ELECTRONIC PRESSURE AND TEMPERATURE SWITCHES

The Preferred Choice for Plant Instrumentation Upgrades

FEATURES

• 2-Wire models for PLC & DCS input switching
• High-power models for local switching applications
• Patented Electronic IAW® self-diagnostics
• Plugged Port detection
• All Solid-State – no moving parts
• 100% Programmable Set Point and deadband
• Large Process Display
• and ATEX Certified for hazardous location service

Field-Scalable 4-20mA Models Now Available!
OVERVIEW

MODELS 2W2D & 2W3A - PLC & DCS DISCRETE INPUT SWITCHING
The One Series 2-Wire derives its operating power from the discrete input to which it is connected. Unlike a transmitter, it will do this on a digital channel, not a more expensive analog channel. In most applications this will be the input of a Programmable Logic Controller (PLC), a Distributed Control System (DCS) or an interposing relay. When operating in an “OPEN” condition, One Series 2-Wire draws less than 750 uA of current, which the host device interprets as an open condition. When operating in a “CLOSED” state the switch will pass enough current to be interpreted by the host as a closed condition.

Whether it’s internal switch is open or closed, the One Series 2-Wire obtains a minute but sufficient amount of power to operate continuously - directly from the discrete input. No separate power wiring is required. The PLC/DCS input interprets the One Series 2-Wire connection as if it were mechanical contacts - JUST LIKE A SWITCH!

MODEL 2WLP - LOOP-POWERED TRANSMITTER AND SWITCH IN ONE
A 4-20 mA loop-powered version of the One Series is now available. This model derives its power from a 4-20 mA loop, rather than from a discrete PLC input, and provides isolated analog and solid-state switch outputs. The 4-20 mA analog signal changes proportionately with the changes in the process while the switch can trigger an alarm or initiate a shutdown when a programmable threshold is reached. Because the switch is loop-powered, there are no extra wiring requirements; 2 wires go out to the load for local or remote switching while 2 wires send the 4-20 mA signal back to the PLC for process trending. This model potentially replaces a switch, gauge and transmitter with one instrument, using only one process tap!

MODEL 4W3A - HIGH-POWER LOCAL SWITCHING
Incorporating an integral solid-state relay (SSR), this model directly handles 10 amperes and up to 280 VAC, providing a local switching capability for controlling large loads directly. Switch decisions are made within 60 milliseconds, making this One Series ideal for pump and compressor protection applications. All of the powerful One Series features are incorporated into this 115 VAC-powered model such as Plug Port detection, Delay nuisance trip filtering and Manual Reset included! And the IAW® (I Am Working) watchdog self-diagnostics continuously monitor the health and status of the switch, providing piece of mind in critical applications. No PLC or DCS is required since power is provided separately.

MODEL 8W2D - TWO INDEPENDENT SOLID-STATE RELAYS + 4-20 mA
Each solid-state relay in this 24 VDC-powered model has an independent set point and deadband to provide precise control for two local or remote loads. The relays can handle up to 250 VAC at 1.5 A for local switching applications. Alternatively, a 0-140 VAC and VDC relay can be substituted for either one or both relays to provide remote switching at the PLC or DCS input. In addition to the switches, there is a field-scalable 4-20 mA analog signal providing continuous process trending information. Considering the digital display, now there is an excellent choice for replacing a switch, a gauge and a transmitter - all with one instrument and one process connection. Fewer leak paths, lower cost, higher reliability - the One Series 8W2D is the ultimate in versatile electronic switching.

- Patented IAW® self diagnostic software assures the One Series will switch when needed
- Local LCD display of process and programming values
- All solid state; no moving parts
- No regular calibration required; extended service life
- Field adjustments for offset and span
- Set point and deadband adjustable up to 100% of range
- Digital accuracy and 0.1% repeatability over wide temperature range
- 3-year warranty
KEY FEATURES

• **Keypad display**  Large, easy-to-read display, showing the process condition and the status of the switch. Set point, deadband and minimum/maximum process values can be easily accessed from the keypad while in operation. Settings are protected from unauthorized access via specific keypad sequencing. All values are stored in non-volatile memory.

• **IAW® (I AM WORKING) self-diagnostics**  All One Series models contain the patented IAW® self-diagnostics feature, giving the user peace-of-mind that the instrument is operating properly and will switch when required. Locally, animated IAW® arrows and display messages inform the operator of problems detected. Remotely, the switch output can be configured to alert the control room operator of the IAW® status.

• **2-Wire design**  (2W2D & 2W3A models)  The One Series 2-Wire innovative design allows the unit to power itself, and switch, using the same two wires. The electronic switch’s low power requirements allow the One Series 2-Wire to operate using residual current from the PLC discrete input, totally undetected during an open switch condition.

• **Easy wiring**  The One Series 2-Wire is a direct drop-in replacement for a switch that is attached to a PLC, using the same two wires. No other wiring is necessary. Power and switching signals are accommodated over the same (existing) wire pair. The terminal block wiring is effective for either new construction or field replacement.

