



One Series Electronic Pressure and Temperature Switches



UNITED ELECTRIC
CONTROLS

**Discrete Input, Intrinsically Safe,
Flameproof and Non-Incendive
Models: 1XSWLL, 1XSWHL, and 1XSWHH**

Installation and Maintenance Instructions

Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties. All Warnings are translated to French and can be found on pages 21, 22 and 23.

GENERAL

 MISUSE OF THIS PRODUCT MAY CAUSE EXPLOSION AND PERSONAL INJURY. THESE INSTRUCTIONS MUST BE THOROUGHLY READ AND UNDERSTOOD BEFORE UNIT IS INSTALLED. SEE THE PRODUCT NAMEPLATE INFORMATION FOR SPECIFIC AGENCY CERTIFICATIONS APPLICABLE TO YOUR PRODUCT.

 **WARNING:** EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USE IN HAZARDOUS LOCATIONS. CABLE GLANDS USED MUST BE RATED FOR A MINIMUM OF IP66 IN ORDER TO MAINTAIN THE SAME IP RATING.

 **WARNING:** FOR ZONE HAZARDOUS LOCATIONS, ALL CABLE ENTRY DEVICES SHALL BE CERTIFIED IN TYPE OF EXPLOSION PROTECTION FLAMEPROOF ENCLOSURE “d” WITH AN IP66 RATING, SUITABLE FOR THE CONDITIONS OF USE AND CORRECTLY INSTALLED. IF CABLES AND CABLE GLANDS ARE NOT USED, A STOPPING BOX SHALL BE PROVIDED WITHIN 2” OF THE ENCLOSURE. FLAMEPROOF JOINT AND GAP DETAILS ARE PROVIDED ON PAGE 15.

DURING INSTALLATION, MARK THE BOX NEXT TO EACH PROTECTION METHOD ON THE NAMEPLATE THAT APPLIES TO YOUR APPLICATION.

THIS EQUIPMENT IS CERTIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF THE FOLLOWING APPLICABLE STANDARDS AND IS SUITABLE FOR USE IN NON-HAZARDOUS AND THE FOLLOWING HAZARDOUS LOCATIONS AND IS ATEX AND IECEx CERTIFIED SUITABLE FOR APPROPRIATE USE IN GAS AND DUST ZONE 1 APPLICATIONS.

	N. America	Europe	International
Intrinsic Safety - Model 1XSWLL Only			
Cert number:	UL File E226592	DEMKO 09 ATEX 0813748X	IECEx UL 08.0017X
Applicable Standards	UL 913:Ed.8, CSA 157:Ed.3, UL 60079-11:Ed.6, CSA 60079-11:2011	EN 60079-0:2012 + A11;2013 EN 60079-11:2012	IEC 60079-0:Ed.6(2011-06) + Corr.1 (2012-01) + Corr.2 (2013-12) IEC 60079-11:Ed.2012
Suitable for appropriate use in: EXIA Intrinsically Safe - Sécurité Intrinsèque	Class I, Div. 1, Groups A, B, C & D Class II, Div. 1 Groups E, F & G Class III Class I, Zone 0 AEx ia IIC T4 Ex ia IIC T4	II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIC T135°C Da	Ex ia IIC T4 Ga Ex ia IIIC T135°C Da
Flameproof - Models 1XSWLL, 1XSWHL and 1XSWHH			
Cert Number:	UL File E226592	DEMKO 09 ATEX 0813748X	IECEx UL 08.0017X
Applicable Standards	UL 1203:Ed.5, CSA 30:Ed.1 Rev. 2006, UL 60079-1:Ed.7, CSA 60079-1:Ed.2,	EN 60079-0:2012 + A11;2013 EN 60079-1:2014 EN 60079-31:2009	IEC 60079-0:Ed.6(2011-06) + Corr.1 (2012-01) + Corr.2 (2013-12) IEC 60079-1:Ed.7 IEC 60079-31:Ed.2
Suitable for appropriate use in:	Class I, Div. 1, Groups A, B, C & D Class II, Div. 1 Groups E, F & G Class III Class I, Zone 1 AEx d IIC T5 Class I, Zone 1 Ex d IIC T5	II 2 G Ex db IIC T5 Gb II 2 D Ex tb IIIC T90°C Db IP66 -40°C ≤ TAMB ≤ +85°C	Ex db IIC T5 Gb Ex tb IIIC T90°C Db IP66 -40°C ≤ TAMB ≤ +85°C

Non-Incendive - Model 1XSWLL, 1XSWHL and 1XSWHH			
	N. America	Europe	International
Cert number:	UL File E226592	DEMKO 15 ATEX 1483	IECEX UL 08.0017X
Applicable Standards	ISA 12.12.01:Ed.1, CSA 157:2006, UL 60079-15:Ed.4, CSA 60079-15:Ed.1	EN 60079-0:2012 + A11;2013 EN 60079-15:Ed.10	IEC 60079-0:Ed.6(2011-06) + Corr.1 (2012-01) + Corr.2 (2013-12) IEC 60079-15:Ed.4
Suitable for appropriate use in:	Class I, Div. 2, Groups A, B, C & D Class II, Div. 2 Groups F & G Class III Class I, Zone 2 AEx nA IIC T4 Ex nA IIC T4	II 3 G Ex nA IIC T4 Gc	Ex nA IIC T4 Gc

FLAMEPROOF - SPECIAL CONDITIONS FOR SAFE USE

- Field wiring must be rated 105°C minimum. For ambient temperatures below -10°C, use suitable field wiring.
- Blanking elements from factory have been tested for flameproof “d” and dust “tb” with the enclosure as an assembly and carry no markings.
- A suitable thermowell made from corrosion-resistant material and engaging 5 threads minimum (with thread sealant) is required for the local spring loaded temperature sensor to maintain IP66
- User installed temperature sensors must be certified to flameproof “d” and dust “tb” requirements for the same groups and ambient temperature range, made from a corrosion resistant material, and engage 5 threads min with grease required on threads. This EC-Type Examination Certificate applies to the device described herein only and does not cover the user installed temperature sensor.
- Flameproof joint and gap details
 - Enclosure to cover threaded joint: 4” - 16 UN-2, 7 threads engaged minimum
 - Glass to cover cemented joint: 0.753” (18.1 mm) rabbet/spigot minimum length
 - Breather element threaded joint: 1/4”-20 UNC-2, 10 threads engaged minimum
 - Electrical conduit threaded joint: 3/4”-14 NPT, 5 threads engaged minimum
 - Enclosure to sensor threaded joint:
 - Pressure models: 1”-20 UNEF-2, 10 threads engaged minimum
 - Temperature models: 1/2”-14 NPT, 5 threads engaged minimum
 - Remote and local spring loaded temperature sensor gap joints: 0.0045” (0.114 mm) maximum annular gap by 1.25” (31.8 mm) minimum length

Dual Seal Adaptor Option

- Threaded Dual Seal Adaptor Option Enclosure to One Series Enclosure : 1”-20 UNEF-2, 10 threads engaged minimum
- Breather element threaded joint: 1/4”-20 UNC-2, 10 threads engaged minimum
- Secondary Seal Housing to union housing joint: 0 .580” (14.73 mm) rabbet/spigot minimum length, maximum annular gap 0.003 in. (0.08 mm)
- Sensor to union housing joint: 0 .580” (14.73 mm) rabbet/spigot minimum length, maximum gap 0.003 in. (0.08 mm)
- Threaded Dual Seal Adaptor option to Sensor 1”-20 UNEF-2, 10 threads engaged minimum or 1/2”-14 NPT 5 threads engaged minimum.

INTRINSIC SAFETY - SPECIAL CONDITIONS FOR SAFE USE

- Enclosure and cover are made from Aluminum Alloy, do not strike with heavy object. Separation distances were assessed to Annex F

FLAMEPROOF, NON-INCENDIVE, INTRINSIC SAFETY - MOUNTING

Tools Required: Screwdriver for mounting bolts; 4 mounting bolts (1/4" Max.)

NOTE: For optional surface and pipe mounting kit, order part no. 6361-704. See page 19.



BEFORE INSTALLING, CHECK THE SENSOR MODEL SELECTED FOR COMPATIBILITY TO THE PROCESS MEDIA IN CONTACT WITH THE SENSOR AND WETTED PARTS.



IN ALL APPLICATIONS, SECURE THE ENCLOSURE AS DETAILED BELOW. DO NOT MOUNT VIA THE PROCESS CONNECTION ONLY.

Mount the unit using the four (4) 1/4" clearance holes in the enclosure base. Plumb sensor to the process port. See page 19 for dimensions.

The One Series product may be mounted in any position except with the sensor connection facing up. Ensure the process connection is sealed to the process port to prevent leakage. Care should be taken to minimize effects of shock and vibration. The One Series should be protected from direct sunlight and rain in outdoor installations using a shroud. **NOTE:** the optimal display viewing position is 6:00.



FOR PRESSURE AND LOCAL TEMPERATURE MODELS ALWAYS HOLD A WRENCH ON THE SENSOR HEX WHEN MOUNTING UNIT. DO NOT TIGHTEN BY TURNING ENCLOSURE, THIS WILL DAMAGE THE CONNECTION BETWEEN THE SENSOR AND HOUSING.



INSTALL UNITS WHERE SHOCK, VIBRATION AND TEMPERATURE FLUCTUATIONS ARE MINIMAL. ORIENT UNIT TO PREVENT MOISTURE FROM ENTERING ENCLOSURE. USE PROPERLY RATED SEALING FITTINGS FOR ELECTRICAL WIRE ENTRY. DO NOT MOUNT UNIT IN AMBIENT TEMPERATURES EXCEEDING PUBLISHED LIMITS. THIS IS ESPECIALLY CRITICAL FOR LOCAL MOUNT TEMPERATURE UNITS. USE OF A SHROUD IS RECOMMENDED WHERE DIRECT SUNLIGHT AND RAIN MAY COME IN CONTACT WITH THE ENCLOSURE.



FOR DIFFERENTIAL PRESSURE MODELS (ESPECIALLY LOW RANGE UNITS), CARE SHOULD BE TAKEN TO MOUNT THE SENSOR LEVEL TO MINIMIZE ANY PRESSURE READING OFFSETS. THE OFFSET COMMAND MAY BE USED TO ZERO THE DISPLAY, SEE PAGE 12 FOR ADDITIONAL INFORMATION.

PROCESS CONNECTIONS AND SENSOR FOR FLAMEPROOF, NON-INCENDIVE AND INTRINSIC SAFETY INSTALLATIONS



WARNING: NEVER INSERT ANY OBJECT INTO THE PRESSURE SENSOR OPENING. DAMAGE TO THE SENSOR WILL RESULT, AFFECTING ACCURACY.

Pressure and Differential Pressure Models

To pipe mount: Thread the pressure connection onto the pressure port, with thread sealant, making sure that the mating threads are clean and free of debris. Use a wrench on the pressure connection hex to tighten. Test for leaks. On Differential Pressure models, the Low (L) side pressure must NOT exceed the high (H) side pressure. Damage to the sensor may result.

Local and Remote Temperature Models

For Local Ambient Sensing (model L): Mount using the mounting holes on the electronics housing. Mount the product to ensure that the sensor housing will not be damaged and where the measured temperature is representative of the surrounding environment.

For Local Spring-Loaded (model T): A suitable thermowell, made from corrosion-resistant material, 5 threads engaged minimum, with thread sealant, is required to maintain enclosure type 4X/IP66.

For Remote Sensing: Route the extension wire to avoid contact with live components or close proximity to electrical noise sources. Avoid kinks, or excessive flexing. Tighten the ferrule fitting, if applicable.

For Surface Sensing: Secure the sensor housing to the pipe or vessel using an adhesive or strapping method suitable for the application.

For Immersion Sensing (models C, H, R & L): Use of a thermowell is highly recommended to aid in maintenance, testing and preservation of the system integrity. Insert the sensor housing (0.25" diameter) into the well ensuring that the sensor's sheath bottoms out and the well is completely immersed in the media (2.5" min.) Screw the sensor's nipple into the thermowell, with thread sealant, by placing a wrench on the union nut. Tighten the union connector.

