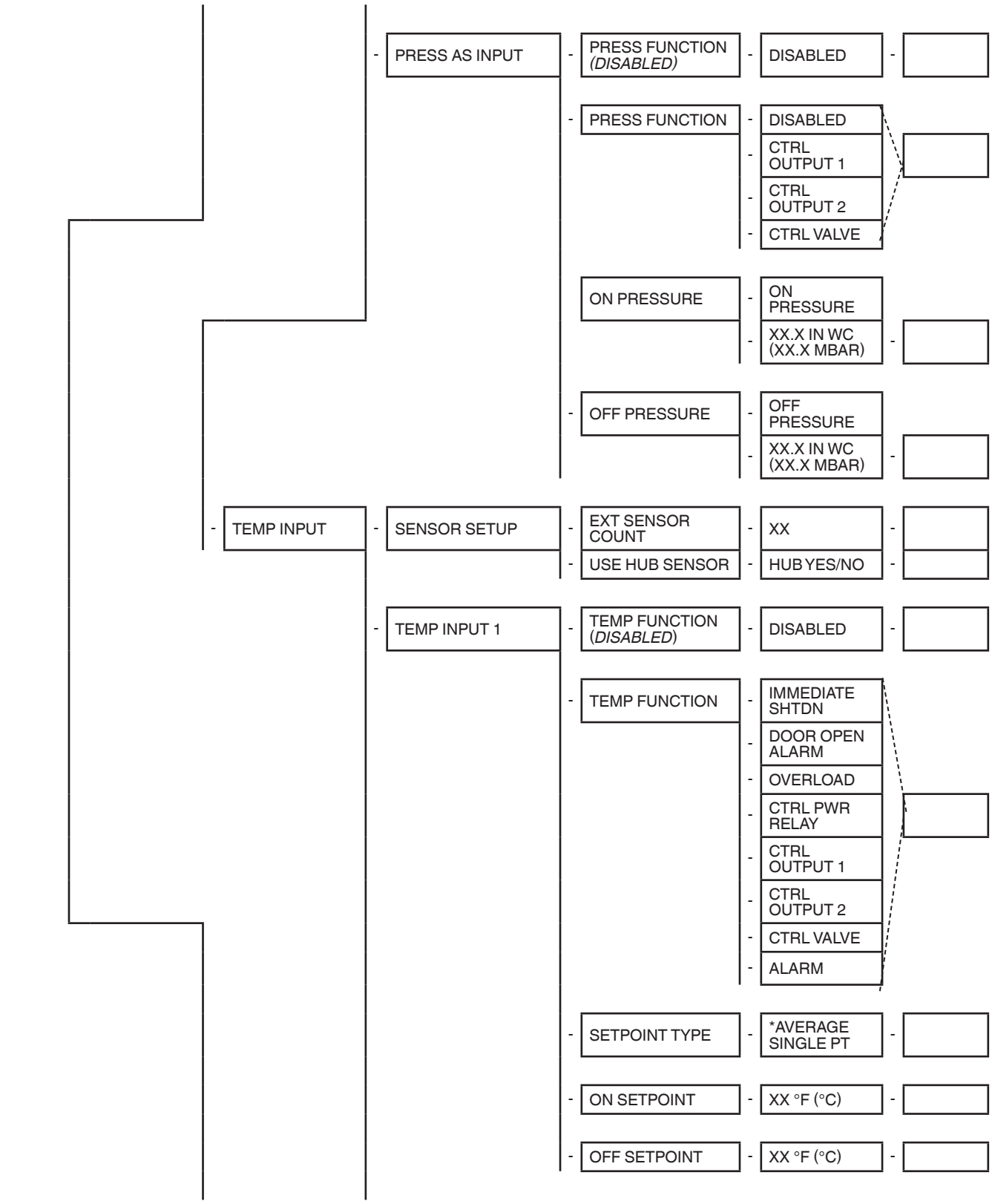

