



## One Series *Field Safety System*<sup>™</sup> Electronic Pressure, Differential Pressure, and Temperature Transmitter Switch Model: 2SLP



UNITED ELECTRIC  
CONTROLS

### 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 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.

 SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USE IN HAZARDOUS LOCATIONS.

 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" (5CM) OF THE ENCLOSURE. FLAMEPROOF JOINT AND GAP DETAILS ARE PROVIDED ON PAGE 2.

 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.

 IN ORDER TO MEET THE ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS SPECIFIED IN EN61000-6-2: IMMUNITY FOR INDUSTRIAL ENVIRONMENTS, EXTERNAL WIRING MUST BE RUN USING CABLE WITH A GROUNDED SHIELD OR CABLE RUN INSIDE OF A GROUNDED METAL CONDUIT

 INTERFERENCE FROM IMPROPERLY SHIELDED VFD'S (VARIABLE FREQUENCY DRIVES) AND MOTOR CONTROLLERS MAY CAUSE NUISANCE TRIPS.

**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 (SEE TABLE 1) 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.**

| Model 2SLP                       | N. America                                                                                                                                                                                                    | Europe                                                                                   | International                                                              |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Flameproof                       |                                                                                                                                                                                                               |                                                                                          |                                                                            |
| Cert Number:                     | Report Reference: E226592-20090305                                                                                                                                                                            | DEMKO 09 ATEX 0813748X                                                                   | IECEx UL 08.0017X                                                          |
| Applicable Standards             | UL 50, UL 50E, UL 61010-1, UL 1203, CSA C22.2 No. 25, CSA C22.2 No. 30-M, CSA C22.2 No. 94.01, CSA C22.2 No. 94.02, CSA C22.2 No. 61010-1, UL 60079-0, UL 60079-1, CSA 22.2 No. 60079-0, CSA 22.2 No. 60079-1 | EN 60079-0<br>EN 60079-1<br>EN 60079-31                                                  | IEC 60079-0<br>IEC 60079-1<br>IEC 60079-31                                 |
| Suitable for appropriate use in: | Class I, Div. 1, Groups A, B, C & D<br>Class II, Div. 1 Groups E, F & G<br>Class III<br>Class I, Zone 1 AEx db IIC T3/T5*<br>Ex d IIC T3/T5*                                                                  | II 2 G Ex db IIC T3/T5* Gb<br>II 2 D Ex tb IIIC T90°C Db<br>IP66<br>-40°C ≤ TAMB ≤ +70°C | Ex db IIC T3/T5* Gb<br>Ex tb IIIC T90°C Db<br>IP66<br>-40°C ≤ TAMB ≤ +70°C |

\*Straight pressure sensor models P06-P16 have a temperature class of T3, all others T5

For standard revision/edition number, refer to actual certificate (e.g. DEMKO 09 ATEX 0813748X, IECEx UL 08.0017X ) on UE website: <https://www.ueonline.com/support/certifications/?product=one-series&region=International>

## FLAMEPROOF AND DUST-IGNITION PROOF - 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

### 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" (19.1 mm) rabbet/spigot minimum length
- Breather element threaded joint: M8-1.25 (6g/6H medium fit class), 11 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
- The device must be cleaned with a damp cloth to avoid static discharge.

### Dual Seal Adaptor (Option M041)

- Threaded Dual Seal Adaptor Option Enclosure to One Series Field Safety System™ 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" (0.08 mm)
- Sensor to union housing joint: 0.580" (14.73 mm) rabbet/spigot minimum length, maximum gap 0.003" (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.



CONTINUOUS OPERATION SHOULD NOT EXCEED THE DESIGNATED OVER RANGE PRESSURE OR MAXIMUM WORKING PRESSURE STATED WITHIN THE LITERATURE AND ON DEVICE NAMEPLATE.

Over Range Pressure: The maximum pressure to which a pressure sensor may be continuously subjected without cause damage and maintaining set point repeatability.

Max Working Pressure: The maximum that can be applied to both process ports simultaneously without affecting sensor performance.

The One Series transmitter-switch product line is based on an all-solid-state electronic module that incorporates a microprocessor. The One Series Field Safety System™ is a loop-powered, all-in-one device connected directly to the final element and replacing a transmitter, safety relay, trip amplifier, and logic solver. It has an embedded high capacity, programmable safety relay that provides extremely fast response time in the event an emergency shutdown of a final control element is triggered. The One Series Field Safety System™ incorporates UE's patented IAW® self-diagnostics, redundant and diverse signal processing, and software algorithms to detect abnormalities in the process, and internal faults within. The device meets the latest IEC 61508 standard for SIL 2 SIS and the requirements of SIL 2 for random integrity at HFT = 0, SIL 3 for random integrity at HFT = 1, and SIL 3 for systematic capability.

Not all abnormal conditions require emergency shutdown, so the One Series Field Safety System™ provides additional logic outputs for use in voting logic schemes that could report warnings prior to a shutdown. This feature provides the ability to balance safe working environments with process throughput when conditions permit it.

The One Series Field Safety System™ provides an explosion-proof type 4X/IP66, weather-tight enclosure suitable for harsh environments and hazardous (Class I, Division 1, Zone 1) locations. Repeatability rivals that of a process transmitter, with a 0.1% of full range while the switch set point and deadband (hysteresis) of the Safety Relay Output are fully programmable over the entire range of the sensor. Reaction time for the One Series Field Safety System™ to a process change is less than 100 milliseconds. When filter settings are set to “OFF,” switch status and Safety Relay Output are moved to the safe state (open position) in less than 100 milliseconds, and the 4-20 mA output stabilizes to 90% of a step response within 250 milliseconds.

## I Am Working (IAW®)

The One Series Field Safety System™ also contains UE's patented 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 logic solver and used to detect normal, tripped, and fault conditions. A discrete outputs truth table is provided on page 18. IAW® self-monitors, searching for possible faults, both within the instrument and in the overall system (a list of the various fault codes is outlined in table 5, page 17). In the event of a fault condition, the One Series Field Safety System™ will attempt to display the problem and provide remote indication signals using the IAW® Status and NAMUR NE43 standard 4-20 mA outputs. In the case of certain micro-controller faults, the revolving arrows may freeze or go out, indicating that a failure exists. If loop power is interrupted to the One Series Field Safety System™, the display will go blank and all discrete outputs will open.

## DISPLAY FEATURES AND DIAGNOSTICS

The One Series Field Safety System™ features a large, easy to read LCD display (See Figure 1). It is used for three main purposes: process indication, programming 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 103% of the full scale range noted on the nameplate. For valves beyond 103% of range, the PV is replaced with a scrolling message OVER RANGE.
- 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.
- 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.

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 SP2 XX.XX DB2 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.



Figure 1

## ALARM CONDITION

When the process goes beyond the set point, the display will begin to flash, alternating between the process value and “SW1”. This indicates that set point has been reached, causing the Safety Relay Output (SRO) and Status Switches to open. 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.

## FAULT CONDITIONS

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

- If the IAW® software detects a fault it will display an error code and force the SRO, SRO Status and IAW® Outputs to open state and the 4-20 mA output to the fault current.
- If the power supply or the wiring fails, the display will go blank. All switch outputs will open (fail safe open) and the 4-20 mA signal will go to zero.

(See the Fault Codes and the Discrete Output Truth Table on pages 17 and 18 for a complete description of fault diagnostics and the response by the One Series Safety Transmitter.)

Please refer to the product technical brochure for product specifications. Product technical brochure may be found at [www.ueonline.com](http://www.ueonline.com).

UE declarations and third party issued certifications are available for download at [www.ueonline.com/support/certifications/](http://www.ueonline.com/support/certifications/).

Date code format on nameplate is “YYWW” for year and week (see Figure 19, Page 18)

## PART I - 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 20.



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 device using the four (4) 1/4" clearance holes in the enclosure base. Plumb sensor to the process port. See page 20-21 for dimensions.

The device 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 (user supplied). **NOTE:** the optimal display viewing position is 6:00.



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



FOR DIFFERENTIAL PRESSURE MODELS (ESPECIALLY LOW RANGE MODELS), MOUNT THE SENSOR LEVEL TO MINIMIZE ANY PRESSURE READING OFFSETS. THE OFFSET COMMAND MAY BE USED TO ZERO THE DISPLAY, (SEE PAGE 13 FOR ADDITIONAL INFORMATION).

## PROCESS CONNECTIONS AND SENSOR INSTALLATION



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 device to ensure that the sensor housing will not be damaged and where the measured temperature is representative of the surrounding environment.