For best temperature measurements, the sensor housing must be in full contact with the surface or media being measured. Heat transfer compound may be used to aid in fully transferring the media temperature to the sensor housing. Locate where the temperature is most representative of the system. Minimum insertion depth is 2-1/2". Sensor dimensional drawings are shown on page 20.

Removing the One Series Enclosure Cover and Display Module

 **WARNING:** To prevent Electrostatic Discharge wipe down cover and enclosure of any dust build-up before removing cover.

 **WARNING:** Disconnect all supply circuits before attempting to wire the unit. Wiring must be performed according to national and local electrical codes. Maximum recommended wire sizes and tightening torques for field wiring terminal blocks are shown below.

Remove the enclosure cover by turning it counter-clockwise for 7 revolutions. Carefully remove the display module by grasping the outer edge and pulling it away from the base enclosure, being careful not to strain any of the wired connections. Allow the display module to hang from the wired connections to access the base enclosure and terminal blocks for wiring. Do not remove the display module wire assemblies. Insert the field wiring through the conduit opening(s) of the base enclosure. Make the connections as shown on the wiring diagrams beginning on Page 5. **The primary chassis and equipment grounding terminal** is provided inside the base enclosure.

To prevent seizure of the enclosure cover, do not remove thread lubricant. Threads should be kept free of dirt and other contaminants. Cleaning the display and keypad surface should be performed with a damp cloth only. Do not attempt to wash down the One Series with the cover removed.



WIRING FOR FLAMEPROOF & NON-INCENDIVE INSTALLATIONS

Tools Required: Small flat-head screwdriver; wire strippers

 **WARNING:** EXPLOSION HAZARD - TO PREVENT IGNITION, DISCONNECT POWER BEFORE REMOVING ENCLOSURE COVER. KEEP COVER TIGHT WHILE IN OPERATION. DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

 **WARNING:** EXPLOSION HAZARD - DO NOT REPLACE COMPONENTS UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

 THE DEVICES SHALL BE PROPERLY GROUNDED IN THE END USE APPLICATION USING THE GROUND SCREWS PROVIDED WITH THE ENCLOSURE.

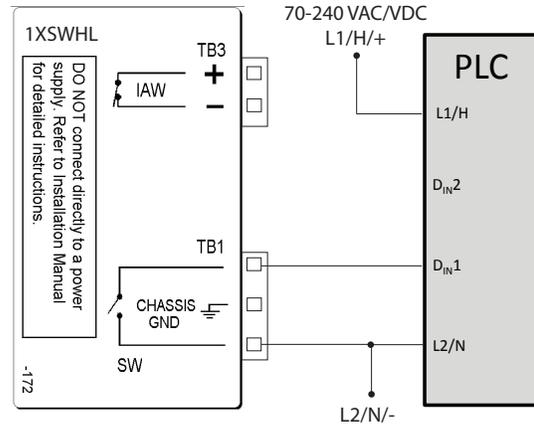
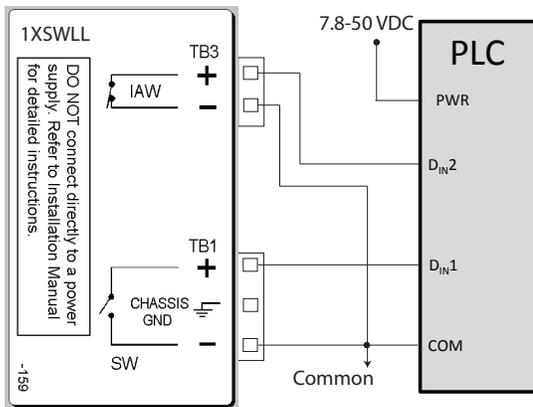
 FIELD WIRING MUST BE RATED 105°C MINIMUM. FOR AMBIENT TEMPERATURES BELOW -10°C, USE SUITABLE FIELD WIRING.

 MODELS 1XSWLL AND 1XSWHL DERIVE THEIR POWER DIRECTLY FROM A PLC/DCS DISCRETE INPUT OR OTHER LOW-CURRENT DC LOADS. THE SWITCHED OUTPUT MAXIMUM LOAD RATING IS 0.1A. **THE UNIT MUST NOT BE CONNECTED DIRECTLY TO A POWER SUPPLY WITHOUT AN APPROPRIATE CURRENT LIMITING LOAD SUCH AS THAT PROVIDED BY A PLC/DCS DISCRETE INPUT. OVERLOADING THE SWITCH MAY CAUSE FAILURE.**

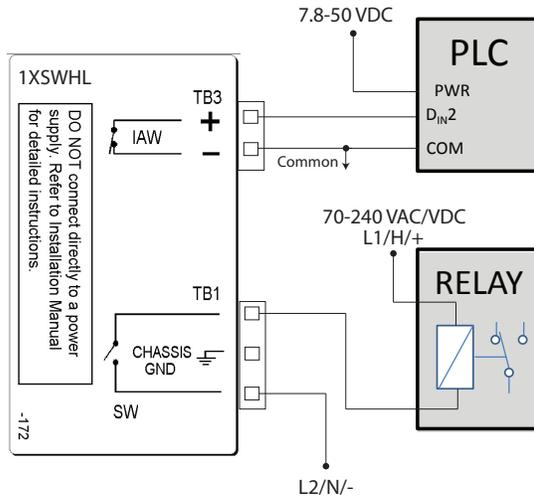
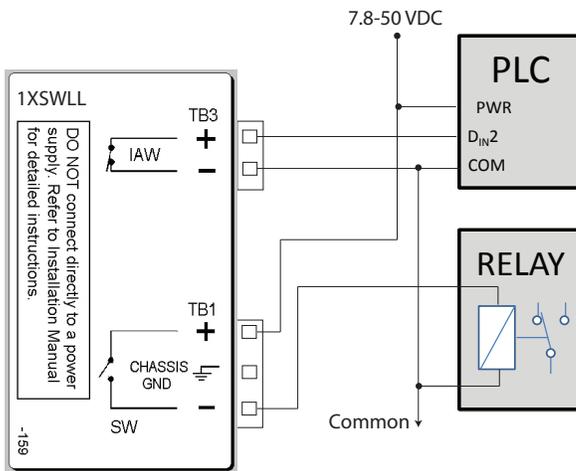
Maximum Switch Ratings – Flameproof and Non-Incendive			
Model	Signal Name	Voltage Rating	Current Rating
1XSWLL	SW	7.8 – 50.0 VDC	0.1 amperes ¹
	IAW	7.8 – 50.0 VDC	0.1 amperes ¹
1XSWHL	SW	70 – 240 VAC/VDC	0.1 amperes ¹
	IAW	7.8 – 50.0 VDC	0.1 amperes ¹
1XSWHH	SW	70 – 240 VAC	0.150 – 10 amperes ²
	IAW	7.8 – 50.0 VDC	0.1 amperes ¹
¹ Derate at 0.001 amperes per °C above 25°C ² Derate at 1 ampere per 5.5°C above 38°C ambient			

WIRING DIAGRAMS - Models 1XSWLL and 1XSWHL

SW and IAW
PLC Inputs Circuit



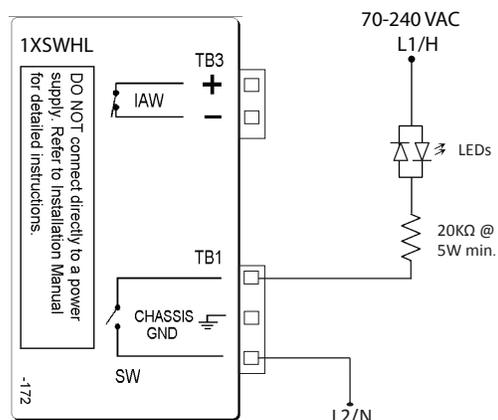
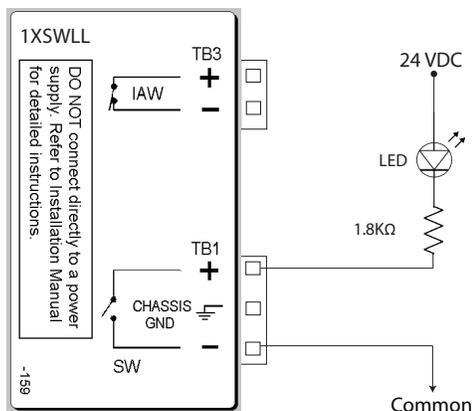
Interposing
Relay with
IAW Circuit



Models 1XSWLL and 1XSWHL can also be wired in series with the coil of certain interposing relays, as shown above. The relay coil specifications must not exceed the maximum switch ratings. See maximum switch ratings table on page 4.

NOTE: For bench testing model 1XSWLL, a circuit is required as shown below. These components are not included and must be provided by the tester. **Do not connect model 1XSWLL directly to a power supply without a suitable load in series with the switch.** Do not exceed the maximum switch ratings or permanent damage may result. See maximum switch ratings table on page 4.

Recommended
Bench Test
Circuit

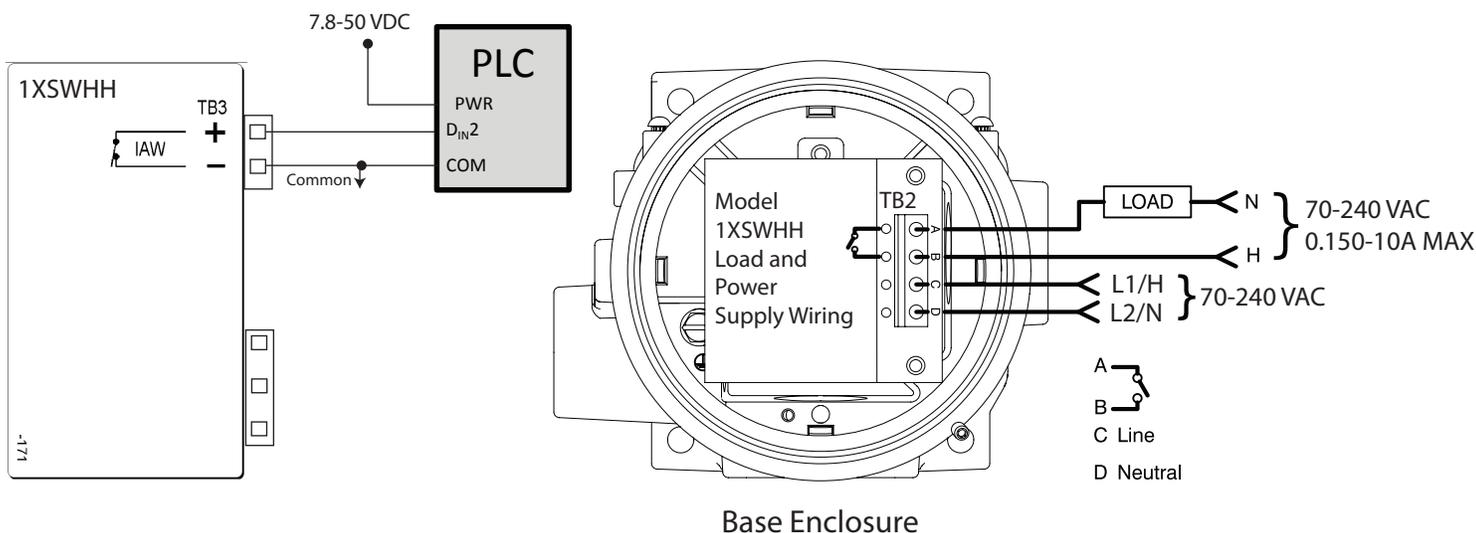


WIRING DIAGRAMS - Model 1XSWHH

Model 1XSWHH requires 70 – 240 VAC @ 0.015 A external power supply for each unit. Power for all One Series functions is provided by this power supply connection at TB2, terminals C (L1/H) and D (L2/N). Connections for the programmable solid state relay switch are made at TB2 terminals A and B. Refer to the Maximum Switch Ratings table on page 4 and the Torque Details table below.