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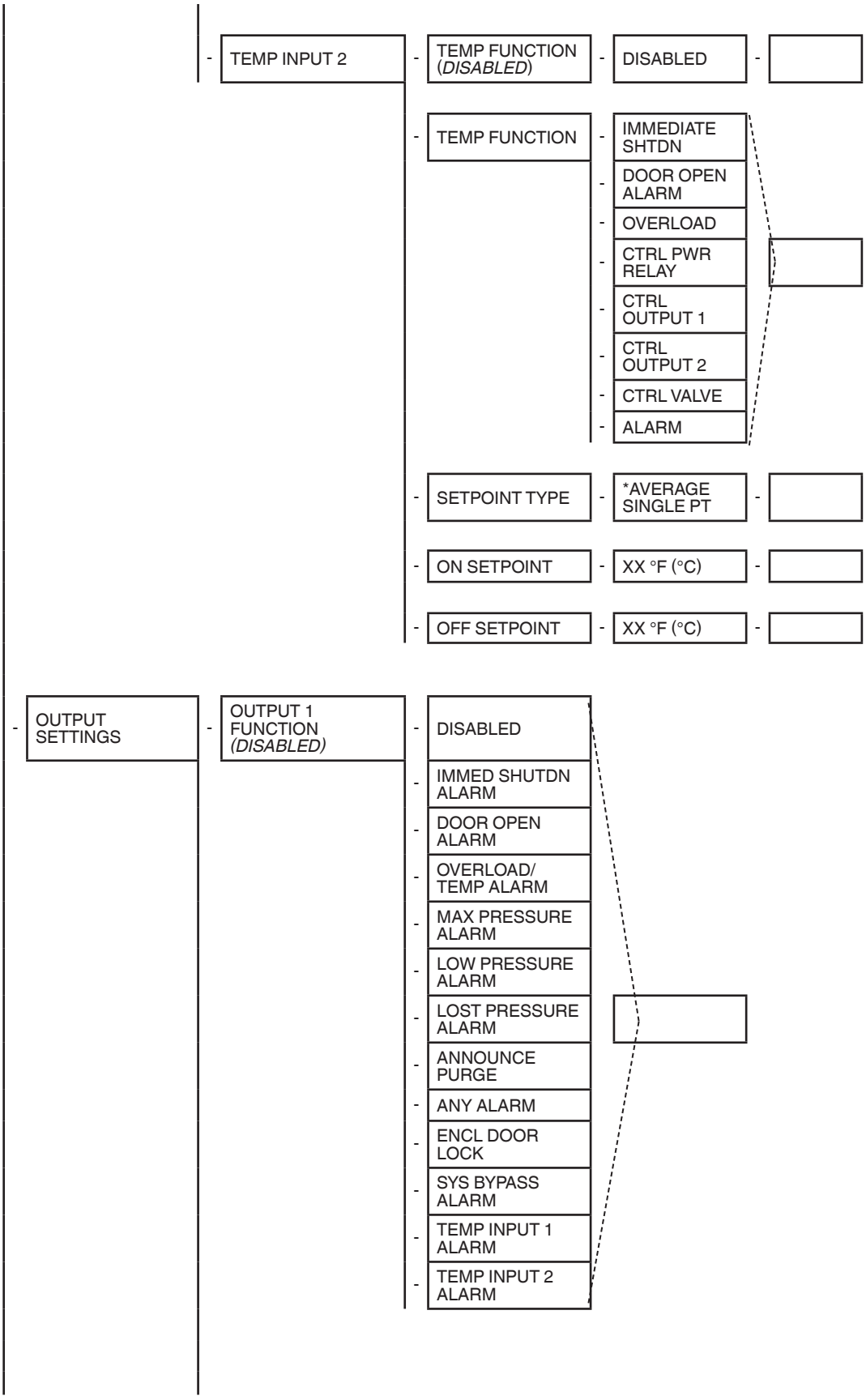