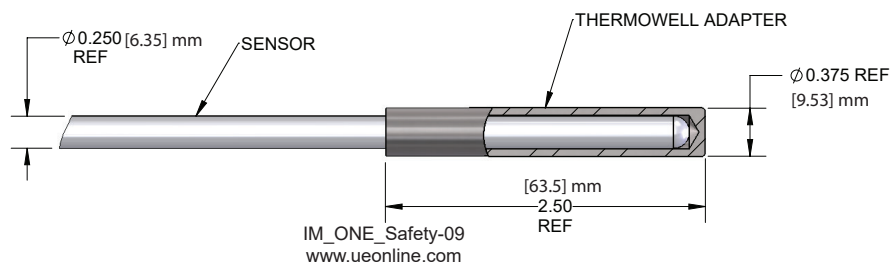
For Local Spring-Loaded (model T): A suitable thermowell, made from corrosion-resistant material, 5 threads engaged minimum, with thread sealant, is required to maintain enclosure type 4X/IP66.

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) 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 21.



## PART II - WIRING

### Removing the One Series *Field Safety System™* Enclosure Cover and Display Module

 TO PREVENT ELECTROSTATIC DISCHARGE WIPE DOWN COVER AND ENCLOSURE OF ANY DUST BUILD-UP BEFORE REMOVING COVER.

 DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING DEVICE. WIRE DEVICE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE AND RECOMMENDED TIGHTENING TORQUE FOR FIELD WIRING TERMINAL BLOCKS ARE SHOWN WITHIN TABLE 2 (PAGE 5).

 TO PREVENT SEIZURE OF ENCLOSURE COVER, DO NOT REMOVE LUBRICANT. THREADS SHOULD ALSO BE FREE OF DIRT AND OTHER CONTAMINANTS.

Remove the enclosure cover by turning it counter-clockwise for 8 revolutions (Figure 3). Carefully remove the display module by grasping the outer edge and pulling it away from the base enclosure (Figure 4), 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 within the wiring diagrams (Figure 5-6, page 6). The primary chassis and equipment grounding terminal is provided inside the base enclosure.

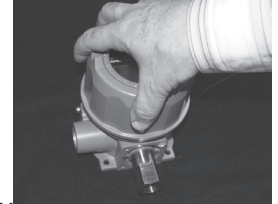


Figure 3



Figure 4

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.

**Tools Required:** Small flat-head screwdriver; wire strippers

 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.

 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. USE COPPER OR ALUMINUM CONDUCTORS OR USE COPPER, COPPER-CLAD ALUMINUM, OR ALUMINUM CONDUCTORS IF THE TERMINALS IS FOR CONNECTION TO EITHER COPPER OR ALUMINUM WIRE. ALL CLASS 2 WIRING IS TO BE INSTALLED WITHIN THE PROVIDED FLEXIBLE TUBING TO MAINTAIN SEGREGATION BETWEEN CIRCUITS

 MODEL 2SLP IS LOOP-POWERED AND OBTAINS OPERATING POWER FROM THE 4-20 mA LOOP. THE POWER SUPPLY PROVIDING POWER TO THE LOOP MUST BE CLASS 2 OR SELV AND CURRENT LIMITED. THE MAXIMUM LOAD RATING FOR THE SAFETY RELAY OUTPUT (SRO) IS SHOWN IN TABLE 3 ON PAGE 6. OVERLOADING THE SAFETY RELAY OUTPUT (SRO) MAY CAUSE FAILURE. THE SRO MUST NOT BE CONNECTED DIRECTLY TO A POWER SUPPLY WITHOUT A SUITABLE SERIES LOAD.

## Terminal Block and Torque Details

Table

|     | Description | Max. Wire Gauge | Min. Wire Gauge | Recommended Tightening Torque |
|-----|-------------|-----------------|-----------------|-------------------------------|
| TB1 | 3-Position  | 14 AWG          | 22 AWG          | 3.50 in-lbs. or 0.4 Nm        |
| TB2 | 4-Position  | 14 AWG          | 26 AWG          | 3.50 in-lbs. or .4 Nm         |
| TB3 | 2-Position  | 16 AWG          | 26 AWG          | 2.2 in-lbs. or .25 Nm         |
| TB4 | 2-Position  | 16 AWG          | 26 AWG          | 2.2 in-lbs. or .25 Nm         |

**NOTE:** The sensor's 4-conductor ribbon cable assembly must remain connected to the display module with the red wire oriented to the arrow on the label at the rear of the module. Reversing this connector will result in measurement errors or failure. Please refer to the wiring diagrams beginning on page 6.

## WIRING DIAGRAMS - MODEL 2SLP

The One Series Field Safety System™ enclosure includes two conduit openings, one intended for the high-power SAFETY RELAY OUTPUT (SRO) wiring and the other intended for low-level signal and analog 4-20 mA wiring. 4-20 mA signals shall be wired using a shielded/twisted pair to minimize the effects of electrical interference. Please follow local electrical code requirements for explosion/flame proof instrumentation.

The diagrams in Figures 5 and 6 provide a rear view of the display module after it has been removed from the base enclosure and an inside view of the base enclosure circuit boards. Terminal Block 1 (TB1) is located on the display module. All other terminal blocks (TB2 - TB4) are located inside the base enclosure.

Model 2SLP is loop-powered and is connected directly to an analog input of a PLC or DCS via TB1 providing a 4-20 mA analog signal (see Table 3). (Polarity must be observed). The loop connection powers the entire One Series Field Safety System™, including the Safety Relay Output switch actuation. The auxiliary SAFETY RELAY OUTPUT is connected via TB2 and is intended to switch an external load. Refer to Table 3 for the SAFETY RELAY OUTPUT switch ratings.

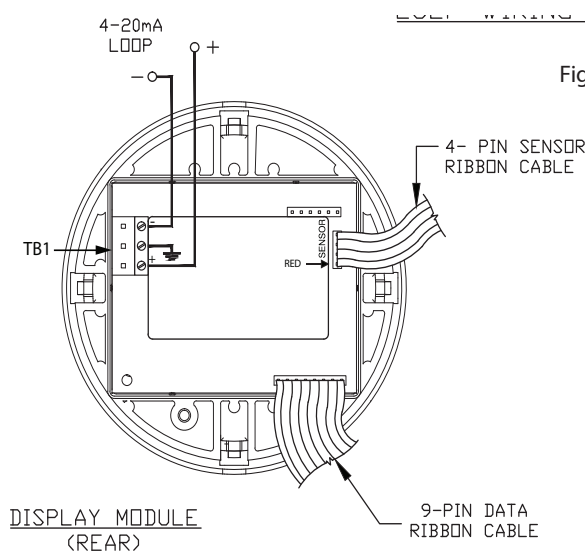


Figure 5 - Rear View Display

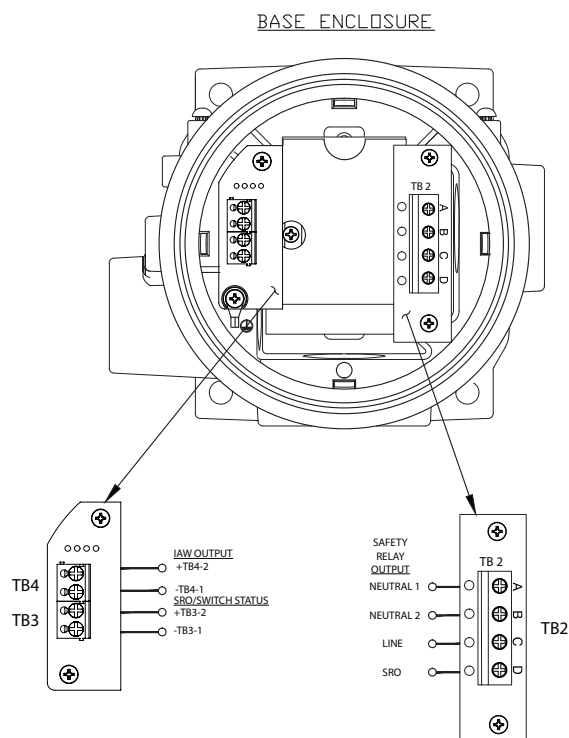


Figure 6 shows the switch wiring connections located at TB2, TB3 and TB4 inside the base enclosure. TB2 A and B terminals are provided for the external power supply inputs to be switched by the Safety Relay Output. The SRO at TB2 C and D terminals provide connections to the Safety Relay Output switch. Polarity must be observed on all VDC switches. Please refer to the wiring diagrams shown on page 7.

The SRO Monitor function, if used, requires a connection to VDC (+) or VDC (-) depending on whether the SRO circuit arrangement is sinking or sourcing (either Neutral1 or Neutral2 for model 2SLP47). This connection allows the SRO current to be measured that is sent out to an external load (final element), allowing the IAW<sup>T</sup> diagnostics to determine the integrity of the SRO wiring and if the SRO is functioning properly.