The wiring diagrams below provide a view inside the One Series base enclosure after the display module has been removed. TB2 is located there. All models include a separate IAM™ switched output located at TB3 on the back of the display module. This signal provides the health status of the One Series and is normally closed. When open, this signal provides an indication that IAW™ has detected a fault condition. Monitor this signal by connecting it to the discrete input of a PLC or DCS. The IAW™ wiring connection is not required if remote health status of the One Series is not important.

NOTE: The solid state relay switch in model 1XSWHH has a minimum load requirement of 0.150 A making it incompatible with control system inputs. Do not exceed the maximum switch ratings shown on page 4 or permanent damage to the One Series may result.



Terminal Block and Torque Details for Flameproof, Non-Incendive and Intrinsic Safety Installations

Terminal	Description	Max. Wire Gauge	Min. Wire Gauge	Recommended Tightening Torque
TB1	3-Position	14 AWG	22 AWG	7 in-lbs.
TB2	4-Position	10 AWG	20 AWG	4.4 in-lbs.
TB3	2-Position	14 AWG	22 AWG	7 in-lbs.

INTRINSIC SAFETY WIRING DIAGRAMS - MODEL 1XSWLL

(Use Class 2 or SELV Power Supply Only)

Model 1XSWLL is intended for direct connection to a PLC or DCS discrete input, or other suitable load (see page 15). Power is obtained and the discrete switch signal is provided by the same two-wire connection. Polarity must be observed. Refer to the Switch Ratings Table for the switch ratings.



Do not connect model 1XSWLL directly to a power supply without a suitable load in series with the switch.

For 1XSWLL models, only one conduit opening is required. The unused conduit opening must include an explosion-proof/flameproof plug, made from a corrosion-resistant material, suitable for all gas and dust groups as listed on the nameplate. Blanking elements from factory have been tested with the enclosure as an assembly and carry no markings.

SELECTING AN INTRINSIC SAFETY BARRIER (Model 1XSWLL)

For Intrinsically-Safe (I.S.) installations, please reference the Control Drawing UE 62174–64 for Intrinsic Safety entity parameters and wiring information. Model 1XSWLL must be wired to an approved I.S. galvanically isolated barrier for Zone 0 EPL Ga and Class I, Division 1 classifications.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

Installation of Intrinsically-Safe circuits must be performed in accordance with the requirements of the government and/or other local authority having jurisdiction. System components and installation methods must be approved by the appropriate recognized approval authority.

The information provided below is for reference only and is intended to act as a guide in the selection of a suitable I.S. Barrier. Please reference the following I.S. control drawing for installation details and device entity parameters:

A-62174-64 (North American & European Class, Division & Zone based installations)

There are two general types of I.S. Barriers, shunt diode (passive) safety barriers and transformer isolated barriers. Shunt diode safety barriers are not recommended for use with model 1XSWLL.

Transformer Isolated Barriers:

Due to the unique method by which the model 1XSWLL operates, a specifically designed isolated barrier must be used. Any safety barrier that adheres to NAMUR standard EN 60947-5-6 for proximity and dry contact switches may be used to achieve intrinsic safety with the One Series model 1XSWLL.

Recommended NAMUR standard transformer isolated intrinsic safety barriers:

Pepperl+Fuchs models KCD2-SR-Ex1.LB and KFD2-SR2-Ex1.WLB

Figures 1 and 2 on the next page show typical wiring schemes depicting model 1XSWLL connected to a programmable logic controller (PLC), distributed control system (DCS) or other logic solver discrete input.

These circuit diagrams provide a rear view of the display module after it has been removed from the base enclosure.

THEORY OF OPERATION

The One Series electronic switch product line is based on an all-solid-state electronic module that incorporates a microprocessor. The combination of features like **no moving parts** and **IAW™ self-diagnostics** provide a highly reliable, accurate and repeatable monitor for detecting pressure and temperature thresholds and, once reached, can make intelligent switch decisions based on retained settings and current conditions. Where a mechanical device has no way of determining its availability, the One Series monitors its own health and reports the status locally. This IAW™ (I Am Working) feature provides a solution to the “blind device” issue common with mechanical apparatus. You will always know the health status of the One Series.

The One Series is also very rugged, featuring a Type 4X, weather-tight enclosure suitable for harsh environments and hazardous (Class I, Division 1) locations. The 0.5% accuracy rating is maintained over a very wide -40°C to +70°C operating range using active temperature compensation. Repeatability rivals that of a process transmitter, with a 0.1% of full range rating. The set point and deadband (hysteresis) of the switch is fully programmable over the entire range of the sensor. Reaction time for the One Series to a process change is typically 100 mS or less.

2-WIRE SIMPLICITY (MODEL 1XSWLL AND 1XSWHL)

The patented One Series 2-Wire electronic switch is designed to operate on discrete input leakage current. The microprocessor-based One Series is the only switch to operate and switch over a single pair of wires, similar to a traditional mechanical switch or 4-20 mA process transmitter. It combines the simplicity and low cost features of a switch and the reliability features of a transmitter and without the need to provide additional wiring.

- Models 1XSWLL and 1XSWHL are designed to work with most Programmable Logic Controller (PLC) or Distributed Control System (DCS) discrete inputs and some interposing relays. When open, the switch draws 750 μ A (max); when closed, the switch sinks or sources 0.1 A maximum.

DISPLAY

The One Series features a large, easy-to-read display, showing the process condition and the status of the instrument. (See Display Features for a complete description.) Set point, deadband and minimum/maximum process values can be easily accessed from the front of the unit while in operation. Programming and interrogating the One Series is done through two buttons on the display keypad. No handheld programming is required.

I Am Working (IAW™)

The patented One Series also contains UE's IAW™ self-diagnostic software. On a continuous basis, the IAW™ algorithm checks for proper operation, and locally reports the status using messages or revolving arrows on the display. For remote reporting, a discrete IAW™ Output signal can be monitored by the control system and used to detect normal, tripped, and fault conditions. IAW™ self-monitors, searching for possible faults, both within the instrument and in the overall system (a list of the various parameters is outlined in the chart under Fault Codes, page 16). In the event of a detected fault, the One Series will attempt to display the fault details and provide remote electrical indication by opening (turning off) the IAW™ Output. In the case of certain micro-controller faults, the revolving arrow may freeze or go out; indicating locally that a failure exists.

OTHER FEATURES

The One Series has other advanced features:

- When the Plugged Port feature is enabled, the One Series will watch for process conditions which could be evidence of a plugged sensing port or an accidentally-closed instrument valve, and alert the user to potential problems.
- The switch output can be configured for either automatic reset or latching, requiring the user to manually acknowledge the alarm.
- User selectable switch response time (delay) filter allows for dampening the One Series response to process upsets or spikes, eliminating nuisance trips. (See Key Programming Features, page 9 for a complete description of these features).

DISPLAY FEATURES AND DIAGNOSTICS

The One Series features a large, easy to read LCD display. It is used for three main purposes: process indication, programming of key features and switch status/troubleshooting.

In the Process Display mode, the display may be indicating the following:

- Current process value and units of measure: A value will be displayed as long as the reading is within 110% of the full scale range noted on the nameplate. The units of measure are factory-set.
- I Am Working (IAW™) status: When the unit is working properly, a circular 4-segment arrow will be revolving around the letters "IAW" in the top center of the display. (For a full description of IAW™, see Theory of Operation, page 7).
- Offset/Span Adjustment: The word "offset" will appear above the process value, indicating that the factory offset and/or span calibration has been modified by the user (see Key Programming Features, for a description of Offset and Span).

In addition, the user can easily access information such as the set point, deadband and minimum/maximum process readings:

By pushing the right → button once, the display will scroll as follows:

SP1 XX.XX DB1 XX.XX

By pushing the left ↓ button once, the display will scroll the min/max process values recorded in memory:

MAX XX.XX MIN XX.XX

The display will automatically revert back to the Process Display mode after scrolling.



ALARM CONDITION

When the process goes beyond the set point, the display will begin to flash, alternating between the process value and "SW1". The display will continue to flash until the process has returned to a value beyond the deadband, at which point the display will revert to normal operation and process value display. If the unit was programmed to have a latching output, a small "Latch" icon will light in the display when the set point is reached, indicating that the output is latched and needs to be manually reset. (See Key Programming Features, for a complete description).

FAULT CONDITIONS

In the case of a fault condition, the display may indicate the following:

If the IAW® software detects a fault outside of the micro-controller, and can still operate, it will display an error message.

If the fault is one which affects the micro-controller or the display, the revolving arrow around "IAW" will either freeze or go out.

If it is a failure of the power supply or the wiring, the display will go blank.

(See Fault Codes, page 16 for a complete description of fault diagnostics.)

KEY PROGRAMMING FEATURES

PROGRAMMING

Tools Required: Software Flowchart, page 18

Step 1: Prior to Programming

Programming of the One Series is accomplished using the two buttons on the faceplate (labeled ↓ and →). By stepping down through the main menu using the left ↓ button, you can access the various commands of the One Series Safety Sensor software menu. The right button is then used to move into the command submenu for setting up or modifying the parameters.

NOTE: See the flowchart on page 18 showing the entire programming commands menu structure. Before removing the enclosure cover, please read the instructions on page 4. The One Series programming menu is a single direction loop, with submenus embedded in it. Because the main menu is single direction, there is no way to reverse direction and back up in the program. If you need to make a correction to a prior Main Menu step, you will need to continue forward and exit, then re-enter the program and step through to the appropriate feature. If you are in a Submenu, you will need to continue to the beginning of the menu item and re-enter the Submenu to make the correction.

Step 2: Entering the Programming Mode

NOTE: While in the Programming Mode, the One Series will remove itself from service (go offline). All outputs are set to the fail safe state and the One Series ignores process variable input from the process sensor. The IAW Output signal will open. The switch output will go to the fail safe state. The switch output failsafe state will be based on the programmed operating mode of the switch. For example, the failsafe state for “Open on” modes is open. The control system will interpret these signals as a detected fault and a process upset (set point reached) simultaneously. **It is essential to alert the control system operators before entering the Programming Mode.**

Use the Flowchart on page 18 as a guide as you step through the various commands in the Programming Mode.

- Press and release both buttons ↓→ simultaneously and then press the right button → to enter
- Enter the 4-digit password. The factory default password is “0000”.
 - The left ↓ button increments the blinking digit.
 - The right → button sets the digit and moves to the next.
 - Once a valid password is entered, “OK” will appear on the display.
- Press and release the right → button.
 - CLR MAX/MIN (or MAN RSET if Latch is set) will appear on the display.

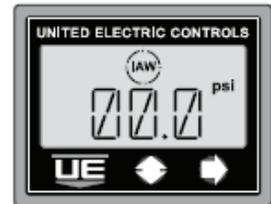


Figure 3.

This is the first command prompt in the Programming Mode.

NOTE: If two minutes elapse without a button being pressed, the One Series will automatically exit the Programming Mode and resume monitoring the process (go back online) recalling all previously saved parameters from memory. Any program changes that were made will be discarded without an opportunity to save them. This two-minute timeout feature prevents the One Series from being left offline accidentally.

Step 3: Exiting the Programming Mode

When any of the program commands are displayed, it is possible to escape and exit the Programming Mode by pressing the left ↓ and right → button simultaneously. Doing this redirects the programmer to the Save Changes menu location, which is only possible at menu actions indicated by an asterisk (*) on the Programming Flowchart, found on page 18.

It is also possible to exit the Programming Mode by repeatedly pressing the left ↓ button from any program command until the Save Changes menu location is reached.

SAVING PROGRAMMING CHANGES

When changes have been made to the program settings, a choice is provided to Save or Discard the changes. At any prompt:

- Press both left ↓ and right → buttons to display SAVE CHNG menu.

To Save changes, press the right → button. NO (the default) will be displayed.