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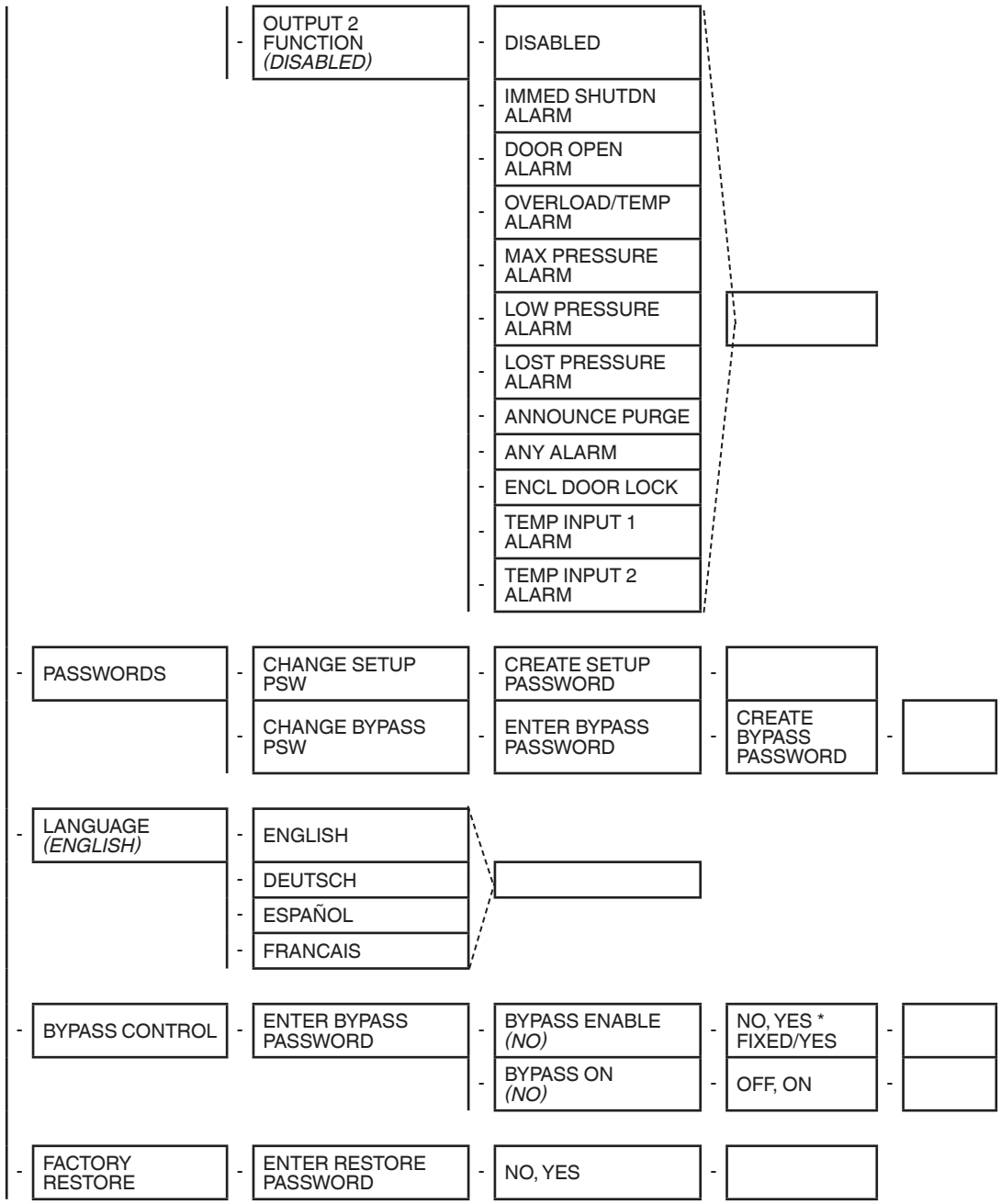