**NOTE:** As an alternative to loop power, model 2SLP may be wired directly to a 24 VDC power supply (+) and minus (-) terminals. In this wiring configuration, power is provided for all switching and diagnostic functions but a 4-20 mA output is not possible. This alternative method of powering the One Series Field Safety System<sup>™</sup> may be used when loop power is not available and a 4-20 mA output is not desired.

Two additional discrete outputs are available at TB3 and TB4 - SRO STATUS and IAW OUTPUT. These are intended for use in Safety Instrumented Systems (SIS) applications and for monitoring certain One Series Safety Transmitter functions. These discrete signals are useful for voting logic schemes where the safety PLC can decide to initiate an emergency shutdown (ESD) or an alarm depending on their state. These outputs may also be used to distinguish between a process upset (set point reached) or the IAW<sup>®</sup> self-diagnostics detecting a fault with the One Series Field Safety System<sup>™</sup>. Please refer to table 4 on page 15 for additional information.

**NOTE:** Do not exceed the maximum switch ratings of the SAFETY RELAY OUTPUT, IAW<sup>®</sup> OUTPUT and SRO STATUS signals or permanent damage to the One Series Field Safety System<sup>™</sup> may result. Please refer to Table 3.

Figure 6 - Inside View Base Enclo-

Table 3 - Voltage and Current Maximum Ratings

| Signal Name                | Location   | 2SLP47                                             | 2SLP48                                                      | 2SLP49                                                          |
|----------------------------|------------|----------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------|
| Power Supply               | TB1: + & - | 2-wire 20-40 VDC @ 4-20 mA (Loop or Fixed Current) |                                                             |                                                                 |
| Safety Relay Output        | TB2: C & D | 12-250 VAC @ 5 mA-5 A <sup>1</sup>                 | 0-30 VDC @ 6 A <sup>1</sup> , 1.8 A <sup>1</sup> Pilot Duty | 0-130 VDC @ 2.5 A <sup>1</sup> , Q150 <sup>1,2</sup> Pilot Duty |
| With Relay Monitor Enabled |            | 12-250 VAC @ 5 mA-5 A <sup>1</sup>                 | 10-30 VDC @ 5 mA-6 A <sup>1</sup>                           | 10-130 VDC @ 5 mA-2.5 A <sup>1</sup>                            |
| Temperature Derating       |            | 1% per °C above 25°C                               |                                                             |                                                                 |
| SRO Status                 | TB3: 1 & 2 | 30 VDC @ 20 mA                                     |                                                             |                                                                 |

# Power Options

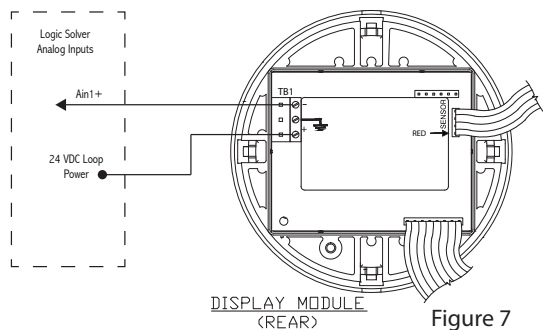


Figure 7

Loop Powered by the 4-20 mA signal. Use this configuration for 2-wire transmitter only function (Figure 7). **NOTE:** If IAW® is not monitored, the SFF of the device is reduced. Reference the product FMEDA report. [www.ueonline.com/techinfo/one\\_series\\_st\\_fmEDA\\_re-](http://www.ueonline.com/techinfo/one_series_st_fmEDA_re-)

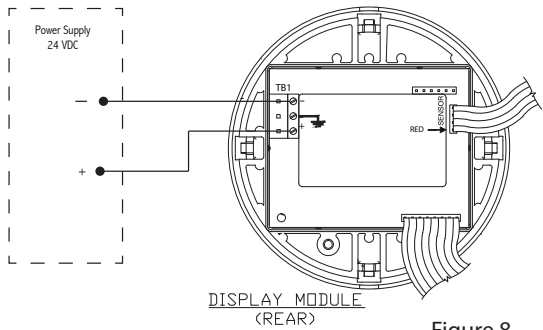


Figure 8

DC power supply – The device is powered using the 4-20 mA signal connections. All other outputs Safety Relay Output, SRO Status and IAW® Output function as normal. **NOTE:** The 4-20 mA analog signal is not possible in this wiring configuration.

# Wiring Diagrams

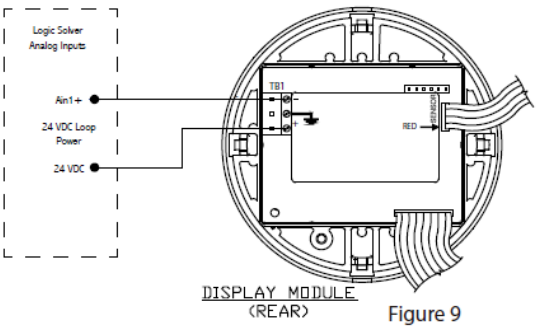


Figure 9

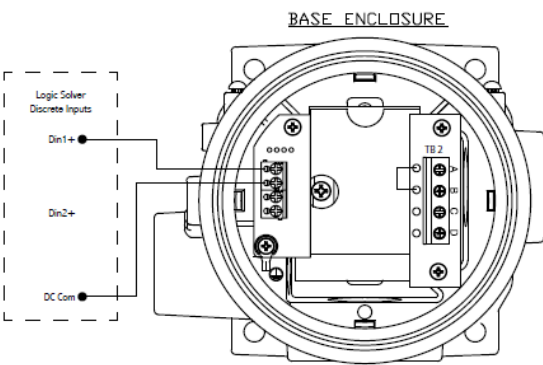
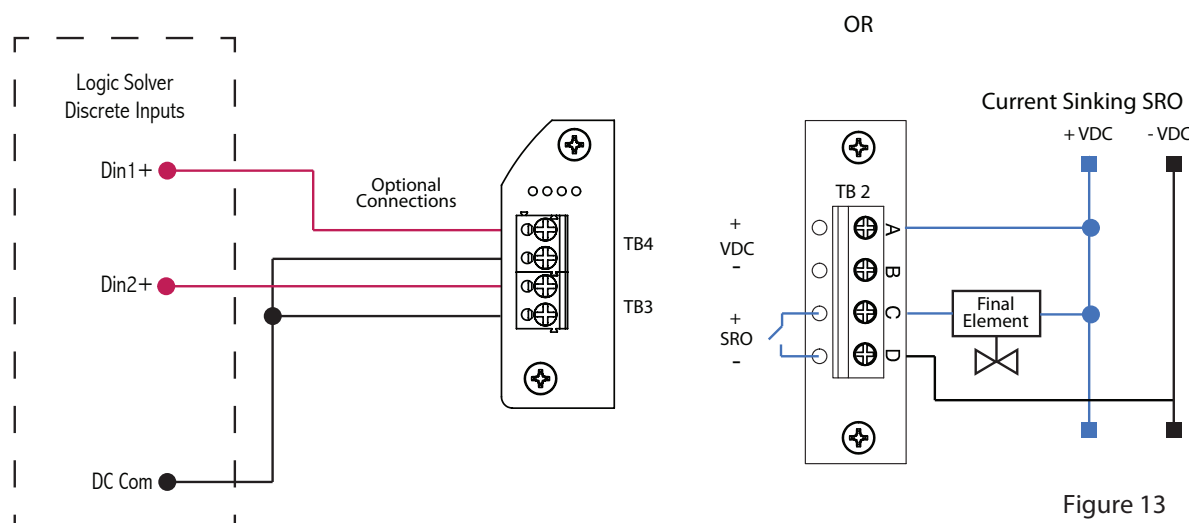
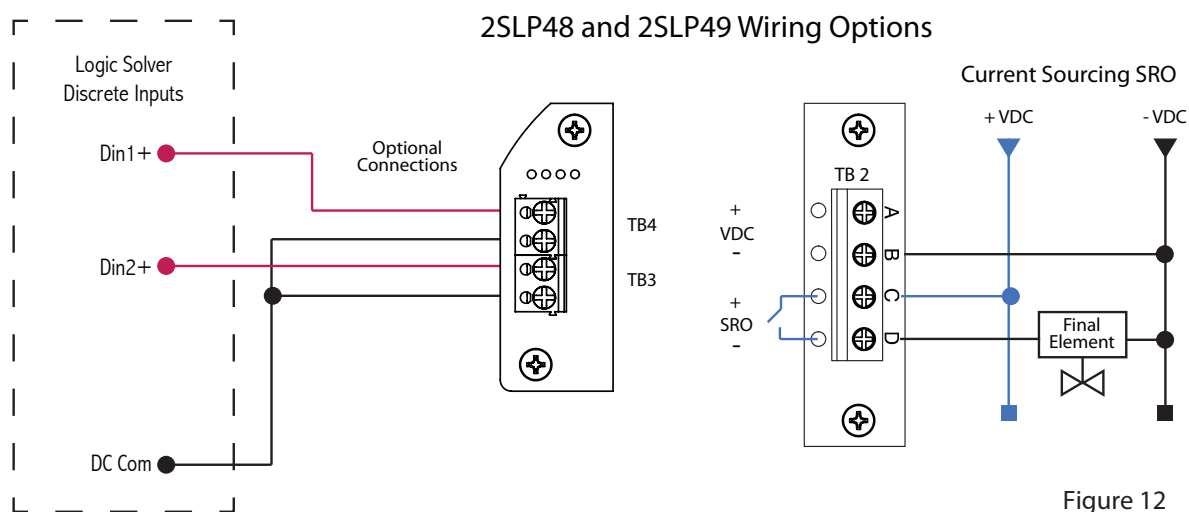
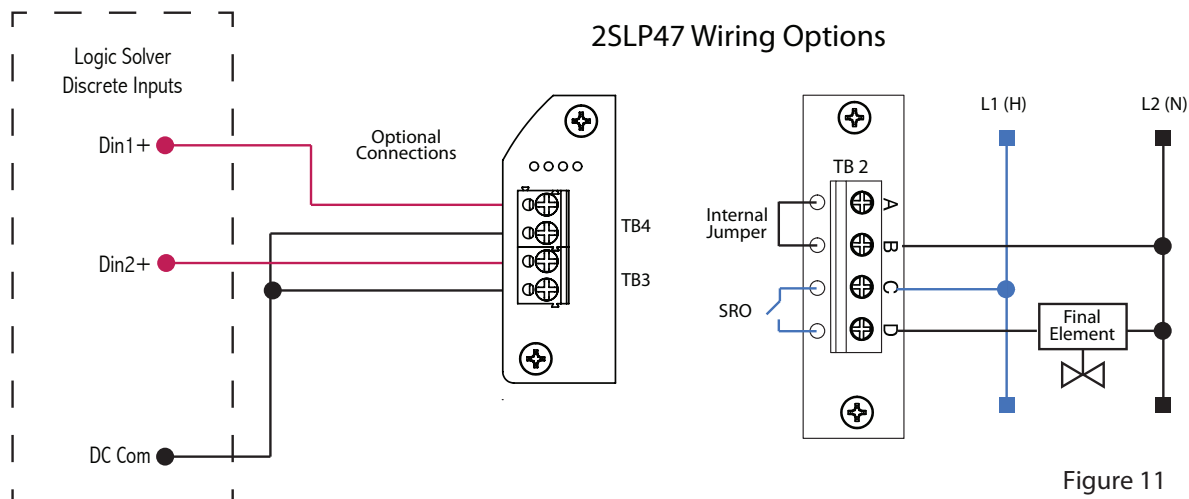