- Press the left ↓ button to toggle and display YES.
- Then press both left ↓ and right → buttons to confirm, save the changes and return to the Process Display mode.

The One Series will resume process monitoring (go back online) using the new program parameters.

To Discard changes, press the right → button. NO will be displayed.

- Press both left ↓ and right → buttons to confirm, discard changes and return to the Process Display mode.

The One Series will resume monitoring the process (go back online) recalling all previously saved parameters from memory.

SETTING THE UNITS OF MEASURE

The One Series allows the units of measure to be set in the field. The default units are pounds per square inch (PSI) for pressure models and degrees Fahrenheit (°F) for temperature models.

- To change the units of measure, enter the programming mode. Press the left ↓ button. The display will scroll SET UNITS.
- Press the right → button and the display will read the default units psi or °F.
- Repeatedly press and release the left ↓ button to select from the available choices. Stop at the desired choice.

- Press the right → button to make the selection. The display will return to “Set Units.”
- Press the left ↓ button to continue on in the menu or press both left ↓ and right → buttons to exit the Programming Mode and save changes.

NOTE: MAX/MIN memory is reset (changed to zero) whenever the units of measure have been changed. Set Point, Deadband, Offset, Span and Plug Port values are recalculated for the newly selected units of measure.

SETTING THE SWITCH MODE

The One Series has six available modes of operation

OPEN RISE - Switch opens on rising process values that exceed the set point.

OPEN FALL - Switch opens on falling process values that drop below the set point

OPEN WINDOW - Switch opens when process values go outside programmed limits specified by set point high and set point low.

CLOSE RISE - Switch closes on rising process values that exceed the set point.

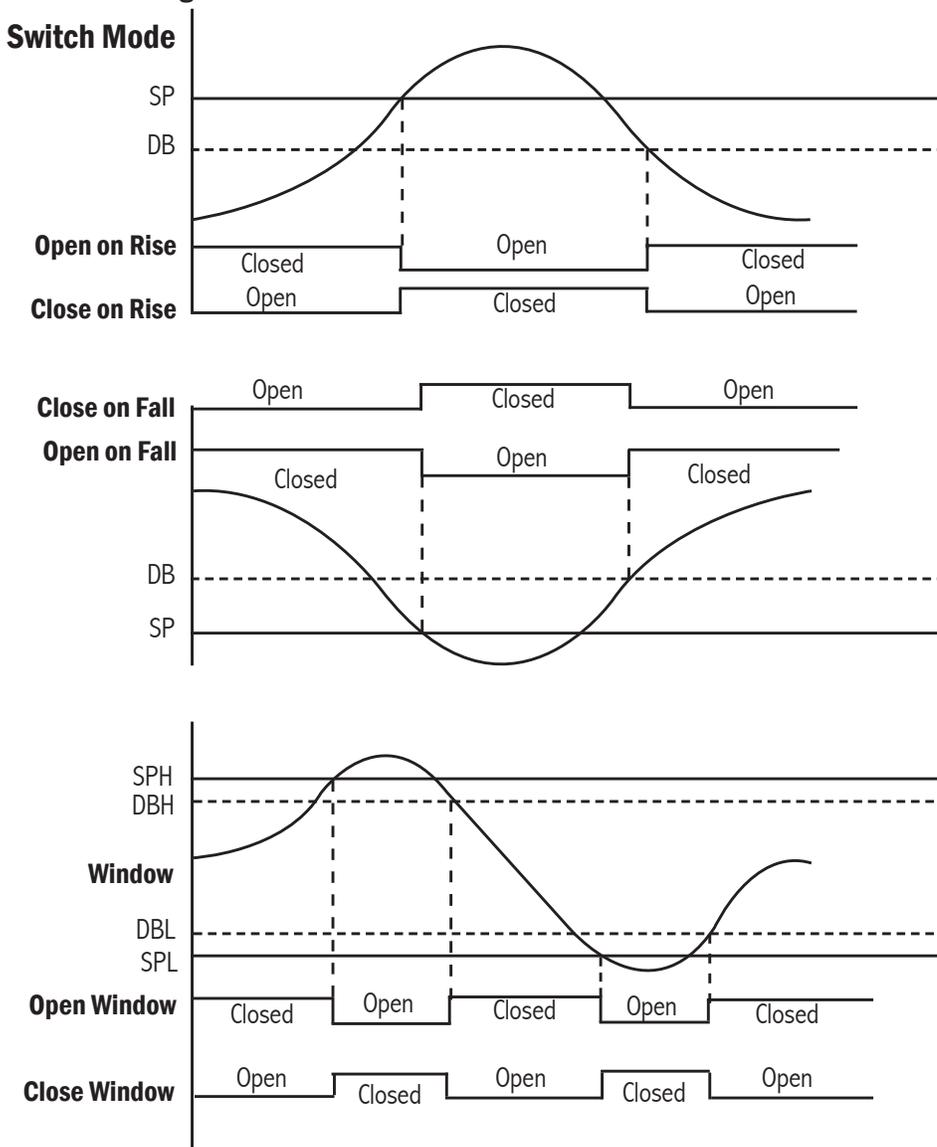
CLOSE FALL - Switch closes on falling process values that drop below the set point.

CLOSE WINDOW - Switch closes when process values go outside programmed limits specified by set point high and set point low.

Note: “OPEN” Modes are recommended in safety applications where a DTT (De-energize to Trip) output is required. This ensures that the switch output will go to the fail safe state in the event of a power loss or line break. The IAW™ output always operates in DTT mode.

Please use the Switch Decision Logic listed below for help with setting the appropriate switch mode.

Table 3 - Switch Decision Logic



Latch Mode

If the latch mode is enabled and the switch is tripped, the output will remain tripped until the user resets the latch in the menu or until a power cycle has occurred.

THE SET POINT

The set point is the process value at which the One Series opens or closes the switch. The Set Point is fully programmable throughout the operating range of the sensor as noted on the product nameplate.

THE DEADBAND (Hysteresis)

The Deadband is the amount above or below the set point at which the One Series resets the switch, returning it to the normally closed or open state. Deadband is represented as a value which is added or subtracted from set point, depending on the control mode.

- Example 1: If the Control Mode is OPEN RISE and the set point is 100 and the deadband is 10, the Switch will open as pressure rises to 100 and close (reset) as the pressure falls to 90.
- Example 2: If the Control Mode is CLOSE RISE and the set point is 100 and the deadband is 10, the Switch will close as pressure rises to 100 and open (reset) as the pressure falls to 90.
- Example 3: If the Control Mode is OPEN FALL and the set point is 100 psi and the deadband is 10, the Switch will open as pressure falls to 100 psi and close (reset) as pressure rises to 110 psi.
- Example 4: If the Control Mode is CLOSE FALL and the set point is 100 psi and the deadband is 10, the Switch will close as pressure falls to 100 psi and open (reset) as pressure rises to 110 psi.

NOTE: Deadband should be set wide enough so that frequent or rapid switch cycling (chatter) does not occur but narrow enough to satisfy the process conditions. A Deadband value of zero is undefined and, therefore, not permitted.

SETTING THE SWITCH MODE, SET POINT AND DEADBAND

Please refer to the Programming Flowchart, found on page 18.

- Enter the programming mode (see page 9).
- Press and release the left ↓ button until SW1 appears on the display.
- Press the right → button. The previously selected mode will appear. OPEN RISE is the factory default.
- Press and release the left ↓ button until the desired mode appears.
- Press the right → button to select the mode and move on to the set point. SP will appear.
- Press the right → button to select a positive or negative set point. POS is the default. Use the left ↓ button to change to NEG.
- Press the right → button to view and change the set point. Press the left ↓ button to increment the blinking digit. Press the right → button to enter and move to the next digit.
- Press the right → button to enter a new Deadband. DB will show on the display.
- Press the right → button to view and change deadband. Press the left ↓ button to increment the blinking digit. Press the right → button to enter and move to the next digit.
- Press the right → button to enter new deadband. SW1 will show on the display.

NOTE: The Set Point and Deadband settings are subject to the accuracy of the instrument. Actual switch points may vary up to $\pm 0.5\%$ of the sensor's maximum range at room temperature. Example: The P15 sensor has a range of 0 to 300 psi. When setting a Set Point of 150, the actual switch point may occur between 148.5 and 151.5 due to the accuracy error of ± 1.5 ($300 \times 0.5\%$).

RESETTING THE MAXIMUM & MINIMUM VALUES

The One Series continuously captures the readings from the sensor and stores one minimum and maximum value since the last time they were reset. The values can be viewed at any time by removing the enclosure cover and pushing the left ↓ button. The display will scroll the values and then return to the Process Display mode.

To reset the values, enter the Programming Mode (see page 9). Repeatedly press the left ↓ button to get to the CLR MAX/MIN command and then press the right → button two times. After exiting the Programming Mode and saving the changes (see page 9), the values will be reset to the current reading and begin recording again.

ADVANCED FEATURES

NOTE: No initial programming of these features is required. The default for these advanced commands is zero or off.

ADJUSTING DISPLAY OFFSET

The One Series is factory calibrated to 0.25% of the sensor's maximum range at room temperature. In some installations, it may be necessary to adjust the display's offset due to the range and position of the sensor. Chemical seals with long capillaries combined with low maximum range sensors are a common cause of offset error. The OFFSET command allows the user to enter a positive ("POS") or negative ("NEG") offset to the display readings. An offset adjustment of up to $\pm 10\%$ of the sensor's maximum range is allowed.

EXAMPLE: When the sensor has a zero pressure applied, but the display reads a value other than zero, entering the additive inverse (reversing the sign) of the displayed value for OFFSET will force the display to read zero.

NOTE: Any numerical value entered other than 0.00 will cause the display to indicate "Offset" just above the process reading in the process display.



WARNING: USE OF THIS OPTION MAY CREATE A CONDITION WHERE THE DISPLAY MAY INDICATE "0.00" WHEN SIGNIFICANT PRESSURE OR TEMPERATURE (UP TO 10% OF MAXIMUM RANGE) EXISTS IN THE SYSTEM. INDEPENDENT VERIFICATION OF THE PROCESS VARIABLE SHOULD BE DONE PRIOR TO MAINTENANCE ON THE SYSTEM WHEN "OFFSET" APPEARS ON THE PROCESS DISPLAY.

Refer to the Programming Flowchart on page 18.

- Enter the Programming Mode and use the left \downarrow button to move to the OFST command.
- Press the right \rightarrow button to select a positive or negative offset. POS is default. Use the left \downarrow button to change to NEG.
- Press the right \rightarrow button to view and change the offset. Zero is the factory setting. Press the left \downarrow button to increment the blinking digit. Press the right \rightarrow button to enter and move to the next digit.
- Press the right \rightarrow button to enter the new offset and return to the main menu.

ADJUSTING SPAN

SPAN provides an adjustment to shift the slope of the sensor's response curve to accommodate an offset value other than zero. To adjust SPAN, calculate and enter a new SPAN value.

To calculate the SPAN value, apply a reference source below maximum scale to the sensor. Record the value that shows on the One Series display and the reference source value. Divide the reference source value by the display value and then multiply the result by the sensor's upper range.

FORMULA: $SPAN = \text{reference source} / \text{display value} \times \text{upper range value}$

- Pressure example: For a sensor range of 0 - 100 psi, choose a reference source (90) below the upper range limit (100) to prevent an over range condition. Divide the reference source value from the resulting display value (88). Multiply the result by the upper range limit. $Span = 90 / 88 \times 100 = 102$ (rounded)
- Temperature example: For a sensor range of -40 to 450°F, choose a reference source (400) below the upper range limit (450) to prevent an over range condition. Divide the reference source value from the resulting display value (404). Multiply the result by the upper range limit. $Span = 400 / 404 \times 450 = 446$ (rounded)

Refer to the Programming Flowchart on page 18.