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5. Product Identification

5.1. Specific Conditions of Use

Control Unit

- Conduit seals shall be certified in type of explosion protection flameproof “db”, or explosion-proof Class I/II Div 1 as required for the installation location and suitable for the conditions of use. They shall be correctly installed to the explosion-proof/flameproof enclosure or conduit extensions as required. All NPT threads are to be minimum 5 thread engagement, wrench tight.
- For US/Canadian applications, conduit seals or the 6000-CC-3/4NPT plug must be within 450 mm (18”) of the internal explosionproof/flameproof enclosure, or within 380 mm (15.25”) from the end of the conduit supplied with the 6000 unit. For ATEX/IECEx Zone applications, the conduit must be sealed directly at the wall of the explosionproof/flameproof enclosure or immediately at the end of the conduit supplied with the 6000 unit.
- When the purge control unit is mounted to an enclosure, the complete unit shall be evaluated to the current revision of IEC/EN 60079-2 or NFPA 496 as applicable. See certificates and/or Declaration of Conformity for reference to relevant editions of these standards.
- The purge control unit has an operating temperature class of 135 °C (T4 temperature class). This temperature shall be considered when mounted to an enclosure.
- The device must be installed in accordance with the manufacturer’s installation drawing 116-B027A.
- Intrinsically safe cables extending from the explosion-proof/flameproof “db” enclosure must be provided with at least 0.25 mm insulation thickness per conductive core to maintain segregation between intrinsically safe circuits.
- The cable entries may be used only in places where they are protected against the influence of mechanical danger.
- The non-metallic membrane touchpad and display is a potential electrostatic discharge hazard. Use only water damp cloth and allow to air dry for cleaning device. Do not use or install in high charge areas. See IEC 60079-32-1 for further information.
- In hazardous dust environment, regularly remove dust from the control unit enclosure to prevent excessive temperature rise, including the solenoid valve.
- Only pressure relief vent model EPV-6000-xx-xx covered under the following certificates can be used with devices covered by this certificate: For ATEX applications: Certificate No. DEMKO 15 ATEX 1622X and DEMKO 07 ATEX 0705753X. For IECEx applications: Certificate No. IECEx UL 15.0147X and IECEx UL 08.0003X. For cULus applications: UL certification as part of file E184741.
- For all applications, the 6000-TEMP-XX I.S. temperature hub must be mounted in an enclosure that is a minimum IP54. In hazardous dust environment, the 6000-TEMP-xx temperature hub has to be mounted in an enclosure that is certified for the area classification. The pressurized enclosure does not account for this type of enclosure because power to this device is required before safe operation within the pressurized enclosure. Maintain separation of I.S. to non-I.S. wiring as required by local codes.
- Caution must be used when handling or cleaning products so there is no static charge buildup. Do not wipe off the 6000-TSEN-xx sensor with dry cloth or use in the presence of high charge-

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generating processes such as ionizers or electrostatic equipment. See IEC 60079-32-1 for further information.

- The 6000 systems may also be provided with previously certified items (operators, cable glands, terminal box, etc.) as specified in the test reports.
- Enclosure 6000-DPE-xx is only for I.S. termination board 6000-ISB-xx and/or 6000-TEMP-xx.

I.S. Termination Board, DIN-Mounted: 6000-ISB-xx

- In hazardous dust environments, the I.S. termination board, DIN mounted: 6000-ISB-xx must be mounted in an enclosure that is certified for the area classification. The pressurized enclosure does not account for this type of enclosure because power to this device is required before safe operation within the pressurized enclosure. Only connect to the 6000 EPCU I.S. termination connection.
- Only connect to the 6000 EPCU I.S. termination connection.
- All wiring to and from this board is for intrinsically safe connections and must be properly routed and managed per international, NEC, local codes, and applicable standards.
- See the latest revision of installation drawing 116-B027A for important installation information.
- The 6000-CBLA-… is not certified to be used in a Zone 21 location. Use approved cable glands for this area classification.

Note

- Peripheral devices such as optional SRM module and I.S. solenoid were not evaluated by UL as part of the intrinsically safe certification.
- When using third-party certification, ensure that you match the entity parameters for intrinsically safe devices as shown in control drawing 116-B027A.
- SRM module is a simple apparatus and does not require third-party certification.