Figure 10

In this configuration the 4-20 mA output and IAW® Output are monitored by the safety system logic solver. The final element is controlled by the logic solver. Total wire connections = 4. The 4-20mA signal is used by the logic solver to initiate the safety function. IAW® provides a separate indication of device health. **NOTE:** If IAW® is not monitored, the SFF of the device is reduced. Reference the product FMEDA report. [www.ueonline.com/techinfo/one\\_series\\_st\\_fmEDA\\_report.pdf](http://www.ueonline.com/techinfo/one_series_st_fmEDA_report.pdf)

The following wiring diagrams show the One Series Field Safety System™ fully configured where the health status (IAW®) and SRO switch status signals are being monitored by a logic solver (PLC or DCS). These connections are not required; however, UE recommends monitoring the IAW signal to maximize the safe failure fraction in an SIS application. Additionally, wiring the SRO to an external load (final element) is not required.

For direct control of a final element from the One Series Field Safety System™, Figures 11-13 show the recommended SRO wiring methods. The wiring connection shown at TB2 – A+B is required for proper operation of the SRO Monitor diagnostics only if this feature is turned ON in the menu. The default factory setting for SRO Monitor is OFF.

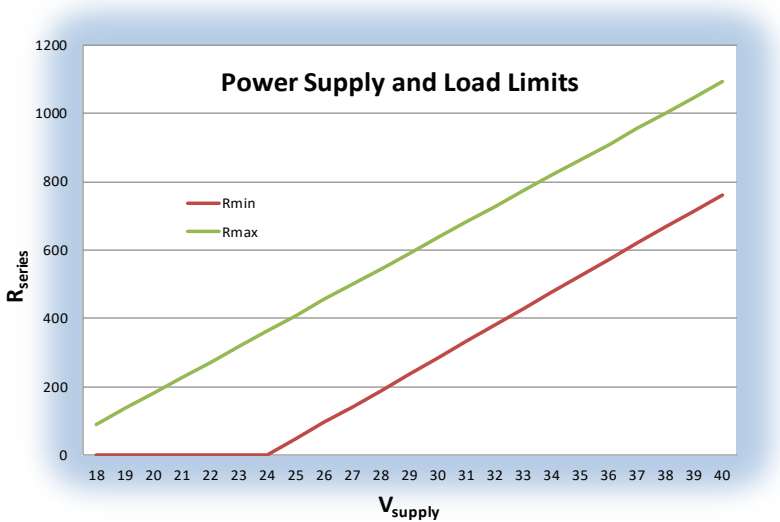


# ONE SERIES 4-20mA POWER SUPPLY AND LOAD LIMITS

| $V_{in}$ | $R_{min}$ | $R_{max}$ |
|----------|-----------|-----------|
| 20       | 0.0       | 181.8     |
| 21       | 0.0       | 227.3     |
| 22       | 0.0       | 272.7     |
| 23       | 0.0       | 318.2     |
| 24       | 0.0       | 363.6     |
| 25       | 47.6      | 409.1     |
| 26       | 95.2      | 454.5     |
| 27       | 142.9     | 500.0     |
| 28       | 190.5     | 545.5     |
| 29       | 238.1     | 590.9     |
| 30       | 285.7     | 636.4     |

| $V_{in}$ | $R_{min}$ | $R_{max}$ |
|----------|-----------|-----------|
| 31       | 333.3     | 681.8     |
| 32       | 381.0     | 727.3     |
| 33       | 428.6     | 772.7     |
| 34       | 476.2     | 818.2     |
| 35       | 523.8     | 863.6     |
| 36       | 571.4     | 909.1     |
| 37       | 619.0     | 945.5     |
| 38       | 666.7     | 1000.0    |
| 39       | 714.3     | 1045.5    |
| 40       | 761.9     | 1090.9    |

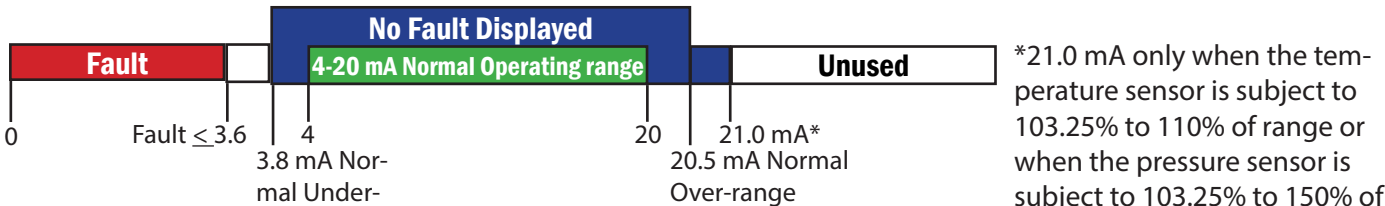
Table 4



Graph 1

## FAULT CURRENT

In addition to the discrete IAW® and Safety Relay Output status signals, the One Series Field Safety System™ includes a 4-20 mA output that adheres to the NAMUR NE 43 current level standard. Figure 14 details these current levels and what they indicate.



Figure

A diagnostic fault will force the IAW® Safety Relay Output and Status to the fail safe state and the ( $\leq 3.6$  mA) fault con-

## PART III - PROGRAMMING

### Basic Programming

**Tools Required:** Programming Flowchart (see Flowchart 1, page 19)

Programming of the One Series Field Safety System™ is accomplished using the two buttons on the faceplate (labeled ↓ and → see Figure 15). Stepping down through the main menu using the left ↓ button, you can access the various commands of the software menu. The right button is then used to move into the command submenu for setting up or modifying the parameters.

**NOTE:** The flowchart on page 19 shows the entire programming commands menu structure. Before removing the enclosure cover, please read the instructions on page 5. The programming menu is a single direction loop, with submenus embedded within, so there is no way to back up in the program. If you need to make a correction to a prior Main Menu step, you will need to continue forward, exit, then re-enter the program to 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.