CERTIFIED FOR DIVISION 2 HAZARDOUS LOCATIONS

• **Certified to Enclosure Type 4X/IP66**  Corrosion resistant enclosure is epoxy-coated aluminum with a gasketed, polycarbonate faceplate to withstand harsh and dirty environments, and plant washdowns. The pressure sensors are stainless steel welded construction.

• **Agency Certifications: cULus, ATEX, and CE approvals**  The One Series has been rigorously tested by independent agencies to ensure adherence to required industrial specifications, manufacturing practices and quality. Each One Series is backed by a limited 3-year warranty. United Electric Controls is an ISO 9001 certified manufacturing company.

• **Intrinsically safe**  (with IS barrier, 2W2D model only)  The One Series 2-Wire is approved for use in intrinsically-safe (Class I, Div. 1) applications. United Electric’s galvanically-isolated barrier (option M036), part no. 62169-29 is custom-designed for use with the One Series. The One Series is also compatible with standard 28 volt diode barriers supplied by most major manufacturers including MTL 7087+ and Pepperl+Fuchs Z787. Without the safety barrier, all One Series models are approved for Division 2 Hazardous locations.

ADVANCED FEATURES

BUILT INTO ALL ONE SERIES MODELS

• **Recording of minimum and maximum process readings**  A very useful feature of the One Series is its ability to read and record the minimum and maximum process “extremes” in non-volatile memory. The values remain in memory until they are manually reset, using the keypad.

• **Offset and span**  adjustment for calibrating to user instrument and system requirements.

• **Plug Port detection**  One Series IAW® includes an algorithm for detecting a plugged or isolated pressure sensor port, where the medium is viscous or contains particulate matter. When Plugged Port detection is enabled, the One Series display will alert the user locally and remotely, using its IAW® indications.

• **Latching or automatic reset**  The switch output can be field-configured for either automatic reset or latching. The latching feature provides a “manual reset” requirement, making it necessary for the operator to intervene and determine why the alarm occurred. (Excluding model 8W2D)

• **Delay (nuisance trip) filtering**  The One Series is designed to react within 60 mS to process variations. Certain short-duration events (pressure spikes and transients) can cause nuisance trips and shut down a process unnecessarily. Delay filtering can be enabled by choosing a time duration (1/4, 1/2, 1 or 2 seconds) within which the One Series will ignore (filter out) the process variation. With this feature disabled, the One Series reacts within 60 mS to all process variations.
APPLICATIONS

In the past, there were two choices for alarm and/or shutdown applications: an electro-mechanical switch, or a transmitter. The switch had the advantages of low cost and simple operation. The transmitter was higher cost, but offered diagnostic information through its “live zero” and perceived higher reliability. The customer had to choose.

Then came the One Series, a family of rugged electronic switches with the combination of low cost, reliability and diagnostics. It was the cost-effective answer for many applications which required the combination of “switch” function and “health” information. It has achieved widespread usage in the process and energy industries.

REPLACING MECHANICAL SWITCHES

By utilizing residual current from the host, the One Series 2-Wire models provide digital switching on a single pair of wires. This allows the user to retrofit existing mechanical switches with no wiring changes, as long as the circuit is a low power discrete input (such as a PLC or DCS input). Combining a process display, self-diagnostics, digital electronics and full programmability, The One Series 2-Wire solves many of the issues associated with mechanical switching. With no moving parts, vibration intensive and high cycle rate applications are no problem for the One Series.

REPLACING TRANSMITTERS

The One Series versatility also makes it the ideal solution for alarm and shutdown applications previously accomplished by transmitters. Typically, transmitters are used in switching applications when a “live-zero” is desired - to confirm that the device is working. However, transmitters have two weaknesses - they are typically slow-reacting to process changes, and they are expensive. The One Series provides the IAW® diagnostics for similar peace-of-mind to the transmitter’s 4-20 signal, but is typically much faster-responding to process upsets, and can use less-expensive digital channels, reducing cost. The $1100 installed cost of a transmitter can be reduced by $300 to $700 per unit!

REPLACING A SWITCH, GAUGE AND TRANSMITTER

The One Series 2WLP models obtain operating power in the same way that transmitters do – directly from a 4-20 mA loop. This feature provides many advantages. First, separate power wiring (and expense) is not required. Second, a proportional analog signal can be sent back to the PLC or DCS for remote process monitoring, diagnostics and trending. Third, with its integral solid-state relay, this one instrument can replace up to 3 others – a switch, gauge and a transmitter, providing a huge cost savings, less leakage paths and an improvement in system reliability. The 2WLP may also be used as just a low-cost transmitter or just a loop-powered switch, if desired.

Applications include pressure and temperature measurements for rotating equipment protection, process and tank monitoring, and boiler/burner alarms. With adjustable deadband from 0-100% of range, the One Series is the perfect solution to optimize and protect pumps!

The One Series is field-proven in many process industries including chemical, food, pharmaceutical, energy, wastewater and refinery applications.
TECHNOLOGY

SWITCH DESIGN
The One Series is a microprocessor-based pressure or temperature instrument with an extremely low power design. A digital display gives real-time process and diagnostic information and simplifies programming. Because of its unique interface and low power design, the One Series 2-Wire can be attached to a PLC, DCS, or many common relays, using only 2 wires.