EPV-6000 Enclosure Protection Vent

- The EPV has an operating temperature class of 135 °C (T4 temperature class). This temperature shall be considered when mounted to an enclosure.
- Cables use to connect the EPV must be provided with at least 0.25 mm insulation thickness per conductive core to maintain segregation between intrinsically safe circuits.
- In hazardous dust environments, regularly remove dust from the EPV vent to prevent excessive temperature rise. See certificate for full information.
- In hazardous dust environments, the connector end of the vent shall be protected from direct exposure of a UV light source. See certificate for full information.

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5.2. Applied Standards and Markings

Note

See the certificates and/or the Declaration of Conformity for details on specific editions of the standards listed below.

IECEx and ATEX:
EN / IEC 60079-0
EN / IEC 60079-1
EN / IEC 60079-2
EN / IEC 60079-11
EN / IEC 60079-31

5.3. Type Codes

6000 – DV – S2 – UN – WH – AC

- AC – 100 ... 250 VAC
- DC – 20 ... 30 VDC
- WH – with stainless steel housing
- CK – component kit
- Safety Product
- DV – digital solenoid/manifold included
- NV – no digital solenoid/manifold included

EPV – 6000 – AA – 01

- 01 – standard configuration
- 02 – standard configuration, 2nd address
- 03 – low leakage rate for pressurization / low flow
- 04 – low leakage rate for pressurization, 2nd address
- 05 – very low leakage rate for pressurization / low flow
- 06 – very low leakage rate for press / low flow, 2nd address
- AA – anodized aluminum body and cap
- SS – anodized body and 316L stainless steel cap

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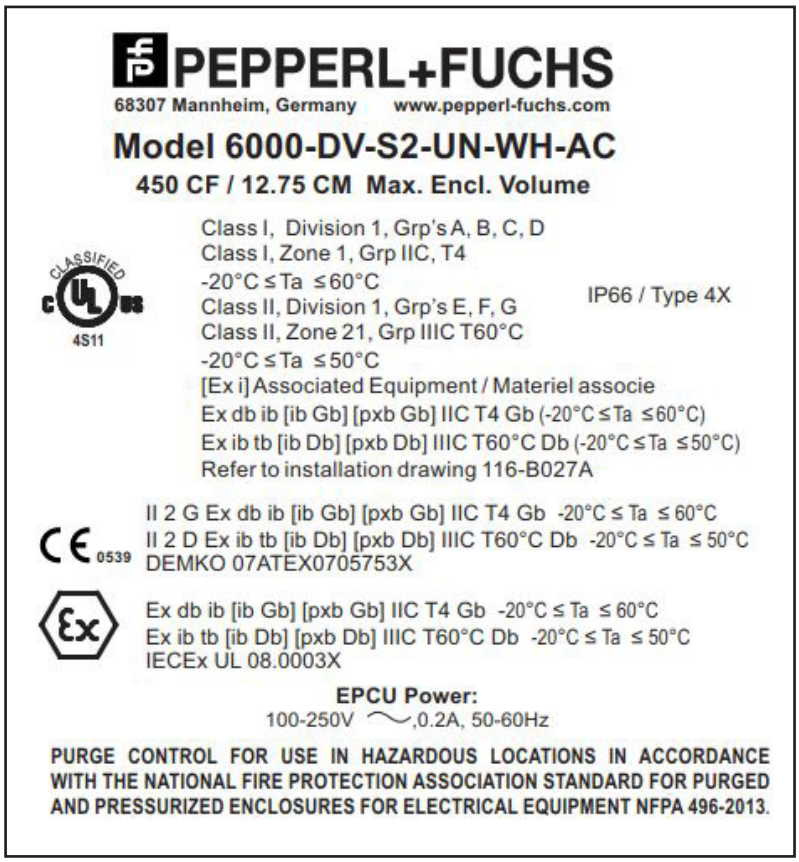
5.4. Labels and Markings