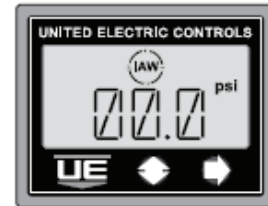
### Entering the Programming Mode

**NOTE:** While in the Programming Mode, the One Series Field Safety System™ will remove itself from service (go offline). All outputs are set to the fail safe state and the Field Safety System™ ignores process variable input from the process sensor. The Safety Relay Output and Status, and the IAW® Output signal will 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 19 as a guide through the various commands in the Programming Mode.

- Press and release both buttons ↓→ simultaneously and then press the right button → to enter the password.
- 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.

This is the first command prompt in the Programming Mode.



**NOTE:** The Field Safety System™ will automatically exit the Programming Mode and resume monitoring the process (go back online) if two minutes elapse without a button being pressed. The One Series recalls all previously saved parameters from memory and any program changes that were made will be discarded. This two-minute timeout feature prevents the One Series from being left offline accidentally.

### Exiting the Programming Mode

When any of the programming 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 program to the Save Changes menu location, which is only possible at menu actions indicated by an asterisk (\*) on the Programming Flowchart, found on page 19.

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

### Saving Programming Changes

When changes have been made to the programming 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 programming 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.

## BASIC FEATURES

### Setting the Units of Measure

The One Series Field Safety System™ 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, Plug Port, and 4 mA and 20 mA values are recalculated for the newly selected units of measure.

### Setting the Safety Relay Output Mode, Set Point and Deadband

Please refer to the Programming Flowchart, page 19.

**NOTE:** The One Series Field Safety System™ is intended for use in functional safety applications. As a result, the Safety Relay Output (SRO) was designed to fail safe (open) if power is lost to the One Series Field Safety System™ or if a fault is detected by the IAW® self-diagnostics.

- Enter the programming mode (see page 10).
- 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.

**NOTE:** The One Series Field Safety System™ has three operating modes:

OPEN RISE - The Safety Relay Output opens on rising process values that reach the set point.

OPEN FALL - The Safety Relay Output opens on falling process values that reach the set point

OPEN WINDOW - The Safety Relay Output opens when process values are within a specified range set by two points, set point high and set point low.

Please use the Safety Relay Output Decision Logic (Figure 13, page 12) for help with setting the appropriate Safety Relay Output mode.

- 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.

**NOTE:** The set point is the process value at which the One Series Field Safety System™ opens the Safety Relay Output. The Set Point is fully programmable throughout the operating range of the sensor as noted on the device nameplate.

- 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 blink-

ing 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.

**NOTE:** The Deadband is the amount above or below the set point at which the One Series Field Safety System™ resets the Safety Relay Output, returning it to the normally closed 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 Safety Relay Output will open as pressure rises to 100 and close (reset) as the pressure falls to 90.
- Example 2: If the Control Mode is OPEN FALL and the set point is 100 psi and the deadband is 10, the Safety Relay Output will open as pressure falls to 100 psi and close (reset) as pressure rises to 110 psi.

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

- 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 a new Deadband. SW1 will show on the display.

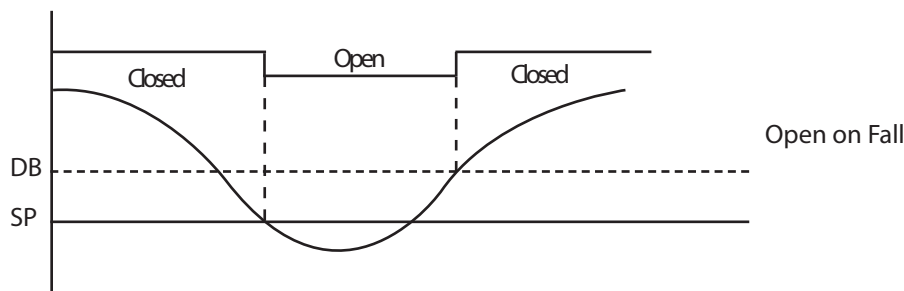
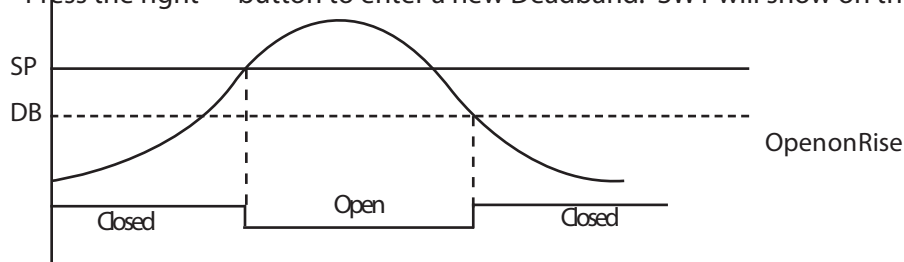
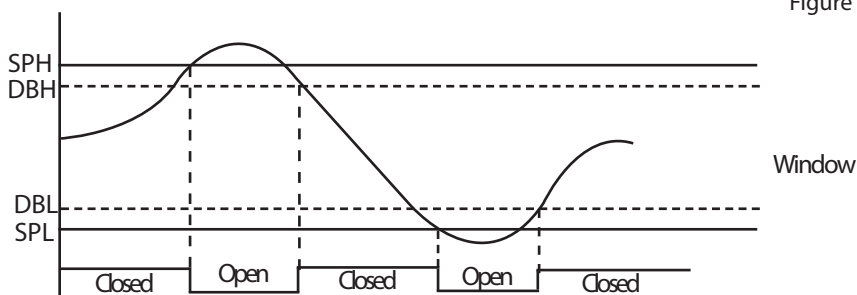


Figure 16



## Resetting the Maximum & Minimum Values

The One Series Field Safety System™ continuously records the readings from the sensor and stores the minimum and maximum (MAX/MIN, peak hold) values in non-volatile memory. The max/min values may be viewed at any time by removing the enclosure cover (page 5) and pushing the left ↑ button. The display will scroll the MAX/MIN values and then return to the Process Display mode.

To reset the values, enter the Programming Mode (see page 10). 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 10), the values will be reset to the current reading and begin recording again.

## ADVANCED FEATURES

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

### Adjusting Display Offset

The One Series Field Safety System™ 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. If adjusting OFFSET, it may be necessary to adjust SPAN (see below).

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.



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 DISPLAY.

Refer to the Programming Flowchart on page 19.

- 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 Field Safety System™ 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:  $\text{SPAN} = \text{reference source} / \text{display value} \times \text{upper range value}$

- 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.  $\text{Span} = 90 / 88 \times 100 = 102$  (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.  $\text{Span} = 400 / 404 \times 450 = 446$  (rounded)

Refer to the Programming Flowchart on page 19.

- Enter the Programming Mode (see page 10) 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.

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

### Setting the Latch Mode (Manual Reset)

The Safety Relay Output can be configured to latch open when the set point is reached. Refer to the Programming Flowchart on page 19.

- 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 Safety Relay Output changes state from closed to open when the set point is crossed and remains latched until the Safety Relay Output is manually reset by the user or the One Series Field Safety System™ is power cycled.

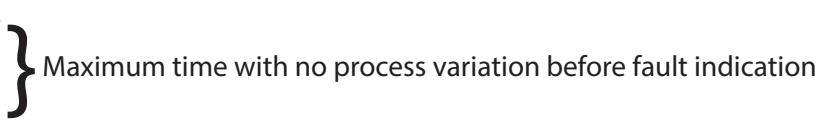
When latched, the display will read MAN RSET.

To Reset the Latch

- Enter the Programming Mode (see page 10). 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.

### Setting the Plugged Port Feature

The One Series Field Safety System™ 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 19.

- 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 12 for additional information.

## SETTING THE SRO FAULT MONITOR

The SRO fault monitor senses the output of the relay and verifies that it is in the correct state. If the relay is closed when it should be open or open when it should be closed this feature will turn off IAW®, set the output current to  $\leq 3.6$  mA attempt to turn off the SRO and SRO Status outputs. A relay fault message will be displayed. This feature requires a connection to +VDC, -VDC or neutral (L2) from the load's power supply. See wiring connections for TB2 on page 8.

**NOTE:** The SRO fault monitor default is set to "OFF" from the factory and must be enabled by the user. Refer to the Programming Flowchart on page 19.

- Enter the Programming Mode and move through the program until SRO FAULT MON is scrolling on the display. Press the right → button.
- If OFF is displayed, press the left ↑ button to set fault monitoring to ON
- Press the right → button to activate SRO fault monitoring.

## Setting the Filter

In some applications, it is desirable to "dampen" the Safety Relay Output 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 configuration time constant for suppressing certain transient short-duration events.