- Enter the Programming Mode (see page 9) and use the left \downarrow button to move to the SPAN command.
- Press the right \rightarrow button to select a positive or negative span. POS is the default. Use the left \downarrow button to change to NEG.
- Press the right \rightarrow button to view and change the span. Zero is the factory setting. Press the left \downarrow button to increment the blinking digit. Press the right \rightarrow button to enter and move to the next digit.
- Press the right \rightarrow button to enter the new span and return to the main menu.

NOTE: To return to factory calibration settings, enter all zeros for both SPAN and OFST.

SETTING THE LATCH MODE (MANUAL RESET)

The switch can be configured to latch when the set point is reached. Refer to the Programming Flowchart on page 18.

- LCH1: In the Programming Mode, press the right → button.
- If OFF is displayed, press the left ↓ button to set LCH1 to ON.
- Press the right → button to set the latch. When latch mode is on (set), the Switch changes state when the set point is crossed and remains latched until the Switch is manually reset by the user or the One Series is power cycled.

When latched, the display will read MAN RSET.

To Reset the Latch

- Enter the Programming Mode (see page 9). If the Latch is set, the display will read MAN RSET. To return to the Process Display without resetting the latch, press the right → button.
- To continue programming without resetting the latch, press the left ↓ button.
- Press both ↓→ buttons to reset the latch. The display now reads RSET DONE.
- Press the right → button to return to the Process Display.
- Press the left ↓ button to continue programming.

NOTE: Interrupting power to the One Series will also reset the latch.

SETTING THE PLUGGED PORT FEATURE

The One Series IAW™ self-diagnostics have the ability to detect that the process port may be plugged. It does this by monitoring the sensor for changes over time. The amount of change and the time period are programmable. If the process variable does not change by the amount and selected time period, the display will indicate PLUG and the IAW™ Output will open, indicating a fault. Refer to the Programming Flowchart on page 18.

- Enter the Programming Mode and press the left ↓ button until PLUG PORT is scrolling on display. Press the right → button.
- There are four possible selections -
 - OFF - This disables the plugged port function and is the default setting. This should be done where sensor plugging is not a concern or where the system pressures may not change over time (example: a storage tank).
 - 1 minute
 - 1 Hour
 - 24 Hours

} Maximum time with no process variation before fault indication
- Using the left ↓ button, select a time.
- If OFF is selected, press the right → button to return to the PLUG PORT command and leave Plug Port deactivated.
- Press the right → button to enter a process value $\leq 10\%$ of the sensor's maximum range. This number represents the minimum variation expected in the process value over the time period entered above under normal operating conditions. Each time the process value reaches this value, the Plug Port timer is reset.

NOTE: This value can be accurately determined by subtracting the minimum from the maximum process value as recorded by the MAX/MIN feature. See RESETTING MAXIMUM AND MINIMUM VALUES on page 11 for additional information.

RESETTING TRIP COUNT

Trip Count provides information that may be useful for troubleshooting a process. Each time the set point is reached, the trip count is incremented by 1, up to 9999, where it will automatically return to 1. Trip Count is always on and can be manually reset to zero at any time by following these steps.

Refer to the Programming Flowchart on page 18.

- Enter the Programming Mode (see page 9)
- Press and release the left ↓ button until RESET TRIP CNT appears on the display
- Press the right → button. The recorded value of times the set point was reached (the trip count) will appear on the display.
 - Press the right → button to clear (reset) the trip count to zero.
 - Press the left ↓ button to retain the trip count value without resetting.

SETTING THE FILTER

In some applications, it is desirable to “dampen” the switch response and prevent intermittent false trips due to pressure spikes or other transient/isolated events. The Filter feature provides a software digital filter with a programmable time constant for suppressing certain transient short-duration events.

Refer to the Programming Flowchart on page 18

- Enter the Programming Mode and move through the program until FILTER is scrolling on the display. Press the right → button.
- The available selections are as follows

Pressure Models:	OFF (Default)	Temperature Models:	1/2 second
	1/4 second		1 second
	1/2 second		2 seconds
	1 second		
	2 seconds		

- Using the left ↓ button, select a time constant.
- Press the right → button to enter the time constant and return to main menu.

NOTE: The One Series typically responds to a process value change in less than 100 milliseconds when the Filter is set to off. Using this feature can lengthen the overall response time of the One Series for certain types of process value changes (pressure spikes).

- A shorter delay setting provides a faster response but is less stable.
- A longer delay setting provides a slower response and is more stable.

SETTING THE TRIP DELAY

The Trip Delay provides a programmable delay for the switch with a range of 0 – 999.9 seconds. Zero seconds is the factory default. When the set point is reached, the switch trip will be delayed by the number of seconds entered into the Trip Delay command using the following steps.

Refer to the Programming Flowchart on page 18.

- Enter the Programming Mode (see page 9)
- Press and release the left ↓ button until TRIP DELAY scrolls on the display.
- Press the right → button. OFF will appear on the display.
- Press the left ↓ button to select ON. The Trip Delay value in seconds (default = 000.0) will appear on the display with the left digit blinking.
 - Press the left ↓ button to increment the blinking digit.
 - Press the right → button to move to the next digit.
- Press the right → button to enter the new Trip Delay value.

DISPLAY MODULE CALIBRATION

These serial numbers must match for proper operation.



NOTE: Do not attempt to replace the One Series display module or pressure sensor. Swapping these will cause a mis-match between the stored calibration data and the pressure sensor. For proper operation, the display module serial number must always match the serial number inside the enclosure.

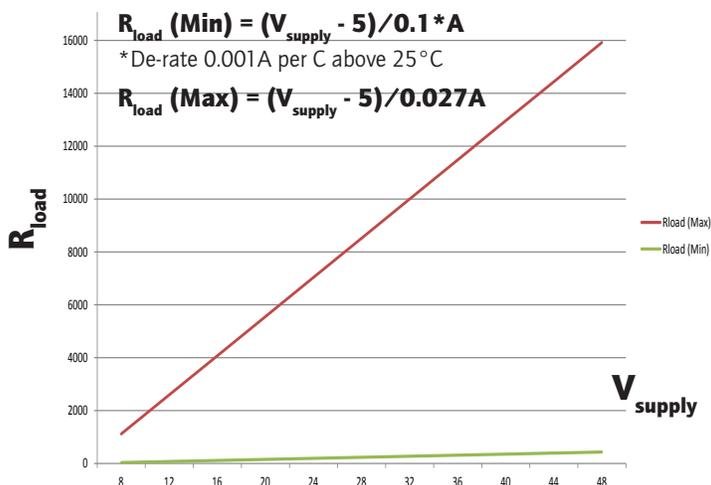
ACCEPTABLE SUPPLY VOLTAGES AND LOADS FOR 1XSWLL AND 1XSWHL

The charts below provide a range of acceptable power supply voltages (in Volts) and series loads (in Ohms). This is useful when the One Series is connected to non-standard PLC and DCS inputs or is connected in series with a relay or solenoid coil.

NOTE: If you need assistance with determining the compatibility of the One Series with your PLC, DCS, or relay, we can help. Please have the manufacturer's model number ready when you call us. In rare cases, when the series resistor value is too large and falls out of the Acceptable Range, placing another resistor across the input will allow it to work. Please call +1 (617) 923-6977 (Technical Sales) for assistance.

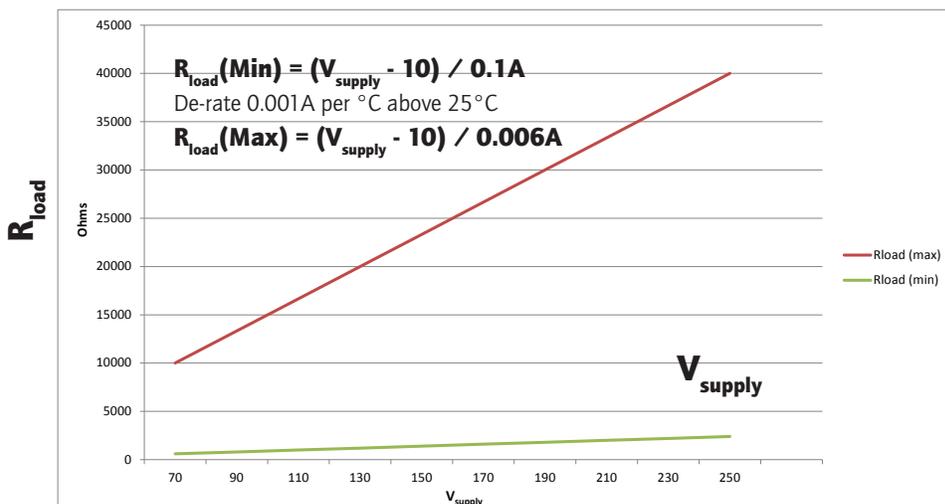
1XSWLL Allowable Voltage / Load Characteristics

V_{supply}	$R_{load} (Max)$	$R_{load} (Min)$
8	1111	30
12	2593	70
16	4074	110
20	5556	150
24	7037	190
28	8519	230
32	10000	270
36	11481	310
40	12963	350
44	14444	390
48	15926	430



1XSWHL Allowable Voltage / Load Characteristics

V_{supply}	$R_{load} (Max)$	$R_{load} (Min)$
70	10000	600
90	13333	800
110	16667	1000
130	20000	1200
150	23333	1400
170	26667	1600
190	30000	1800
210	33333	2000
230	36667	2200
250	40000	2400



ONE SERIES FAULT CODES

The One Series IAW™ diagnostics are capable of detecting many possible fault conditions. Some fault conditions will clear automatically when the parameter returns to normal; others require the unit to be powered down and restarted; and some are catastrophic and require repair or replacement. A list of fault conditions is shown below:

Please provide this code if calling UE Technical Sales for assistance.

Code		Probable Cause	Reason	Action
E-	9	3.3V power supply fault	Voltage Regulator Out of Range	
E-	13	Internal Reference Fault	Internal Voltage Reference Out of Range	
E-	14	Sensor Excitation Fault	Sensor Drive Voltage is Out of Range	
E-	15	Sensor Fault (Open Circuit)	Sensor is disconnected or has been damaged.	Verify that the sensor is connected and that the wiring and connector have not been damaged.
E-	16	Sensor Fault (Short Circuit)	Sensor has developed a short circuit.	Verify that the sensor wiring and connector have not been damaged.
E-	19-23	Internal CPU Hardware Fault	Diagnostics has detected a problem with internal CPU hardware.	
E-	24, 28	Memory Fault (RAM)	Diagnostics has detected a problem while scanning RAM.	
E-	25	Memory Fault (Program Memory)	Diagnostics has detected a problem with program memory.	
E-	27, 29	Invalid Diagnostic Number	Software attempted to run an invalid diagnostic.	
E-	31	Secondary A/D channel start error	The A/D converter used for fault monitoring failed to start.	
E-	32, 33, 34	A/D Fault (Primary Channel)	The primary channel A/D converter is saturated or has encountered a fault.	Make sure that the process applied to the sensor is within the range limits for the device.
E-	35	ASCII Conversion Error	Software calculation error occurred during an ASCII conversion.	
E-	36	Keypad Error	An error has occurred during the interpretation of keypad buttons.	
E-	37, 61, 63, 85	Math Fault	A calculation has overflowed.	
E-	38	Filter Error	An error occurred with filter settings.	
E-	40	Diagnostics Scheduling Error	An error has occurred in the software that schedules system diagnostics.	
E-	41 or 42	Error Setting Units	An error has occurred while setting the units of measure.	
E-	43	Software Error (Switch Code)	An error has occurred in the software that controls the switch output.	Cycle power to the device.
E-	44, 45, 49, 50, 59, 60, 73, 74	CRC Error	Configuration Data or Calibration Data is corrupt.	
E-	46	Pointer Error	The pointer used to access Menu data is not valid.	
E-	47	Display Message Error	A decimal point occurred at an unexpect point in a display message.	
E-	48	Initialization Error	An error occurred while initializing fault flags.	
E-	51	Hardware Configuration Error	An error occurred while configuring hardware peripherals.	
E-	52, 53, 58	Non-volatile memory Error	An error was encountered while accessing non-volatile memory.	
E-	47, 54,55,69	Error LCD Message	An error occurred while formatting LCD Message	
E-	56	Error Menu State	The menu state is invalid.	
E-	57	Software fault	A software fault occurred.	
E-	62	System Reset Error	A system reset was generated as the result of a fault.	
E-	65,93	Switch Output Error	The switch output state does not match the expected state for the programmed settings.	
E-	67	Clock Crystal Fault	A crystal fault was detected.	
E-	70	CPU Core Voltage Fault	The CPU core voltage setting is incorrect.	