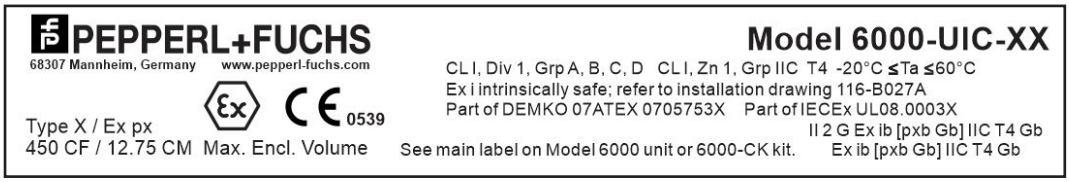
Marking for the 6000 Control Unit

6000-___-S2-UN-WH-__ and 6000-___-S2___-XD-___

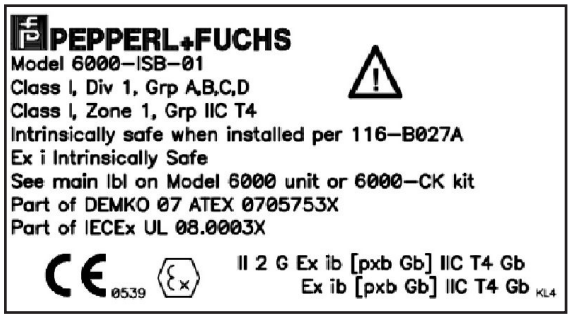


Marking for the 6000 user interface controller, 6000-UIC-01

6000-___-S2-UN-WH-__ and 6000-___-S2___-XD-___



Marking for the termination board (DIN-mounted), 6000-ISB-___



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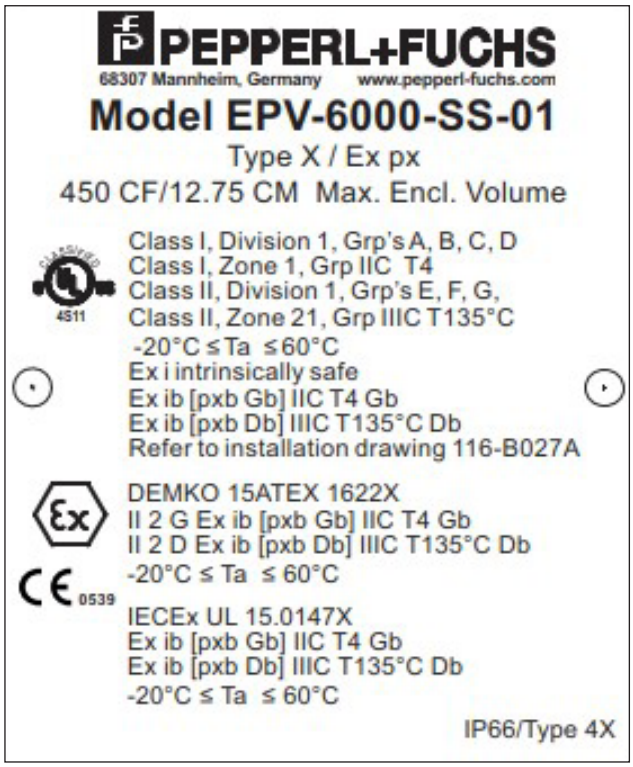
Marking for the 6000-TSEN-01

Class I, Division 1, groups A, B, C, D
Class II, Division 1, groups E, F, G, Class III
Class I, Zone 1, Group IIC T4 / Zone 21, Group IIIC
Intrinsically Safe if installed per 116-B027A Ex i
See main label on Model 6000 control unit
Part of DEMKO 07 ATEX 0705753X
II 2 G Ex ib IIC T4 Gb / II 2 D Ex ib IIIC T210°C Db
Part of IECEx UL 08.0003X
Ex ib IIC T4 Gb
Ex ib IIIC T210°C Db
Part of DNV 24.0014 X