OPERATION
The One Series uses a stainless steel pressure transducer or temperature sensor to provide input to a micro-controller for making switch decisions. Programming and interrogating the One Series is done through two buttons on the faceplate. A sequence of key strokes for programming provides tamper resistance.

- The input is filtered, as programmed by the user.
- The value is compared to the programmed set point and deadband information.
- The output state is changed if required.
- The digital display is updated.
- The value is recorded, with a new maximum or minimum reading, for later interrogation by the user.
- The Plugged Port feature monitors the process to detect a clogged sensor.

IAW® (I AM WORKING) SELF-DIAGNOSTICS
One Series contains UE’s patented IAW® algorithm, providing both local and remote assurance of switch health, switch status, and fault conditions. The switch output can be configured to operate in either the IAW® (remote diagnostic mode) or simple on-off manner. When programmed for IAW® operation, the switch has three possible states. Various switch operating modes are shown in the table below.

<table>
<thead>
<tr>
<th>Switch Mode</th>
<th>Display</th>
<th>Switch States</th>
<th>Switch Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open on Rise (Default)</td>
<td>OPEN RISE</td>
<td>2</td>
<td>Normally closes, opens as variable increases to set point, opens on fault</td>
</tr>
<tr>
<td>Close on Rise</td>
<td>CLOS RISE</td>
<td>2</td>
<td>Normally open, closes as variable increases to set point, opens on fault</td>
</tr>
<tr>
<td>Open on Fall</td>
<td>OPEN FALL</td>
<td>2</td>
<td>Normally closes, opens as variable decreases to set point, opens on fault</td>
</tr>
<tr>
<td>Close on Fall</td>
<td>CLOS FALL</td>
<td>2</td>
<td>Normally open, closes as variable increases to set point, opens on fault</td>
</tr>
<tr>
<td>Pulse on Rise (IAW®)*</td>
<td>PULS RISE</td>
<td>3</td>
<td>Normally closed, pulses as variable increases to set point, opens on fault</td>
</tr>
<tr>
<td>Pulse on Fall (IAW®)*</td>
<td>PULS FALL</td>
<td>3</td>
<td>Normally open, pulses as variable decreases to set point, opens on fault</td>
</tr>
</tbody>
</table>

* Not available on 8W2D models

PLUGGED PORT DETECTION
The Plugged Port Detection feature, if enabled by the user, monitors the changes in the process variable over time. If there is sufficient fluctuation in the process variable, no problem is reported. If the process variable does not change (flattens) over the specified time period, a Plugged Port condition will be displayed. Both the amount of variation and the period of time to be monitored are user-programmable.
### SPECIFICATIONS

**Power input:**

- **Model 2W2D**: 12-30 VDC @ 750 µA derived from a PLC or DCS discrete input, or suitable load
- **Model 2W3A**: 90-130 VAC or VDC @ 1 mA derived from a PLC or DCS discrete input, or suitable load
- **Model 2WLP**: 10-36 VDC @ 4-20 mA loop-powered
- **Model 4W3A**: 90-130 VAC @ 15 mA external power supply
- **Model 8W2D**: 10-30 VDC @ 30 mA external power supply

**Accuracy:**

0.5% of full range span, under nominal conditions

**Repeatability:**

0.1% of full range span

**Ambient operating temperature range:**

- **Models 2W2D and 2W3A**: -40 to 185°F (-40 to 85°C)
- **Model 2WLP and 8W2D**: -40 to 176°F (-40 to 80°C)
- **Model 4W3A**: -40 to 158°F (-40 to 70°C)
- Full display visibility, all models: -4 to 158°F (-20 to 70°C)

**Long-term Stability:**

±0.25% of range/year maximum

**Temperature drift:**

0.03% of full scale per °C

**Switch response time:**

“Change-of-output” response within 60 mS (for detection of full step change and change of output state, delay feature off)

**Display response time:**

400 mS

**Response time filtering:**

Software-configurable between 250 mS and 2 seconds in 2X increments

**Diagnostics (IAW®):**

Open or shorted sensor; plugged port; power supply out of range; over and under-range conditions; microprocessor faults/failure; keypad short; switch fault

**Output states:**

Field selectable for 2-state or 3-state operation.

- **For 2-state operation**: (Default Setting)
  - Output will remain in one state (open or close) during normal (“inside threshold”) operation; change to the opposite state for “at and outside threshold” conditions. However, unit must be configured as normally closed (Open rise, Open fall) in order that a diagnostic or other failure will produce an open output state.
- **For 3-state operation**:
  - Output will remain in closed state during normal (“inside threshold”) operation; change to open state to indicate a fault/failure; and change between closed and open (pulse) state during “at and outside threshold” conditions.
  - Pulse rates vary by model. Fast and slow rates are selectable. See Table.