Refer to the Programming Flowchart on page 19.

- Enter the Programming Mode (see page 10) and move through the commands 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 that 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 SCALE

The 4-20 mA output is field scalable. The default setting is 100% of the sensor's maximum range, where 4 mA represents minimum and 20 mA is maximum range. If desired, both the 4 mA and 20 mA levels may be set independently to shrink or stretch the portion of the sensor's range represented by the 4-20 mA output.

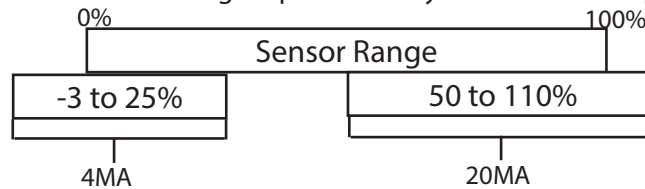
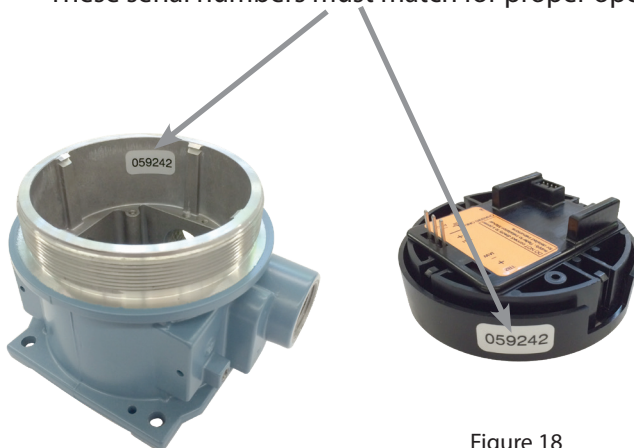


Figure 17

- Setting the 4 mA portion of the scale (see Figure 17):
  - Enter the Programming Mode (see page 10) and use the left ↓ button to move to the 4MA SET command.
  - Press the right → button to select a positive or negative scale. POS is the default. Use the left ↓ button to change to NEG.
  - Press the right → button to view and change the scale. Press the left ↓ button to increment the blinking digit. Press the right → button to enter and move to the next digit. This process value must be between -3% and 25% of the sensor's maximum range.
  - Press the right → button to enter the new scale and return to the main menu.
- Setting the 20 mA portion of the scale (see Figure 17):
  - Enter the Programming Mode (see page 10) and use the left ↓ button to move the 20MA SET command.
  - Press the right → button to select a positive or negative scale. POS is the default. Use the left ↓ button to change to NEG.
  - Press the right → button to view and change the scale. Press the left ↓ button to increment the blinking digit. Press the right → button to enter and move to the next digit. This process value must be between 50% and 110% of the sensor's maximum range.
  - Press the right → button to enter the new scale and return to the main menu.

## DISPLAY MODULE CALIBRATION

These serial numbers must match for proper operation.



**NOTE:** Do not replace the One Series display module or pressure sensor. Swapping these amongst devices will cause a mis-match between the stored sensor calibration data and the pressure sensor. For proper operation, the display module serial number must always match the serial number inside the enclosure (see Figure 18).

Figure 18

## ONE SERIES FAULT CODES

The One Series Field Safety System™ 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 device to be powered down and restarted; and some may require repair or replacement. A list of fault conditions are shown below in table 5.

If a fault message appears on the One Series display, a fault code can be obtained by pressing both keypad buttons  $\uparrow \rightarrow$  simultaneously.

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

| Code |    | Probable Cause                              | Reason                                                                                                                                                     | Action                                                                                                                                                     |
|------|----|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E-   | 04 | Loop Current Fault                          | The current measured in the 4-20mA loop, by the fault monitoring circuitry, is incorrect.                                                                  | Verify that the power supply voltage and load resistance on the 4-20mA loop are within allowable limits.                                                   |
| E-   | 15 | Diagnostic Fault Sensor OPEN                | An open circuit has been detected on the sensor drive pins 2 & 3.                                                                                          | Diagnostic Fault Sensor open, check all sensor connections.                                                                                                |
| E-   | 16 | Diagnostic Fault Sensor SHORT               | A short circuit has been detected on the sensor drive pins 2 & 3.                                                                                          | Diagnostic Fault Sensor Short, check all sensor connections.                                                                                               |
| E-   | 18 | Diagnostic Fault Relay Monitor              | The relay output fault monitor circuit has detected that the output state of the solid state relay is incorrect. This feature must be enabled in the menu. | Check the wiring connections or disable feature if not being used.                                                                                         |
| E-   | 65 | Error -- switch output                      | The switch output fault monitor circuit has detected that the switch output state is incorrect.                                                            | Internal Hardware Fault, contact factory                                                                                                                   |
| E-   | 88 | Error -- Process Variable Extreme Overrange | Extreme overrange, a pressure input has exceeded 150% of the operating range or a temperature input has exceeded 110% of range.                            | Warning: This fault may indicate damage to the sensor. Check that the process is within the operating limits of the device. Verify all sensor connections. |

Table 5

NOTE: Power cycling the One Series will reset some faults. If the fault remains after power cycling, please contact UE Inside Sales at [Insidesales@ueonline.com](mailto:Insidesales@ueonline.com) or call +1 (617)-923-6977. Some fault codes not noted above indicate microprocessor faults.

## DISCRETE OUTPUTS TRUTH TABLE

| Set Point Reached | IAW Fault | SRO Status | IAW Output | Safety Relay Output |
|-------------------|-----------|------------|------------|---------------------|
| No                | No        | Closed     | Closed     | Closed              |
| No                | Yes       | Open       | Open       | Open                |
| Yes               | No        | Open       | Closed     | Open                |
| Yes               | Yes       | Open       | Open       | Open                |

Table 6

## TROUBLESHOOTING

The Safety Relay Output contained in the One Series Field Safety System™ is electronic, and the signal is produced by a transistor or a solid-state relay. The Safety Relay Output cannot be properly tested with an ohmmeter. Instead, measure the voltage drop across the SRO connected to the intended load to determine if it is open or closed. A properly functioning One Series Field Safety System™ will exhibit the following voltage levels:

### Troubleshooting Voltage Levels

| Output     | Location     | Voltage Open          | Voltage Closed |
|------------|--------------|-----------------------|----------------|
| IAW OUTPUT | TB4 pins 1,2 | 24 VDC (Loop Voltage) | 0 VDC          |
| SRO STATUS | TB3 pins 1,2 | 24 VDC (Loop Voltage) | 0 VDC          |

Table 7

## LOST PASSWORDS

Contact UE Inside Sales at +1-617-923-6977 or go online at [www.UEonline.com/UUC](http://www.UEonline.com/UUC) to obtain a unique unlock code. The Kanban number from the product nameplate is required (see Figure 19).