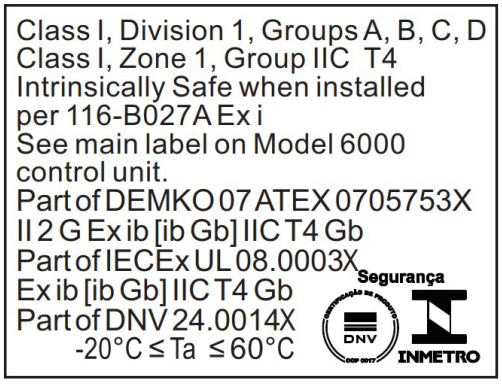
Segurança
INMETRO
-20°C ≤ Ta ≤ 100°C

Marking for the 6000 control unit, 6000-___-S2-___-CK

Marking for the 6000 vent, EPV-6000-__-__

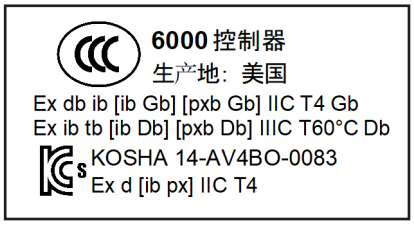


Marking for the 6000-TEMP-01



Marking for CCC approvals for the 6000 control unit

6000-___-S2-UN-WH



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WARNING!

For US/Canadian applications, conduit seals or the 6000-CC-3/4NPT plug must be within 450 mm (18”) of the internal explosionproof/flameproof enclosure, or within 380 mm (15.25”) from the end of the conduit supplied with the 6000 unit. For ATEX/IECEx Zone applications, the conduit must be sealed directly at the wall of the explosionproof/flameproof enclosure or immediately at the end of the conduit supplied with the 6000 unit.

WARNING!

For enclosures in hazardous dust environments:

This enclosure shall not be opened unless the area is known to be free of flammable materials or unless all devices have been de-energized. Power must not be restored after the enclosure has been opened until combustible dusts have been removed and the enclosure is repressurized.

WARNING!

For enclosures in hazardous gas environments:

This enclosure shall not be opened unless the area is known to be free of flammable materials or unless all devices have been de-energized. Power must not be restored after the enclosure has been opened until the enclosure is completely purged of all hazardous gas and the enclosure is repressurized.

WARNING!

For enclosures in hazardous dust and gas environments:

This enclosure shall not be opened unless the area is known to be free of flammable materials or unless all devices have been de-energized. Power must not be restored after the enclosure has been opened until combustible dusts have been removed and completely purged of all hazardous gas and the enclosure is re-pressurized.

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6. Lifetime Product Care

6.1. Maintenance and Repair

1. The 6000 purge and pressurization system does not require special maintenance except replacement of pneumatic filters, when used, and normal periodic functional checks, including pressure and flow readings within specifications contained in this manual. When checking whether the pressure and flow measurements of the EPV-6000 vent are within specifications, use calibrated equipment to determine measurements, or contact a Pepperl+Fuchs representative or the factory to send back the EPV-6000 vent for pressure and flow verification.
2. The purge and pressurization system, when operated in conjunction with a hazardous area, must not be modified. If there is a defect, the product may need to be replaced. Repairs must be performed only by a Pepperl+Fuchs specialist who is specifically trained and authorized to repair the defect.
3. Any replaceable fuses must be replaced with specific fuse ratings and type, as written in this manual under Specifications.
4. When servicing, installing, and commissioning, the area must be free of all combustible material and/or hazardous explosive gas. Only the terminal compartment of the control unit is accessible to the user. Not under any circumstances, shall the control unit, user-interface, or vent, be taken apart. The Ex d housing cover shall only be removed when power is removed from the device or the area is known to be safe.
5. Any cable glands that require replacement shall be replaced with the same model or another approved cable gland that meets the area classification.
6. When replacing the EPCU, the area must be free of hazardous gas and/or dust and power removed from the EPCU, enclosure contacts, and auxiliary contacts. Two screws on the bottom of the Ex d enclosure need to be loosened but not removed. Twist the EPCU clockwise and lift it out of the Ex d enclosure. Reverse to install new EPCU.