<table>
<thead>
<tr>
<th>Pulse Rate Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>2W2D</td>
</tr>
<tr>
<td>FAST</td>
</tr>
<tr>
<td>SLOW</td>
</tr>
</tbody>
</table>

**Control modes:**

Field configurable for change of state above or below set point value. Software configurable for automatic or manual reset
Analog output:
4-20 mA output, 700 ohms max. at 24 VDC, Field scalable, 2:1 turn down

Switch Output:

<table>
<thead>
<tr>
<th>Model Number</th>
<th>SW1</th>
<th>SW2</th>
<th>Minimum Load Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2W2D00</td>
<td>12-30 VDC @ 40 mA</td>
<td>N/A</td>
<td>2.30 mA</td>
</tr>
<tr>
<td>2W3A00</td>
<td>90-130 VAC/VDC @ 100 mA</td>
<td>N/A</td>
<td>3.75 mA</td>
</tr>
<tr>
<td>2WLP41</td>
<td>0-140 VAC/VDC @ 0.6 A</td>
<td>N/A</td>
<td>0 mA</td>
</tr>
<tr>
<td>2WLP43</td>
<td>0-280 VAC/VDC @ 0.3A</td>
<td>N/A</td>
<td>0 mA</td>
</tr>
<tr>
<td>4W3A01</td>
<td>24-280 VAC @ 10 A (max.*)</td>
<td>N/A</td>
<td>150 mA</td>
</tr>
<tr>
<td>8W2D42</td>
<td>75-250 VAC @ 1.5 A</td>
<td>75-250 VAC @ 1.5 A</td>
<td>SW1 - 50 mA, SW2 - 50 mA</td>
</tr>
<tr>
<td>8W2D44</td>
<td>75-250 VAC @ 1.5 A</td>
<td>0-140 VAC/VDC @ 0.6 A</td>
<td>SW1 - 50 mA, SW2 - 0 mA</td>
</tr>
<tr>
<td>8W2D45</td>
<td>0-140 VAC/VDC @ 0.6 A</td>
<td>0-140 VAC/VDC @ 0.6 A</td>
<td>SW1 - 0 mA, SW2 - 0 mA</td>
</tr>
</tbody>
</table>

1 Derate at 8% per 10°C (18°F) for temperatures above 21°C (70°F)
2 Derate at 8 A per 10°C (18°F) for temperature above 38°C (100°F)
3 Derate at 10% per 10°C (18°F) for temperatures above 21°C (70°F)

Electrical characteristics: (Models 2W2D & 2W3A only)
Model 2W2D Switch open: 12-30 VDC @ 750 µA maximum; switch closed: 4.7 VDC @ 40mA, max
Model 2W3A Switch open: 90-130 VAC or VDC @ 1 mA maximum; switch closed: 13 VAC or VDC @ 100 mA, max

Enclosure: Certified to Enclosure Type 4X/IP66, epoxy-coated aluminum

Faceplate: UV-resistant Lexan® (polycarbonate) with 2-button membrane switch and overlay

Wiring terminations: Model 2W2D and 2W3A: terminal block with 3 screw connections (2 for switch, 1 for chassis ground)
Model 2WLP: terminal block 1 with 3 screw connections (2 for switch, 1 for chassis ground), terminal block 2 with 2 screw connections for 4-20 mA loop
Model 4W3A: terminal block with 4 screw connections (2 for ac switch, 2 for ac power)
Model 8W2D: three terminal blocks (1 for DC power, 1 for 4-20 mA output and 1 for both SSR switches)

Conduit: 1/2" NPT (female), Dual ports (2) for Model 2WLP and 8W2D only

Lexan® is a registered trademark of General Electric Co.
IAW® is a registered trademark of United Electric Controls Co.
Specifications subject to change without notice
| **Display:** | Local 4 digit x 0.5" LCD  
I Am Working (IAW®) status arrows  
Process Variable  
Units of measure  
Switch status  
Latch status  
Set point value  
Deadband value  
Min/Max values  
Fault codes |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Set point &amp; deadband:</strong></td>
<td>User-configured, 100 % adjustable over entire sensor range</td>
</tr>
<tr>
<td><strong>Memory:</strong></td>
<td>Programming and data protected by non-volatile EEPROM</td>
</tr>
<tr>
<td><strong>Effective transmission distance</strong></td>
<td>2,000 feet at rated voltage for 2W2D and 2W3A</td>
</tr>
</tbody>
</table>
| **Sensors:** | **Gauge Pressure** – 316 stainless steel, welded diaphragm, 1/2" NPT (female) process connection, micro-machined piezo-resistive strain gauge silicon element, 0.25 ml silicone oil fill.  
Media temperature: -40 to 257°F (-40 to 125°C)  
**Differential Pressure** - 316 stainless steel, welded diaphragms, 1/4" NPT (male) process connections, piezo-resistive strain gauge silicon element, silicone oil fill.  
Media temperature: -40 to 257°F (-40 to 125°C)  
**Temperature** – 316 stainless steel 0.25" OD sheath containing a 100 ohm 4-wire platinum RTD element available with epoxy fill (local low temp) or powder fill (remote high temp).  
Media temperature: -300 to 1000°F (-184 to 538°C) |
| **EMI/RFI:** | Compliance to CE EMC requirements: EN 55011, EN 61326, EN 61000-6-2 |
| **Emission:** | EN 55011 class A; Radiated emissions  
EN 61000-3-2 Harmonic Current Emissions |
| **Immunity:** | EN 61000-3-3 Immunity to Voltage Fluctuations and Flicker  
EN 61000-4-2 Immunity to Electrostatic Discharge  
EN 61000-4-3 Immunity to Continuous Radiated Disturbances  
EN 61000-4-4 Immunity to Electrical Fast Transients  
EN 61000-4-5 Immunity to Surges  
EN 61000-4-6 Immunity to Continuous Conducted Disturbances  
EN 61000-4-8 Immunity to Power Frequency Magnetic Field  
EN 61000-4-11 Immunity to Voltage Dips and Interruptions |
2W & 8W APPROVALS & RATINGS