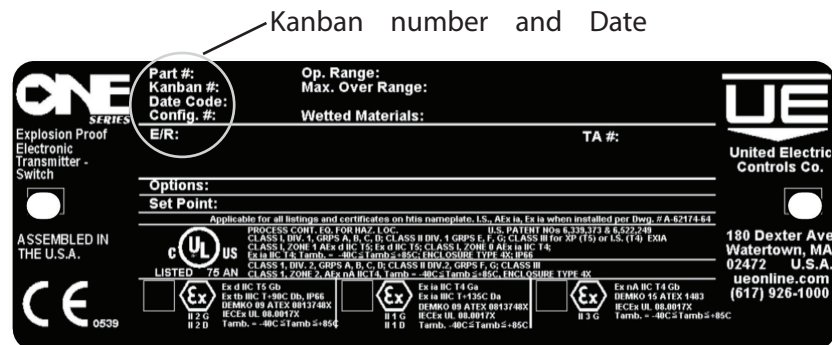
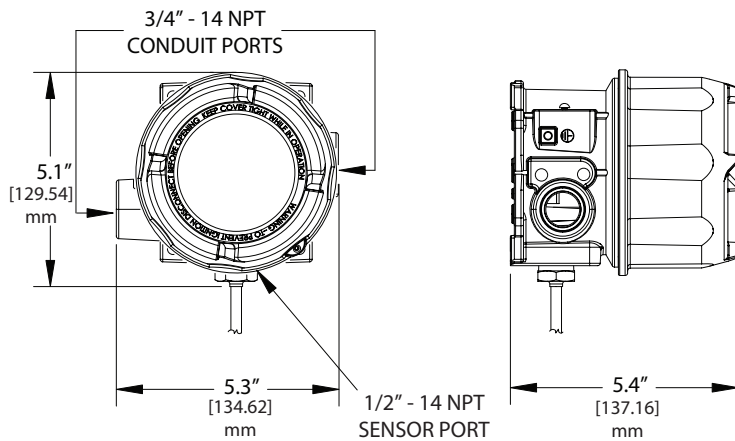
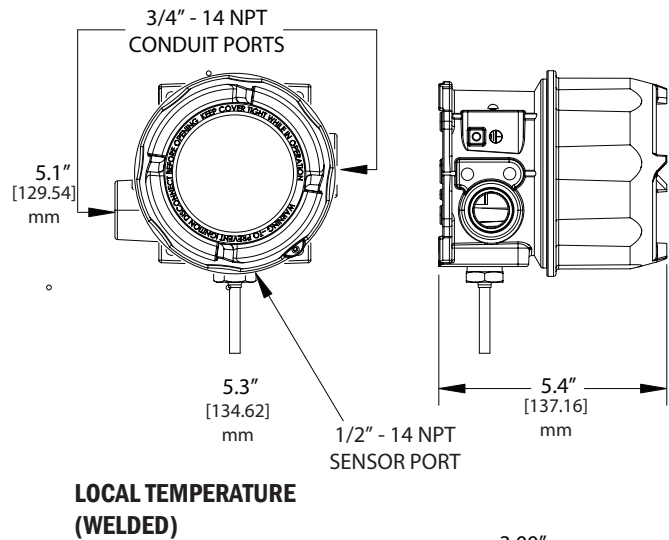
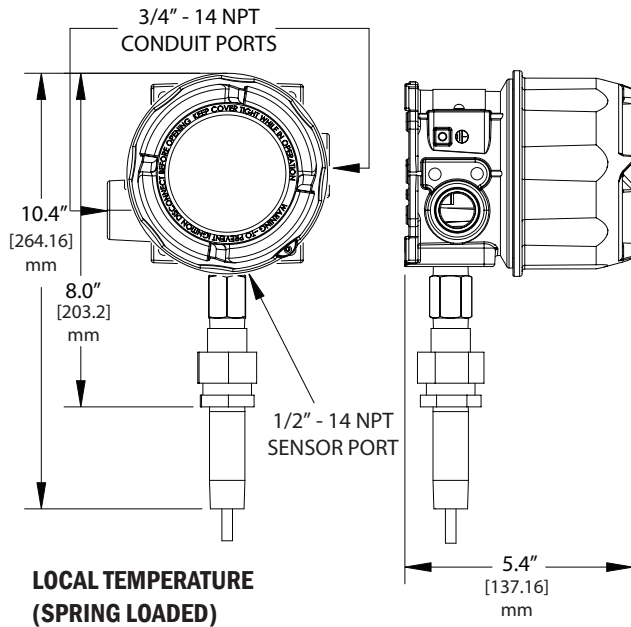
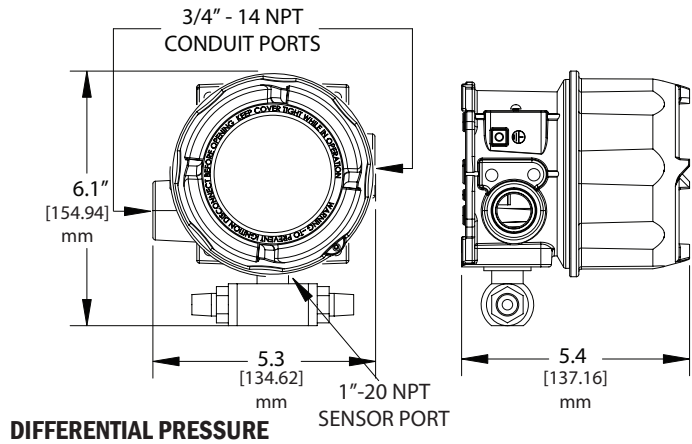
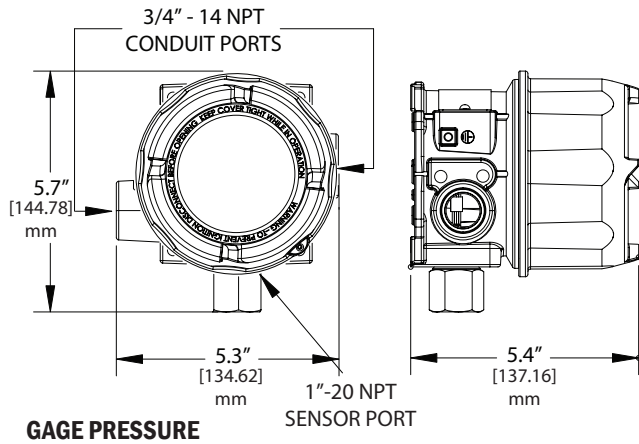


Figure 19

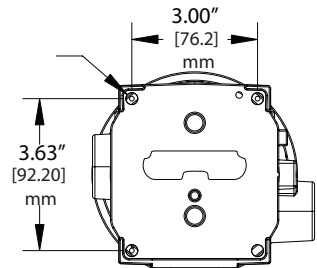


## DIMENSIONAL DRAWINGS

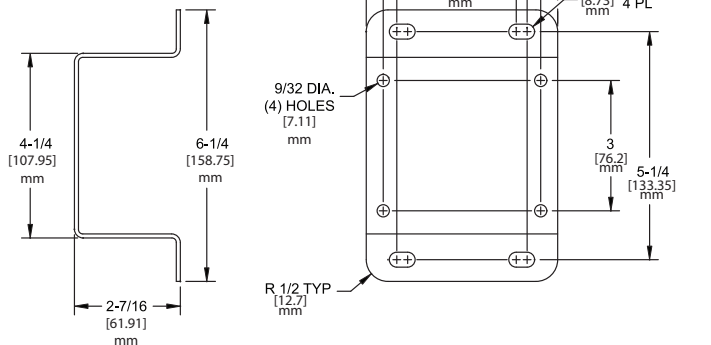


**LOCAL TEMPERATURE  
(WELDED)**

CLEARANCE  
HOLE FOR 1/4" BOLT  
4 PLCS



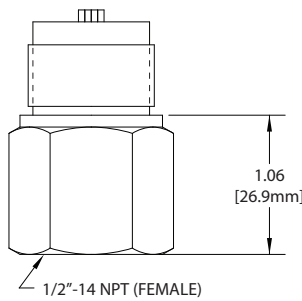
### SURFACE MOUNTING KIT 6361-704



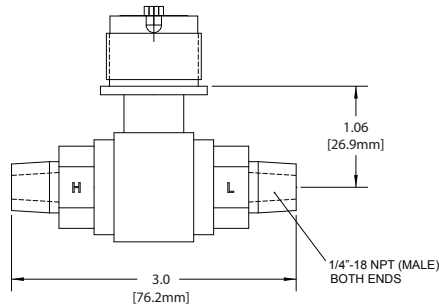
# SENSOR OPTIONS

## Pressure Sensors

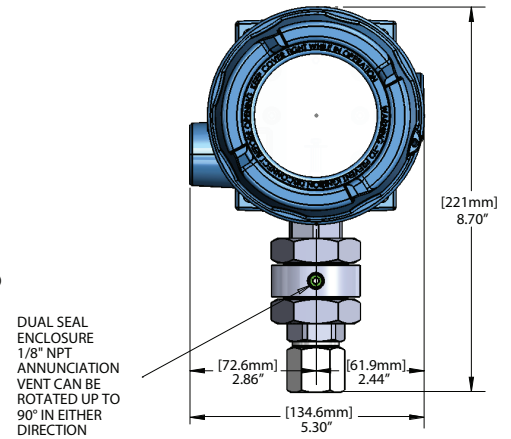
### Gauge Pressure



### Differential Pressure

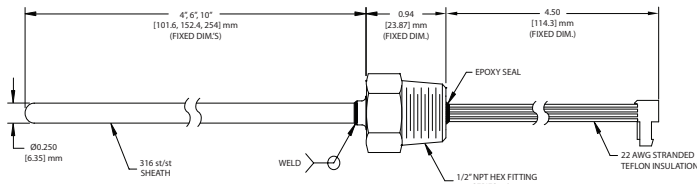


### Dual Seal with Gage Pressure Sensor (Option M041)

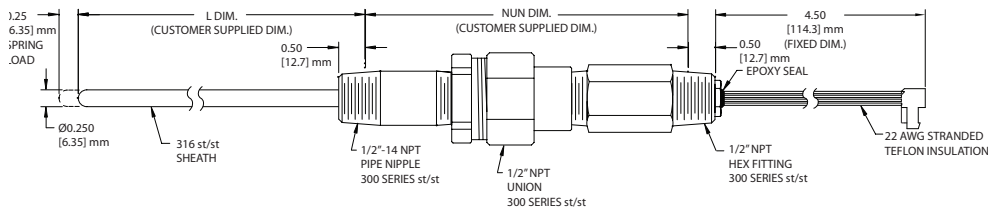


## Temperature Sensors

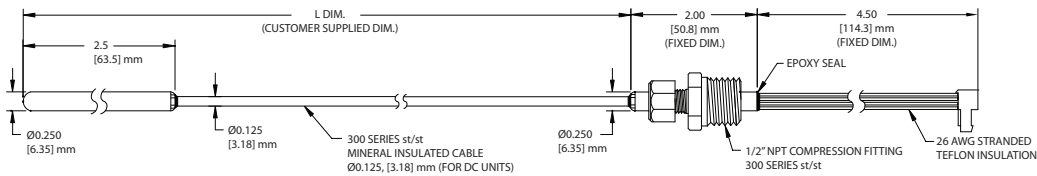
### Fixed Local (TL1 - TL3)