   Contact Pepperl+Fuchs customer service for an RMA (Return Merchandise Authorization).

6.2. Troubleshooting Alarms and Fault Conditions

The 6000 purge controller can indicate certain alarm and fault conditions when they happen. The alarm condition is indicated on the display under the Alarm/Fault LED and will blink for an alarm and remain solid for a fault. The alarm will not disengage enclosure contacts if they are on but can be directed to the AUX alarm contact. The fault will disengage enclosure contacts.

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Below are the alarm descriptions:

Alarm	Description	Cause
NO SAFE PRESSURE	Enclosure pressure is below minimum safe pressure	-No purge supply -Enclosure leakage too great
MAX PRESSURE	Enclosure pressure is above the maximum pressure allowed	-Purge supply pressure too much -EPV-6000 vent is blocked or not installed
LOW PRESSURE	Enclosure pressure is below the alarm pressure but above the minimum safe pressure	-Purge supply capacity is not keeping up -Enclosure is starting to leak more
INPUT 1-4 BROKE/ SHORT	When SRM is selected, then a wire is broken or shorted going to the switch input	-SRM is selected and not installed on the switch input -Broken or shorted wire to switch/ SRM
DOOR OPEN	Causes the purge system to reset and will not start again until clear	-Signal from switch input activated door open -Shorted wire going to switch input with no SRM selected
IMMEDIATE SHUTDOWN	Causes the purge system to reset and will not start again until clear	-Signal from switch input activated immediate shutdown -Shorted wire going to switch input with no SRM selected
OVERLOAD SHUTDOWN	Does not reset purge system but can sound an alarm	-Signal from switch input activated immediate shutdown -Shorted wire going to switch input with no SRM selected
LOST FLOW	During purging, if EPV-6000 vent detects a flow lower than expected, alarm is activated	-Signal from switch input activated immediate shutdown -Shorted wire going to switch input with no SRM selected
13V	Power to internal bus is too low for components to operate properly	-Defective EPCU
9.5V	Power to the I.S. comm bus for vent, UIC, Temp Hub is too low for proper operation.	-Defective EPCU -I.S. barrier board fuse is blown
TEMP INPUT 1	Temperature Input 1 is active	-The temperature of the Temp Hub or Temp sensor is outside the limits
TEMP INPUT 2	Temperature Input 2 is active	-The temperature of the Temp Hub or Temp sensor is outside the limits
ENCLOSURE POWER RELAY	Monitor circuit detects relay malfunction	-One of the contacts are welded shut

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Below are fault descriptions:

Fault	Description	Cause
CONTROL VALVE	The control valve circuit is not functioning properly	-I.S. barrier board fuse is blown -Power supply to control unit is too low
VALVE 1–4	Input 1, 2, 3, or 4 is not functioning properly	-I.S. barrier for inputs has blown fuse -EPCU defective
FLOW READING	Flow reading from EPV-6000 vent is corrupted or not available	-Flow readings are outside the range of the EPV-6000 vent being used
CONFIG STORAGE	Memory location corrupted	-EPCU defective
VENT 1–2 UPDATE	EPV-6000 vent is not communicating	-I.S. barrier for inputs has blown fuse -EPCU defective -No vent is connected, or vent is misconnected
CRC MISMATCH	Both of the EPCU processors instruction set are not in sync.	-EPCU is defective
VENT 1–2 FLOW UPDATE	EPV-6000 vent is getting power but communication is not correct.	-One or more of the connections is not correct -EPV-6000 is defective
TEMPERATURE UPDATE	The Temp Hub/Temp Sensor reading is out of specification or not reading.	-Connections could be incorrect -Not set up properly in the menu structure of the EPCU
INTERNAL RAM	EPCU memory fault	-EPCU is defective

6.3. Dismantling and Decommissioning

Abide by all local and any other code requirements for disposing of electronic equipment. When disposing of any component of the 6000 system, certification labels or printing shall be marked VOID across each label or printing.

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Your automation, our passion.

Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus
- Remote I/O Systems
- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

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