UNITED STATES AND CANADA

2W2D
Class I, Division 1* and 2, Groups A, B, C & D
Class II, Division 1* and 2, Groups E, F & G
Class III
Class I, Zone 0, AEx ia IIC T5
Class I, Zone 0, Ex ia IIC T5
Enclosure Type 4X
* Intrinsically safe when used with suitable barrier per drawing # A-62174-19

2W2D & 2W3A,
Class I, Division 2, Groups A, B, C & D
Class II, Division 2, Groups F & G
Class III
Class I, Zone 2, AEx nC IIC T5
Class I, Zone 2, Ex nC IIC T5
Enclosure Type 4X

2WLP
Class I, Division 2, Groups A, B, C & D
Class II, Division 2, Groups F & G
Class III
Class I, Zone 2, AEx nC IIC T4
Class I, Zone 2, Ex nC IIC T4
Enclosure Type 4X

8W2D
Class I, Division 2, Groups A, B, C & D, T4A
Class II, Division 2, Groups F & G
Class III
Class I, Zone 2, AEx nC IIC T4A**
Class I, Zone 2, Ex nC IIC T4A**
Enclosure Type 4X

UL Listed, cUL Certified
2W2D, 2W3A, 2WLP & 8W2D
Pressure & Temperature: UL 50, 508, 913, 1604 & 2279;
- File # E226592

EUROPE

ATEX Directive (94/9/EC)
2W2D
II 1 G EEx ia IIC T5 (OPTIONAL – code M419)
II 1 D T+90°C
Tamb = -40°C to +85°C, IP 66
I.S. when installed per drawing # A-62174-20

2W2D, 2W3A & 8W2D**
II 3 G EEx nL IIC T5 (OPTIONAL – code M419)
II 3 D T+90°C
Tamb = -40°C to +85°C, IP 66

2WLP**
II 3 G EEx nL IIC T4 (OPTIONAL – code M419)
II 3 D T+130°C
Tamb = -40°C to +80°C, IP 66

UL International DEMKO A/S (N.B.# 0539)
Certificate # DEMKO 03 ATEX 032281X (2W2D & 2WLP)
EN 50014, 50020, 50021, 50284, 50281-1-1 & 60529
Certificate # DEMKO 03 ATEX 135585X (2W3A)
EN 50021, 50281-1-1 & 60529

Pressure Equipment Directive (PED) (97/23/EC)
Gauge pressure models only
Category IV, Module H1 (OPTIONAL – code M407)
TÜV Süddeutschland Bau und Betrieb GmbH (N.B.# 0036)
Certificate # USA 02/04/38/001 thru USA 02/07/38/033

Electromagnetic Compatibility Directive (EMC)

2W2D
UL International EMC Services
Certificate File # NC4525
EN 55011, 61000-4-2 thru 61000-4-6, 61000-4-8 & 61000-6-2

2W3A, 2WLP & 8W2D
Intertek ETL Entela
EN 55011, EN 61326

RUSSIA

2W2D, 8W2D** (Gauge Pressure models only)
Gosportechnadzor Permit (OPTIONAL – code M406)
OExiaIBTS
Tamb = -40°C to +85°C
NANIO CCVE Certification Center
Certificate # RRS 04-8896
GOST 12.2.007.0, GOST R 51330.0 & 51330.10
** Pending Approvals

4W APPROVALS & RATINGS

UNITED STATES AND CANADA

Class I, Division 2, Groups A, B, C & D
Class II, Division 2, Groups F & G
Class III
Class I, Zone 2, AEx nC IIC T4A
Class I, Zone 2, Ex nC IIC T4A
Enclosure Type 4X

UL Listed, cUL Certified
Pressure & Temperature: UL 50, 913, 1604 & 2279;
- File # E226592
HOW TO ORDER