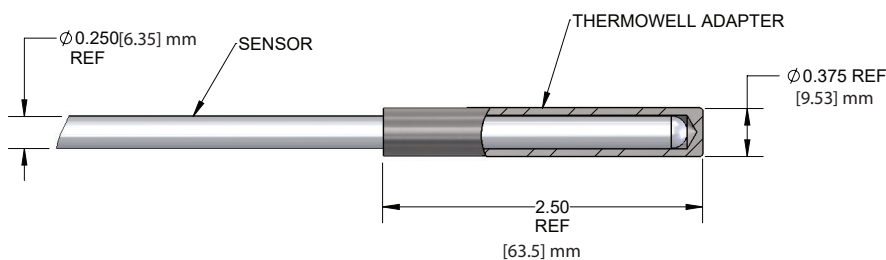
### Spring Loaded Local (TTC)



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



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



## FRENCH WARNING TRANSLATIONS

| Page | Warning Text                                                                                                                                                                                                                                                                                                                                                                                                                                      | Texte d'avertissement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | 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.                                                                                                                                                                                          | 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.                                                                                                                                                                                                                                                           |
| 1    | Substitution of components may impair suitability for use in hazardous locations.                                                                                                                                                                                                                                                                                                                                                                 | La substitution de composants peut nuire à l'aptitude à l'utilisation dans des endroits dangereux.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1    | 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 2.                                                                  | 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 5 cm de l'enceinte. Plus de détails sont fournis à la page (2).                                                                                                                       |
| 1    | 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. | Installez les unités où le choc, vibration et les fluctuations de température sont minimales. 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 local. L'utilisation envelopper est recommandée lorsque le soleil et la pluie peuvent entrer en contact avec le boîtier. |
| 1    | In order to meet the electromagnetic compatibility requirements specified in EN61000-6-2: Immunity for Industrial Environments, external wiring must be run using cable with a grounded shield or cable run inside of a grounded metal conduit.                                                                                                                                                                                                   | Afin de répondre aux exigences de compatibilité électromagnétique spécifiées dans EN61000-6-2: Immunité pour les environnements industriels, le câblage externe doit être exécuté en utilisant un câble avec un bouclier à la terre ou longueur de câble à l'intérieur d'un conduit métallique.                                                                                                                                                                                                                                                         |
| 1    | Interference from improperly shielded VFD's (Variable Frequency Drives) and motor controllers may cause nuisance trips.                                                                                                                                                                                                                                                                                                                           | Les interférences provenant de VFD's (variateurs de fréquence) et de contrôleurs de moteur mal blindés peuvent provoquer des déclenchements intempestifs.                                                                                                                                                                                                                                                                                                                                                                                               |
| 2    | Continuous operation should not exceed the designated over range pressure or working pressure range stated within the literature and on device nameplate.                                                                                                                                                                                                                                                                                         | Le fonctionnement continu ne doit pas dépasser la pression de dépassement ou la plage de pression de fonctionnement indiquée dans la documentation et sur la plaque signalétique de l'appareil.                                                                                                                                                                                                                                                                                                                                                         |
| 3    | Before installing, check the sensor model selected for compatibility to the process media in contact with the sensor and wetted parts.                                                                                                                                                                                                                                                                                                            | 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.                                                                                                                                                                                                                                                                                                                                                                                 |
| 3    | In all applications, secure the enclosure as detailed below. Do not mount via the process connection only.                                                                                                                                                                                                                                                                                                                                        | Dans toutes les applications, sécuriser l'enceinte comme détaillé ci-dessous. Ne pas installer par la connexion de processus seulement.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4    | For pressure and local temperature models, always hold a wrench on the sensor housing hex when mounting the device. Do not tighten by turning the enclosure, as this will damage the connection between the sensor and housing.                                                                                                                                                                                                                   | Pour tous 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.                                                                                                                                                                                                                                                                                                    |

## FRENCH WARNING TRANSLATIONS CONT.

| Page | Warning Text                                                                                                                                                                                                                                                                                                                                                                                     | Texte d'avertissement                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4    | For differential pressure models (especially low range units), mount the sensor level to minimize any pressure reading offsets. The offset command may be used to zero the display (see page 13 for additional information).                                                                                                                                                                     | Pour les modèles de pression différentielle (de pressions faibles), montez le niveau du capteur afin de minimiser tout décalage de lecture de pression. La commande décalée peut être utilisée pour mettre l'affichage à zéro (voir la page xx pour plus d'informations).                                                                                                                                                                                   |
| 4    | Never insert any object into the pressure sensor opening. Damage to the sensor will result, affecting accuracy.                                                                                                                                                                                                                                                                                  | 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.                                                                                                                                                                                                                                                                                                               |
| 5    | To prevent electrostatic discharge, wipe down cover and enclosure of any dust build-up before removing cover.                                                                                                                                                                                                                                                                                    | Pour éviter les décharges électrostatiques, nettoyez le capot et le boîtier de toute accumulation de poussière avant de retirer le capot.                                                                                                                                                                                                                                                                                                                   |
| 5    | Disconnect all supply circuits before wiring device. Wire device in accordance with local and national electrical codes. Maximum recommended wire size and recommended tightening torque for field wiring terminal blocks are shown within table 2 (page 5).                                                                                                                                     | 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 borniers sont indiqués dans le tableau 2 (la page 5).                                                                                                                                                    |
| 5    | To prevent seizure of enclosure cover, do not remove lubricant. Threads should also be free of dirt and other contaminants.                                                                                                                                                                                                                                                                      | Pour éviter le grippage du couvercle du boîtier, ne pas enlever le lubrifiant. Les fils doivent également être exempts de saleté et d'autres contaminants.                                                                                                                                                                                                                                                                                                  |
| 5    | 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 non-hazardous.                                                                                                                                                                                | 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.                                                                                                                                                                               |
| 5    | Do not replace components unless power has been switched off or the area is known to be non-hazardous.                                                                                                                                                                                                                                                                                           | Ne remplacez pas les composants avant que le courant soit coupé ou que la zone est connue pour être non explosives.                                                                                                                                                                                                                                                                                                                                         |
| 5    | The devices shall be properly grounded in the end use application using the ground screws provided with the enclosure.                                                                                                                                                                                                                                                                           | Les appareils doivent être correctement mis à la terre en utilisant les vis de terre fournies avec l'enceinte.                                                                                                                                                                                                                                                                                                                                              |
| 5    | Field wiring must be rated 105°C minimum. For ambient temperatures below -10°C, use suitable field wiring.                                                                                                                                                                                                                                                                                       | Câblage sur le terrain doit être évalué à 105°C minimum. Pour une température ambiante inférieure à -10°C, utiliser le câblage approprié.                                                                                                                                                                                                                                                                                                                   |
| 5    | Model 2SLP is loop-powered and obtains operating power from the 4-20 mA loop. The power supply providing power to the loop must be Class 2 or SELV and current limited. The maximum load rating for the Safety Relay Output (SRO) is shown in Table 3 on page 6. Overloading the SRO may cause failure. The SRO must not be connected directly to a power supply without a suitable series load. | Le modèle 2SLP est alimenté en boucle et tire son énergie de la boucle 4-20 mA. L'alimentation qui alimente la boucle doit être de classe 2 ou SELV et limitée en courant. La charge nominale maximale pour la sortie du relais de sécurité (SRO) est indiquée dans le tableau 3, à la page 6. Une surcharge du SRO peut provoquer une panne. Le SRO ne doit pas être connecté directement à une source d'alimentation sans une charge en série appropriée. |
| 13   | 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 display.                                                                             | L'utilisation de cette option peut créer une condition dans laquelle l'écran peut indiquer «0,00» lorsqu'une pression ou une température significative (jusqu'à 10% de la plage maximale) existe dans le système. Une vérification indépendante de la variable de processus doit être effectuée avant la maintenance du système lorsque «offset» apparaît à l'écran.                                                                                        |

## 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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Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.



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