Fault Codes Continued on next page

ONE SERIES FAULT CODES CONT.

E-	75, 78-83, 92, 94-97	Configuration Error	Invalid Sensor Type, Plugged Port or Switch Configuration has been detected.	
E-	88	Extreme Overrange	The pressure has exceeded 150% or the temperature has exceeded 110% of the device operating range.	The process pressure or temperature is too high. Under certain circumstances, disconnecting the sensor may cause this fault to occur.
E-	98	3.3V regulator input voltage too low.	The voltage at the input to the 3.3 volt regulator is too low for the part to operate correctly.	Verify that the power supply voltage and series load resistance are within acceptable limits. (Reference chart on page 15)
E-	99	Hardware Fault	Hardware Fault	
E-	100	Watch Dog Timer Fault	The watchdog timer had timed out indicating that the Micro is not executing code correctly.	
E-	101	Switch Verification Fault	Verifies that the voltage at the switch input terminals is incorrect for the programmed operating conditions.	
E-	103	Switch Drive Fault	Verifies that the switch drive signal is in the correct operating state for the programmed operating conditions.	
E-	106	Error Password	Error detected while changing password.	
E-	107	Trip Counter Out of Range	Trip counter not between 0 - 9999	

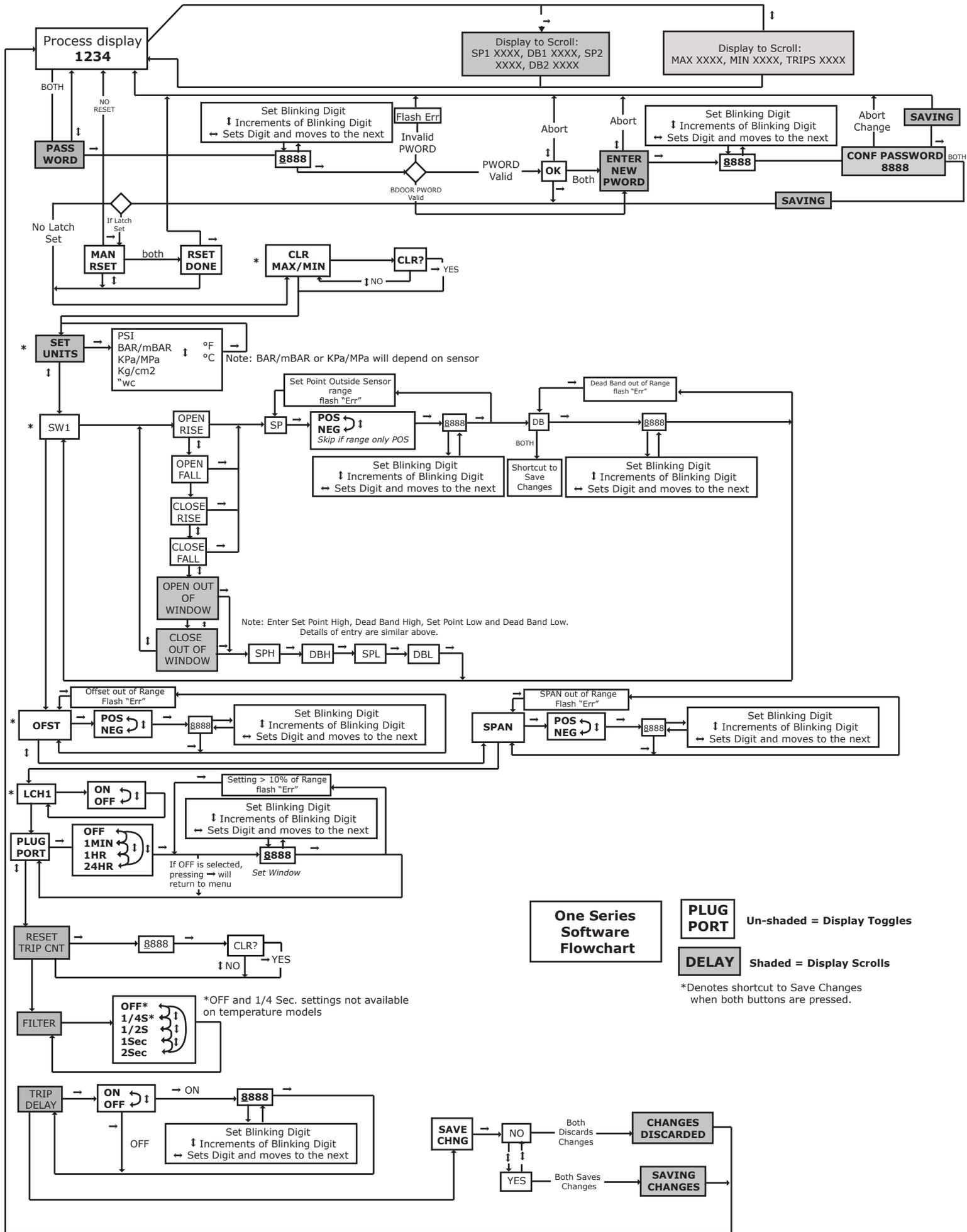
LOST PASSWORDS

Contact UE Technical Sales at +1-617-923-6977 or go online at www.UEonline.com/UUC to obtain a unique unlock code. The Kanban number from the product nameplate is required.

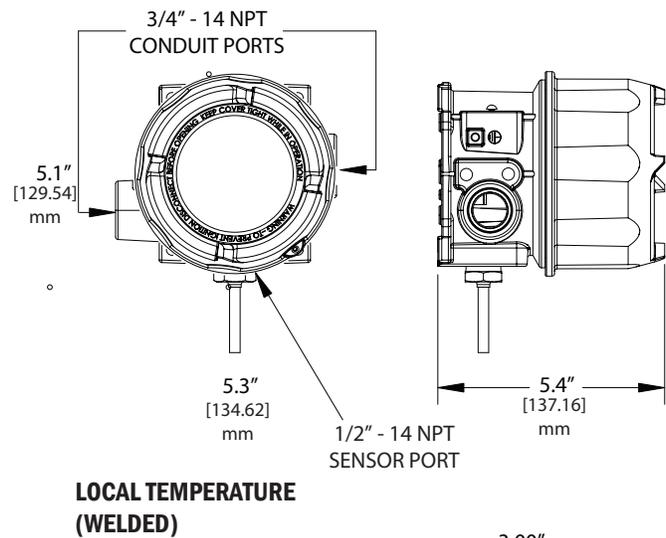
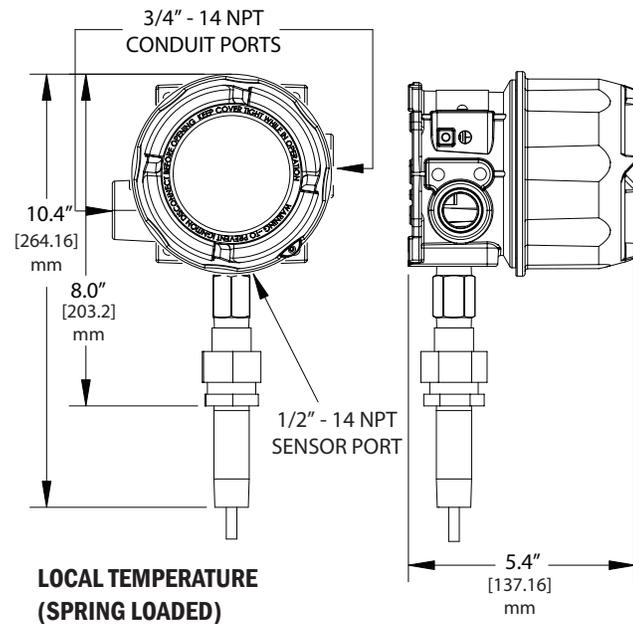
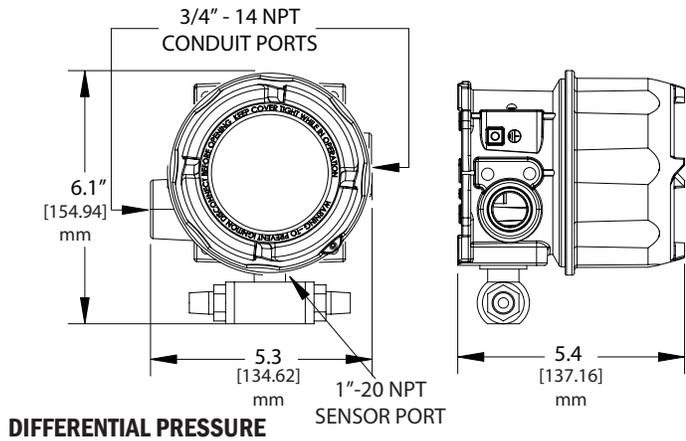
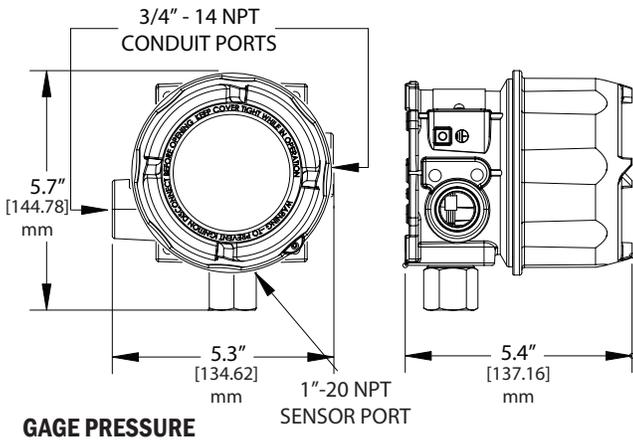
TROUBLESHOOTING

The switches contained in the One Series are electronic. The on/off switch signal is produced by a transistor or a solid-state relay, depending on the One Series model. Electronic switches cannot be properly tested with an ohmmeter. Instead, measure the voltage drop across the switch connected to the intended load to determine if it is open or closed. A properly functioning One Series electronic switch will exhibit the following voltage levels:

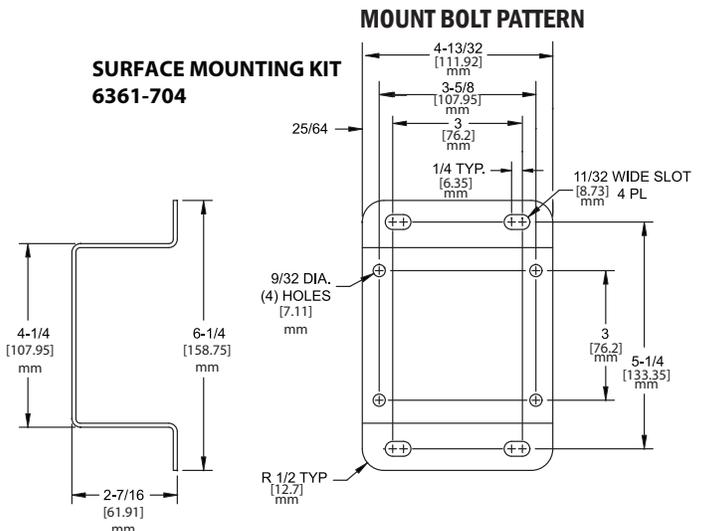
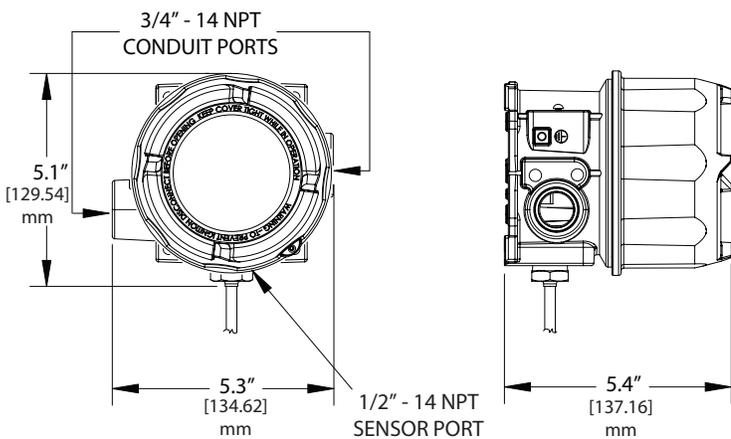
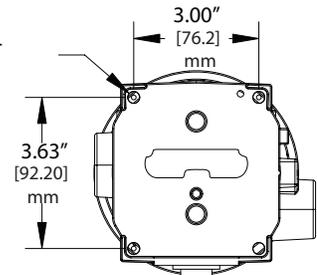
Signal	Location	Voltage Open	Voltage Closed
Ser point switch 1XSWLL	TB1	Supply voltage (up to 50 VDC)	4.7 VDC (nominal)
Set point switch 1XSWHL	TB1	Supply voltage (70-240 VAC, VDC)	13.5 VAC, VDC (nominal)
Set point switch 1XSWHH	TB2 A, B	Supply voltage (24-280 VAC, VDC)	0 VAC, VDC (nominal)
IAW output switch All models	TB3 +, -	Supply voltage (up to 50 VDC)	4.7 VDC (nominal)



DIMENSIONAL DRAWINGS



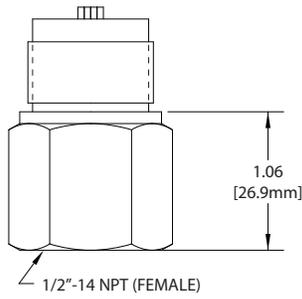
CLEARANCE HOLE FOR 1/4" BOLT 4 PLCS



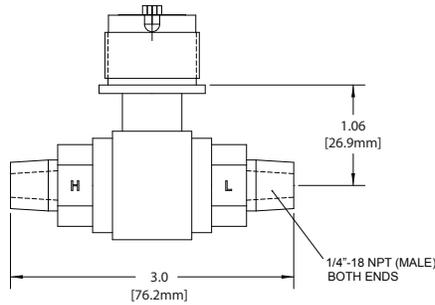
SENSOR OPTIONS

Pressure Sensors

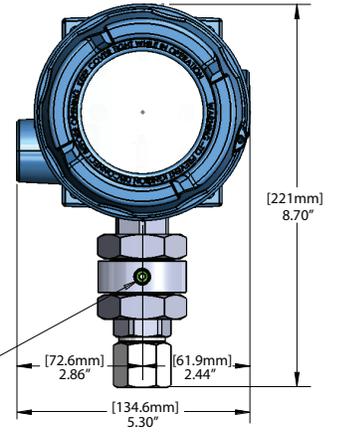
Gauge Pressure



Differential Pressure



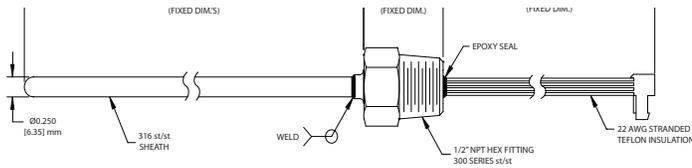
Dual Seal with Gage Pressure Sensor (Option M041)



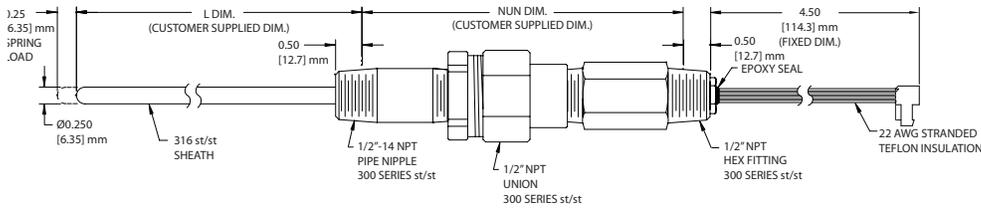
DUAL SEAL ENCLOSURE
1/8" NPT ANNUNCIATION VENT CAN BE ROTATED UP TO 90° IN EITHER DIRECTION

Temperature Sensors

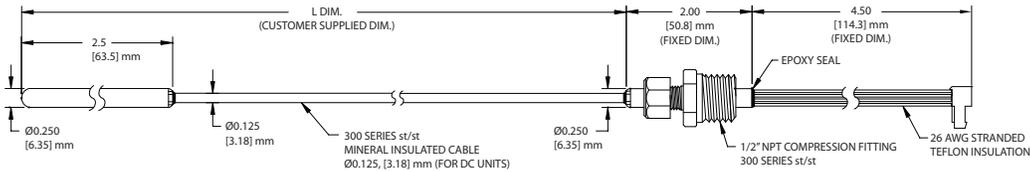
Fixed Local (TL1 - TL3)



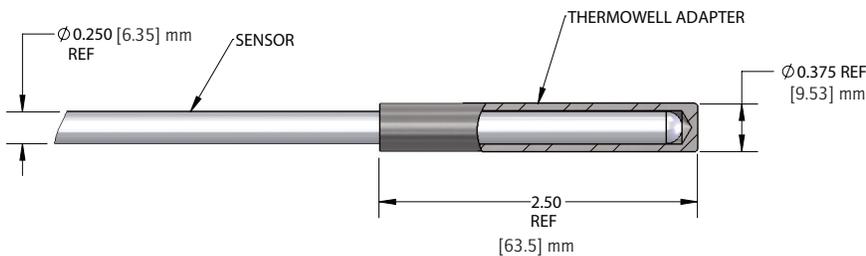
Spring Loaded Local (TTC)



Remote (TR1, TRC, TH1, THC, TC1, TCC)



Thermowell Adapter Kit Option W081 (UE Part #62169-44)



FRENCH WARNING TRANSLATIONS



UTILISATION ABUSIVE DE CE PRODUIT PEUT CAUSER UNE EXPLOSION ET DES BLESSURES. CES INSTRUCTIONS DOIVENT ÊTRE SOIGNEUSEMENT LUES ET COMPRISES AVANT L' APPAREIL EST INSTALLÉ. VOIR L'INFORMATION SUR LA PLAQUE SIGNALÉTIQUE DU PRODUIT POUR LES CERTIFICATIONS D'AGENCE SPÉCIFIQUES APPLICABLES.



AVERTISSEMENT: RISQUE D'EXPLOSION - SUBSTITUTION DE L' APPAREIL PEUT NUIRE À L'APTITUDE À L'UTILISATION DANS DES ENDROITS DANGEREUX.



AVERTISSEMENT: POUR LES ZONES EXPLOSIVES POUSSIÉREUSES, TOUS LES DISPOSITIFS D'ENTRÉE DE CÂBLE DOIVENT ÊTRE CERTIFIÉS DANS LE TYPE DE PROTECTION DE L' ENCEINTE IGNIFUGE "D" AVEC UN INDICE DE PROTECTION IP66, ADAPTÉ AUX CONDITIONS D'UTILISATION ET CORRECTEMENT INSTALLÉS. SI LES CÂBLES ET PRESSE-ÉTOUPES NE SONT PAS UTILISÉS, UNE BOÎTE D'ARRÊT DOIT ÊTRE FOURNIE DANS LES 2 "(5 CM) DE L'ENCEINTE. PLUS DE DÉTAILS SONT FOURNIS À LA PAGE (17).



AVERTISSEMENT: RISQUE D'EXPLOSION - LES CONDUITS DOIVENT ÊTRE SCELLÉS À L'INTÉRIEUR DE 2 "(5 CM) DE L'ENCEINTE.



AVANT L'INSTALLATION, VÉRIFIER LE MODÈLE DE L' APPAREIL SÉLECTIONNÉ POUR LA COMPATIBILITÉ AVEC LE FLUIDE DU PROCÉDÉ EN CONTACT AVEC LE CAPTEUR ET LES PARTIES MOUILLÉES.



DANS TOUTES LES APPLICATIONS, SÉCURISER L'ENCEINTE COMME DÉTAILLÉ CI-DESSOUS. NE PAS INSTALLER PAR LA CONNEXION DE PROCESSUS SEULEMENT.



POUR TOUTS LES MODÈLES DE TEMPÉRATURE ET PRESSION LOCAUX, TOUJOURS TENIR UNE CLÉ SUR L'HEXAGONE DU CAPTEUR PENDANT LE MONTAGE DE L'UNITÉ. NE PAS SERRER EN TOURNANT L'ENCEINTE, CELA POURRAIT ENDOMMAGER LA CONNEXION ENTRE LE CAPTEUR ET L'ENCEINTE.



INSTALLEZ LES UNITÉS OÙ LE CHOC, VIBRATION ET LES FLUCTUATIONS DE TEMPÉRATURE SONT MINIMES. ORIENTER L'UNITÉ D'UNE MANIÈRE À EMPÊCHER L'HUMIDITÉ DE PÉNÉTRER DANS L'ENCEINTE. UTILISER DES RACCORDS D'ÉTANCHÉITÉ BIEN NOTÉS POUR L'ENTRÉE DE FIL ÉLECTRIQUE. NE PAS MONTER L'UNITÉ À DES TEMPÉRATURES AMBIANTES DÉPASSANT LES LIMITES PUBLIÉES. CELA EST PARTICULIÈREMENT IMPORTANT POUR LES UNITÉS DE TEMPÉRATURE À MONTAGE LOCALE.



AVERTISSEMENT: NE JAMAIS INSÉRER UN OBJET DANS L'ORIFICE DU CAPTEUR DE PRESSION. LES DOMMAGES À LA MEMBRANE DE CAPTEUR SE TRADUIRA, À AFFECTER LA PRÉCISION.



REMARQUE: LE PRODUIT PEUT ÊTRE MONTÉ DANS N'IMPORTE QUELLES POSITIONS. POUR LES CAPTEURS DE PRESSION DE PETITES VALEURS, L'ORIENTATION DU CAPTEUR PEUT PRODUIRE UN DÉCALAGE SUR L'ÉCRAN EN RAISON DES EFFETS SUR LE REMPLISSAGE D'HUILE DU CAPTEUR. SI CELA SE PRODUIT, UTILISEZ LE RÉGLAGE DE L'OFFSET POUR COMPENSER CET EFFET. VOIR PAGE 12 POUR PLUS D'INFORMATIONS SUR LA COMMANDE DE DÉCALAGE.



POUR LES MODÈLES DE PRESSION DIFFÉRENTIELLE (DE PRESSIONS FAIBLES), IL FAUT PRENDRE SOIN DE MONTER LE CAPTEUR AFIN DE MINIMISER LES DÉCALAGES DE LECTURE DE PRESSION. LA COMMANDE DE DÉCALAGE PEUT ÊTRE UTILISÉE AFIN DE RÉGLER L'AFFICHAGE À ZÉRO, VOIR PAGE 12 POUR PLUS D'INFORMATIONS.



REMARQUE: UN KIT DE DÉMONSTRATION EST DISPONIBLE (CONTIENT L'UNITÉ ET UNE SOURCE DE PRESSION A L'AIDE D'UN TUYAU ET UNE POMPE MANUELLE) EN OPTION – PEUT ÊTRE COMMANDÉ EN UTILISANT LE CODE 6361-704. VOIR PAGE 21. ENFILER LE RACCORD DE PRESSION SUR LE SABORD DE PRESSION EN UTILISANT UN PRODUIT D'ÉTANCHÉITÉ APPROPRIÉ, EN VEILLANT À CE QUE LES FILS DE CONTACT SONT PROPRES ET EXEMPTES DE DÉBRIS. UTILISEZ UNE CLÉ SUR L'HEXAGONE DE CONNEXION DE PRESSION POUR SERRER. POUR LE MODÈLE DE LA PRESSION DIFFÉRENTIELLE, LA PRESSION DU CÔTÉ BAS (L) NE DOIT PAS DÉPASSER LE HAUT (H) PRESSION DE CÔTÉ OU D'ENDOMMAGER LE CAPTEUR POURRAIT ENTRAÎNER.