ONE SERIES ELECTRONIC SWITCH  User adjustable, digital indicating, 2-Wire and external power configurations. Build a part number by selecting appropriate code for each feature category. Example: **2W2D00P10-M276**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2W2D00</td>
<td>Discrete input powered, 12-30 VDC, 40 mA</td>
</tr>
<tr>
<td>2W3A00</td>
<td>Discrete input powered, 90-130 VAC or VDC, 100 mA</td>
</tr>
<tr>
<td>2WLP41</td>
<td>Loop-powered 4-20 mA output and 0-140 VAC or VDC, 0.6 A</td>
</tr>
<tr>
<td>2WLP43</td>
<td>Loop-powered 4-20 mA output and 0-280 VAC or VDC, 0.3 A</td>
</tr>
<tr>
<td>4W3A01</td>
<td>90-130 VAC Power Input, 24-280 VAC, 10 A</td>
</tr>
<tr>
<td>8W2D42</td>
<td>External powered by 10-30 VDC, two 75-250 VAC @ 1.5 A SSRs, 4-20 mA output</td>
</tr>
<tr>
<td>8W2D44</td>
<td>External powered by 10-30 VDC, one 75-250 VAC @ 1.5 A SSR, one 0-140 VAC/VDC @ 0.6 A SSR, 4-20 mA output</td>
</tr>
<tr>
<td>8W2D45</td>
<td>External powered by 10-30 VDC, two 0-140 VAC/VDC @ 0.6 A SSRs, 4-20 mA output</td>
</tr>
</tbody>
</table>

**SENSOR TYPE**

- P  Gauge Pressure, 316L stainless steel welded diaphragm, 1/2" NPT (female)
- K  Differential Pressure, 316L stainless steel welded diaphragm, 1/4" NPT (male)
- T  Temperature, 100 ohm RTD, 316 stainless steel sheath, 0.25" OD*

**SENSOR RANGE AND CONFIGURATION**

<table>
<thead>
<tr>
<th>GAUGE PRESSURE</th>
<th>Range</th>
<th>Maximum Over Range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0-5</td>
<td>10 (689) (see Option M275 for &quot;wc)</td>
</tr>
<tr>
<td>11</td>
<td>0-15</td>
<td>30 (2068)</td>
</tr>
<tr>
<td>12</td>
<td>0-30</td>
<td>60 (4137)</td>
</tr>
<tr>
<td>13</td>
<td>0-50</td>
<td>100 (6895)</td>
</tr>
<tr>
<td>14</td>
<td>0-100</td>
<td>200 13,8</td>
</tr>
<tr>
<td>15</td>
<td>0-300</td>
<td>600 41,4</td>
</tr>
<tr>
<td>16</td>
<td>0-500</td>
<td>1000 68,9</td>
</tr>
<tr>
<td>17</td>
<td>0-1000</td>
<td>2000 137,9</td>
</tr>
<tr>
<td>18</td>
<td>0-3000</td>
<td>6000 413,7</td>
</tr>
<tr>
<td>19</td>
<td>0-4500</td>
<td>9000 620,5</td>
</tr>
<tr>
<td>20</td>
<td>0-6000</td>
<td>10000 6895</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIFFERENTIAL PRESSURE</th>
<th>Range1</th>
<th>Over Range2</th>
<th>Working3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0-5</td>
<td>10 10,7</td>
<td>50 3,4</td>
</tr>
<tr>
<td>11</td>
<td>0-50</td>
<td>100 6,9</td>
<td>500 34,5</td>
</tr>
<tr>
<td>12</td>
<td>0-100</td>
<td>200 13,8</td>
<td>1000 68,9</td>
</tr>
<tr>
<td>13</td>
<td>0-200</td>
<td>400 27,6</td>
<td>1000 68,9</td>
</tr>
</tbody>
</table>

**RTD TEMPERATURE**

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Local mount sensor, 4&quot; probe length</td>
</tr>
<tr>
<td>L2</td>
<td>Local mount sensor, 6&quot; probe length</td>
</tr>
<tr>
<td>L3</td>
<td>Local mount sensor, 10&quot; probe length</td>
</tr>
<tr>
<td>R1</td>
<td>Remote mount sensor, 6&quot; probe length, 6&quot; Teflon extension wire</td>
</tr>
<tr>
<td>R2</td>
<td>Remote mount sensor, 6&quot; probe length, up to 30&quot; Teflon extension wire</td>
</tr>
<tr>
<td>H1</td>
<td>Remote mount sensor, 2.5&quot; probe length, 6&quot; MI extension wire (must specify length), 2W2D, 2WLP, and 8W2D models only</td>
</tr>
<tr>
<td>H2</td>
<td>Remote mount sensor, 2.5&quot; probe length, up to 30&quot; MI extension wire (must specify length), 2W2D, 2WLP, and 8W2D models only</td>
</tr>
<tr>
<td>C1</td>
<td>Remote mount sensor, 2.5&quot; probe length, 6&quot; MI extension wire,</td>
</tr>
<tr>
<td>C2</td>
<td>Remote mount sensor, 2.5&quot; probe length, up to 30&quot; MI extension wire (must specify length), 2W2D, 2WLP, and 8W2D models only</td>
</tr>
</tbody>
</table>