MODÈLES DE TEMPÉRATURE LOCAUX (MODÈLE L): EN UTILISANT LES TROUS DE MONTAGE SUR LE BOÎTIER ÉLECTRONIQUE. MONTER LE PRODUIT DE SORTE QUE LE BOÎTIER DU CAPTEUR NE SERA PAS ENDOMMAGÉ ET OÙ LA TEMPÉRATURE MESURÉE EST REPRÉSENTATIVE DE L'ENVIRONNEMENT ENVIRONNANT.



POUR LES CAPTEURS LOCAUX À RESSORT: UN Puits THERMIQUE APPROPRIÉ, FAIT DE MATÉRIAU RÉSISTANT À LA CORROSION, VISSER 5 FILETS ENGAGÉS MINIMUM, AVEC UN PRODUIT D'ÉTANCHÉITÉ, EST NÉCESSAIRE POUR MAINTENIR LE TYPE DE COFFRET 4X/IP66.



POUR LA TÉLÉDÉTECTION: ITINÉRAIRE LE FIL D'EXTENSION À ÉVITER TOUT CONTACT AVEC DES ÉLÉMENTS SOUS TENSION OU À PROXIMITÉ DE SOURCES DE PARASITES ÉLECTRIQUES. ÉVITER LES ÉTRANGLEMENTS OU FLEXION EXCESSIVE. SERREZ LE RACCORD D'EMBOÛT, LE CAS ÉCHÉANT.

FRENCH WARNING TRANSLATIONS CONT.



POUR DÉTECTION SUR UNE SURFACE: FIXER LE BOÎTIER DE CAPTEUR SUR LE TUBE OU RÉCIPENT À L'AIDE D'UN ADHÉSIF OU D'UNE MÉTHODE DE CERCLAGE APPROPRIÉ POUR L'APPLICATION.



REMARQUE: POUR LES MODÈLES DE TEMPÉRATURE LOCAUX (MODÈLES C , H , R & L) , L'UTILISATION D'UN Puits THERMIQUE EST FORTEMENT RECOMMANDÉ POUR AIDER À L'ENTRETIEN , LES ESSAIS ET LA PRÉSERVATION DE L'INTÉGRITÉ DU SYSTÈME . POUR LES Puits THERMIQUES EXISTANTS AVEC 0,375 "DE DIAMÈTRE, UN INSERT EST DISPONIBLE A COMMANDER EN UTILISANT LE CODE 62169-44. L'ADAPTATEUR FOURNIT UN TRANSFERT DE CHALEUR PLUS RAPIDE EN ADAPTANT LE BOÎTIER DU CAPTEUR DE TEMPÉRATURE DE DIAMÈTRE 0,250 " À UN PLUS GRAND ALÉSAGE 0.375". UN COMPOSÉ DE TRANSFERT DE CHALEUR EST RECOMMANDÉ DANS LE FOND DU Puits ET À L'INTÉRIEUR DE L'OUVERTURE DE L'ADAPTATEUR.



INSÉREZ LE BOÎTIER DU CAPTEUR (0,250 " DE DIAMÈTRE) DANS LE Puits THERMIQUE, VEILLER À CE QUE LE FOND DU Puits THERMIQUE EST COMPLÈTEMENT IMMÉRGÉ DANS LE PROCÉDÉ (2,5 " MIN .) AVEC LA POINTE DU Puits THERMIQUE AU PLUS PRÈS DU CENTRE DU TUYAU QUE POSSIBLE. VISSER LE MAMELON DE LA SONDÉ DANS LE Puits THERMIQUE, AVEC UN PRODUIT D'ÉTANCHÉITÉ , EN PLAÇANT UNE CLÉ SUR L'ÉCROU . AJUSTEZ LA POSITION DE L'ÉCRAN DE PRODUIT POUR UNE LECTURE FACILE. SERRER LE CONNECTEUR DE L'UNION POUR FIXER LE CAPTEUR DANS LE MUR.



POUR DE MEILLEURS RÉSULTATS, LE BOÎTIER DU CAPTEUR DE TEMPÉRATURE DOIT ÊTRE EN CONTACT AVEC LA SURFACE OU LES MÉDIAS MESURÉS. UN COMPOSÉ DE TRANSFERT DE CHALEUR PEUT ÊTRE UTILISÉ POUR AIDER À TRANSFÉRER CHALEUR DU FLUIDE AU BOÎTIER DU CAPTEUR. LOCALISEZ LE CAPTEUR OÙ LA TEMPÉRATURE EST LA PLUS REPRÉSENTATIVE DE SYSTÈME. PROFONDEUR D'INSERTION MINIMUM EST DE 2-1/2 " . DESSINS COTÉS DES CAPTEURS SONT PRÉSENTÉS À LA PAGE 20.



SE RÉFÉRER AU BULLETIN PAGE 11. POUR AFFICHER DIFFÉRENTS TYPES DE RACCORDS ET ADAPTATEURS DISPONIBLES POUR FIXER LES CAPTEURS DE TEMPÉRATURE.



POUR LES CAPTEURS DE TEMPÉRATURE (MODÈLES-TU) FOURNIT PAR L'UTILISATEUR



ENSEMBLES DE CAPTEURS DE TEMPÉRATURE ANTIDÉFLAGRANT PEUVENT ÊTRE INSTALLÉS PAR CE QUI SUIT: 100 OHM PLATINUM RTD À 4 FILS DIN 0.00385 NON-MIS À TERRE, RACCORD ½ "NPT AU LOGEMENT, 5 FILETS ENGAGÉS MINIMUM DES EXIGENCES CULUS, ATEX ET IECEX. GRAISSE NÉCESSAIRE SUR LES FILETS.



LA CERTIFICATION UL DE CE PRODUIT S'APPLIQUE À L'ENCEINTE ET LE CIRCUIT INTERNE. AFIN DE MAINTENIR UNE PROTECTION ANTI-EXPLOSION, L'INSTALLATEUR DOIT CONNECTER LE PRODUIT À UN CAPTEUR APPROPRIÉ, CERTIFIÉ POUR LES MÊMES GAZ ET DE POUSSIÈRES GROUPES, AYANT LE MÊME INTERVALLE DE TEMPÉRATURE DOTÉ D'UN MATÉRIAU RÉSISTANT À LA CORROSION.



AVERTISSEMENT: RISQUE D'EXPLOSION - POUR ÉVITER L'INFLAMMATION, COUPER L'ALIMENTATION AVANT DE RETIRER LE COUVERCLE DU BOÎTIER. MAINTENIR LE COUVERCLE FERMÉ PENDANT LE FONCTIONNEMENT. NE PAS DÉCONNECTER L'ÉQUIPEMENT QUE LORSQUE L'ALIMENTATION EST COUPÉE OU QUE LA ZONE EST CONNUE POUR ÊTRE NON EXPLOSIVES.



AVERTISSEMENT: RISQUE D'EXPLOSION - NE REMPLACEZ PAS L'INTERRUPTEUR QUE LORSQUE L'ALIMENTATION EST COUPÉE ET QUE LA ZONE EST CONNUE POUR ÊTRE NON DANGEREUX.



LES APPAREILS DOIVENT ÊTRE CORRECTEMENT MIS À LA TERRE EN UTILISANT LES VIS DE TERRE FOURNIES AVEC L'ARMOIRE.



CÂBLAGE SUR LE TERRAIN DOIT ÊTRE ÉVALUÉ À 105 C MINIMUM. POUR UNE TEMPÉRATURE AMBIANTE INFÉRIEURE À -10°C, UTILISER LE CÂBLAGE APPROPRIÉ.



LE MODÈLE 1XSWLL ACCEPTE 7.8-50 VDC COMME SOURCE D'ÉNERGIE, DIRECTEMENT DEPUIS ENTRÉE DISCRÈTE D'UN AUTOMATE INDUSTRIEL PROGRAMMABLE (AIP) OU D'AUTRES CHARGES DE FAIBLE PUISSANCE. LA PUISSANCE MAXIMALE DE CHARGE COMMUTÉ EST DE 0.1 A. L'APPAREIL NE DOIT PAS ÊTRE CONNECTÉ DIRECTEMENT À UNE ALIMENTATION SANS LIMITATION DE COURANT DE CHARGE APPROPRIÉ TEL QUE CELLE FOURNI PAR UNE ENTRÉE DISCRÈTE D'UN AUTOMATE INDUSTRIEL PROGRAMMABLE (AIP) . SURCHARGE DU COMMUTATEUR PEUT PROVOQUER UNE PANNE.



AVERTISSEMENT: DÉBRANCHER TOUS LES CIRCUITS D'ALIMENTATION AVANT DE BRANCHER L'APPAREIL. LE CÂBLAGE DOIT ÊTRE EFFECTUÉE SELON LES CODES ÉLECTRIQUES NATIONAUX ET LOCAUX. TAILLES DE FILS RECOMMANDÉES MAXIMALES ET COUPLES DE SERRAGE POUR LE TERRAIN CÂBLAGE DES BORNERS SONT PRÉSENTÉS À LA PAGE 4.

FRENCH WARNING TRANSLATIONS CONT.



RETIRER LE COUVERCLE DU BOÎTIER DE RÉGLAGE DANS LE SENS ANTIHORAIRE POUR 8 TOURS. RETIREZ DÉLICATEMENT LE MODULE D’AFFICHAGE PAR LE BORD EXTÉRIEUR ET EN LE TIRANT LOIN DE L’ENCEINTE, EN FAISANT ATTENTION DE NE PAS FATIGUER LES CONNEXIONS. LAISSEZ LE MODULE D’AFFICHAGE CONNECTÉ PAR LE FILS DE TERRE (VERT) POUR ACCÉDER À L’ENCEINTE DE BASE À TRAVERS L’OUVERTURE (S) DE CONDUIT DE L’ENCEINTE DE BASE. EFFECTUEZ LES CONNEXIONS COMME INDIQUÉ SUR LES SCHÉMAS DE CÂBLAGE, À LA PAGE 5. NE RETIREZ PAS LES ENSEMBLES DE FILS DU MODULE D’AFFICHAGE. INSÉRER LE CÂBLAGE DE CHAMP À TRAVERS L’OUVERTURE (S) DU CONDUIT DE L’ENCEINTE DE BASE. EFFECTUEZ LES CONNEXIONS COMME INDIQUÉ SUR LES SCHÉMAS DE CÂBLAGE, À LA PAGE 5. DEUX BORNES DE MISE À LA TERRE ET DE L’ÉQUIPEMENT SONT CLAIREMENT MARQUÉES SUR LE BOÎTIER DE BASE INTERNE ET ADJACENTE À TB3 EXTERNE ET JUSTE AU-DESSUS DE L’OUVERTURE DE CONDUIT SUR LE CÔTÉ GAUCHE DE L’ENCEINTE.



POUR ÉVITER LE DOMMAGE DU COUVERCLE DU BOÎTIER, NE PAS ENLEVER LE LUBRIFIANT DE FIL. FILS DOIVENT ÊTRE EXEMPTS DE SALETÉ ET D’AUTRES CONTAMINANTS.



NETTOYAGE DE L’ÉCRAN ET LA SURFACE DU CLAVIER DOIT ÊTRE EFFECTUÉ AVEC UN CHIFFON HUMIDE. NE PAS ESSAYER DE LAVER LE PRODUIT AVEC LE COUVERCLE RETIRÉ.

RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. When applicable, orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts. INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller (36 months for the Spectra 12 and One Series products; 18 months for Temperature Sensors). Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

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