*Exceeding this value may damage the sensor
HOW TO ORDER continued

OPTION CODES

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL1</td>
<td>Hazardous location certificate</td>
</tr>
<tr>
<td>M036</td>
<td>Transformer isolated IS barrier (Use 62169-29 if ordered separately)</td>
</tr>
<tr>
<td>M201</td>
<td>Factory set parameters (set point, deadband, switch operating model). Must be specified when ordering per table on right:</td>
</tr>
<tr>
<td>M202</td>
<td>Factory set parameters for two switches</td>
</tr>
<tr>
<td>M270</td>
<td>Display units, degrees C for temperature</td>
</tr>
<tr>
<td>M275</td>
<td>Display units, inches of water column (P10 &amp; K10 only)</td>
</tr>
<tr>
<td>M276</td>
<td>Display units, bar or mbar</td>
</tr>
<tr>
<td>M277</td>
<td>Display units, kPa or MPa</td>
</tr>
<tr>
<td>M278</td>
<td>Display units, kg/cm^2</td>
</tr>
<tr>
<td>M406</td>
<td>Compliance per Russian Gosgortechnadzor</td>
</tr>
<tr>
<td>M407</td>
<td>PED CE category IV compliance (must order Option M419) Available on 2W &amp; 8W, models P11-P19 only</td>
</tr>
<tr>
<td>M419</td>
<td>ATEX approval (2W2D, 2WLP, and 8W2D* models only)</td>
</tr>
<tr>
<td>M444</td>
<td>Paper tag</td>
</tr>
<tr>
<td>M446</td>
<td>Stainless steel tag</td>
</tr>
<tr>
<td>M550</td>
<td>Oxygen cleaning service</td>
</tr>
<tr>
<td>M905</td>
<td>1/2” NPT (female) conduit (models 2W2D, 2W3A &amp; 4W3A only)</td>
</tr>
<tr>
<td>PF3</td>
<td>1/2” NPT compression fitting kit (temperature models L1 - L3 only)</td>
</tr>
<tr>
<td>SA6213-348</td>
<td>1/2” union connector kit (temperature models R1 &amp; RC, H1 &amp; HC, C1 &amp; CC only)</td>
</tr>
</tbody>
</table>

Differential Pressure Sensors (definitions)

1. Ranges are defined as the ranges of differential pressure between process inputs for which the sensors will operate within specified functional tolerances.
2. Over Range is defined as the maximum difference in pressure between the process inputs. Exceeding this pressure differential at any working pressure may permanently damage the sensor.
3. Working Pressure is defined as the maximum pressure at either process input. Exceeding this pressure at either process input individually or simultaneously may permanently damage the sensor.

* Pending Approvals

ONE SERIES - CONFIGURATION SELECTION GUIDE: POWER AND SWITCH OPTIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Voltage Range</th>
<th>Power/Input Type</th>
<th>SPST Switch Rating (maximum)</th>
<th>Minimum Load Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2W2D00</td>
<td>12-30 VDC</td>
<td>PLC, DCS, PC discrete input or interposing relay coil</td>
<td>30 VDC @ 40 mA</td>
<td>2.30 mA</td>
</tr>
<tr>
<td>2W3A00</td>
<td>90-130 VAC/VDC</td>
<td>PLC, DCS, PC discrete input or interposing relay coil</td>
<td>130 VAC/VDC @ 100 mA</td>
<td>3.75 mA</td>
</tr>
<tr>
<td>2WLP41 (includes 4-20 mA output)</td>
<td>10-36 VDC</td>
<td>PLC, DCS, PC analog input (loop powered) or external power supply</td>
<td>140 VAC/VDC @ 0.6 A</td>
<td>0 mA</td>
</tr>
<tr>
<td>2WLP43 (includes 4-20 mA output)</td>
<td>10-36 VDC</td>
<td>PLC, DCS, PC analog input (loop powered) or external power supply</td>
<td>280 VAC/VDC @ 0.3 A</td>
<td>0 mA</td>
</tr>
<tr>
<td>4W3A01</td>
<td>90-130 VAC</td>
<td>External power supply</td>
<td>24-280 VAC @ 10 A</td>
<td>150 mA</td>
</tr>
<tr>
<td>8W2D42 (includes 4-20 mA output)</td>
<td>10-30 VDC</td>
<td>External power supply</td>
<td>SW1: 75-250 VAC @ 1.5 A SW2: 75-250 @ 1.5 A</td>
<td>SW1: 50 mA SW2: 50 mA</td>
</tr>
<tr>
<td>8W2D44 (includes 4-20 mA output)</td>
<td>10-30 VDC</td>
<td>External power supply</td>
<td>SW1: 75-250 VAC @ 1.5 A SW2: 2-140 VAC/VDC @ 0.6 A</td>
<td>SW1: 50 mA SW2: 0 mA</td>
</tr>
<tr>
<td>8W2D45 (includes 4-20 mA output)</td>
<td>10-30 VDC</td>
<td>External power supply</td>
<td>SW1: 0-140 VAC/VDC @ 0.6 A SW2: 0-140 VAC/VDC @ 0.6 A</td>
<td>SW1: 0 mA SW2: 0 mA</td>
</tr>
</tbody>
</table>
DIMENSIONAL DRAWINGS

2W2D, 2W3A, 4W3A MODELS
(Single conduit shown with Gauge Pressure Sensor)

2WLP & 8W2D MODELS
(Dual conduit shown with Temperature Sensor)
**SENSOR DETAILS**

**GAUGE PRESSURE**

1/2" NPT (FEMALE)  
1.62  
[41.3mm]

**LOCAL TEMPERATURE SENSOR (L1, L3)**

0.25" O.D.  
L ± .12  
.28 [7.1 mm]

**LOW TEMPERATURE REMOTE SENSOR (R1, RC)**

6" LONG x 0.25 O.D.  
LENGTH [DIM "L"]

**DIFFERENTIAL PRESSURE SENSOR**

**HIGH TEMPERATURE REMOTE SENSOR (H1, HC)**

2.5" LONG x 0.25 O.D.  
LENGTH [DIM "L"]  
.24 [.61 mm]  
.94 [23.8 mm]  
3.59 [.91 mm]
## THERMOWELLS FOR TEMPERATURE SENSORS

### THERMOWELL

![Thermowell Diagram](image)

### COMPRESSION FITTING (PF73)

![Compression Fitting Diagram](image)

### UNION CONNECTION (SA6213-348)

![Union Connection Diagram](image)

## THERMOWELLS AND FITTINGS FOR ONE SERIES TEMPERATURE SENSORS

<table>
<thead>
<tr>
<th>Thermowell (316L)</th>
<th>1/2” NPT Compression Fitting</th>
<th>Union Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local Sensor</td>
<td>Remote</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Thermowells (316L) Properties:
- **Thermowell Length (A)**:
  - 1S260 L4-316: 4 inches
  - 1S260 L5.5-316: 5.5 inches
  - 1S260 L6-316: 6 inches
  - 1S260 L6.5-316: 6.5 inches
  - 1S260 L9-316: 9 inches
  - 1S260 L9.5-316: 9.5 inches
  - 1S260 L12-316: 12 inches
  - 1S260 L15-316: 15 inches
  - 1S260 L18-316: 18 inches
  - 1S260 L24-316: 24 inches

- **1/2” NPT Compression Fitting**:
  - Option: PF73
  - UE P/N: PF73

- **Union Connection**:
  - Option: SA6213-348
  - UE P/N: SA6213-348

### Thermowell and Fittings Properties:
- **Remote Sensor**:
  - N/A
  - xx

### Notes:
- **xx**: Recommended fitting in order to bottom out the temperature sensor in the thermowell.
- **x**: Can be used, but temperature sensor will not bottom out in longer thermowells, and the enclosure will need more support in shorter thermowells.
- **N/A**: Will not work with these thermowells.

## ONE SERIES DISPLAY RESOLUTION

<table>
<thead>
<tr>
<th>DISPLAY RESOLUTION</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 psi*</td>
<td>2</td>
</tr>
<tr>
<td>0-15 psi</td>
<td>2</td>
</tr>
<tr>
<td>0-30 psi</td>
<td>2</td>
</tr>
<tr>
<td>0-50 psi</td>
<td>1</td>
</tr>
<tr>
<td>0-100 psi</td>
<td>1</td>
</tr>
<tr>
<td>0-300 psi</td>
<td>1</td>
</tr>
<tr>
<td>0-500 psi</td>
<td>1</td>
</tr>
<tr>
<td>0-1000 psi</td>
<td>0</td>
</tr>
<tr>
<td>0-3000 psi</td>
<td>0</td>
</tr>
<tr>
<td>0-4500 psi</td>
<td>0</td>
</tr>
</tbody>
</table>

* Option M275 - Dec. Places 1. 138.4 °C
One Series

Alternative Products from UE

Spectra 12 Series
- Compact, cylindrical stainless steel design
- Hermetically sealed switch
- Explosion Proof
- Snap-acting belleville spring mechanism to enhance vibration resistance and set point stability
- Pressure ranges 1 to 6,000 psi;
  DP working pressure ranges 0 to 2500 psid;
  temperature ranges -130 to 650°F

120 Series
- Explosion-proof line of pressure, differential pressure, and temperature models with wide selection of ranges, sensors and pressure connections
- UL, cUL, ATEX certified for hazardous locations
- Single or dual switch outputs
- Internal or external set point adjustment

TX200 Series Pressure Transmitters
- Welded, hermetically sealed, 316 Stainless steel construction
- Ranges 0 to 100 psi up to 0 to 25,000 psi
- Choice of field adjustable or fixed range models
- 4-20 mA or 1-5 VDC output

117 Series
- Single Switch for Corrosive and Hazardous Division 2 Locations
- Compact pressure, differential pressure and temperature models
- Hermetically-sealed SPDT and DPDT output
- Epoxy-coated weather-tight design houses stainless steel internal construction
- Convenient terminal block wiring

Temperature Sensors
Rugged RTD’s and Thermocouples for process and energy applications, available with Nema 4X and explosion-proof heads to match heat-trace, turbine, combustion, and stack-emission applications
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 36 months from the date of manufacture by the Seller. 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.

LIMITATION OF SELLER’S LIABILITY

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 NEGLIGENCE ACT OR ACTS (OR NEGLIGENCE FAILURE TO ACT) COMMITTED BY SELLER, OR (IV) AN ACT FOR WHICH STRICT LIABILITY WILL BE IMPOSED ON 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.