# Temperature
# *process values*
# *at a glance*

JMS
SOUTHEAST INCORPORATED

Boiler t
135.7°c
Sensor 1

HART
COMMUNICATION FOUNDATION

## 8PA & 8PS
Field mounted HART temperature transmitter
with display and optical buttons

# Easy configuration and diagnostics *from the front*

## 8PA & 8PS: The Ex d explosion proof / flame proof temperature transmitter with an innovative local operator interface

Now you can benefit from easy programming and quick, at-a-glance review and diagnostics of your process values with the **8PA / 8PS** Field mounted HART temperature transmitter. Using unique technology, you can configure the transmitter from the front of the housing in any environment by simply touching the optical buttons – even when wearing gloves.
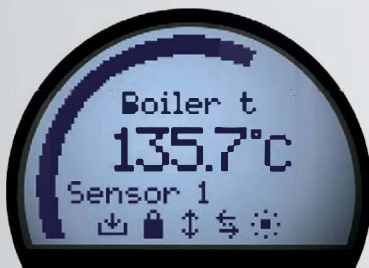
You can also perform advanced HART programming from the front, and as a result, significantly reduce the need for handheld communicators (HHC).

Once installed, you never have to open the housing again. The easy-to-read 60 mm diameter display provides a clear indication of your process magnitude, supported by a radial bar graph. And the enclosure is Ex d explosion proof / flame proof to maintain safety and integrity at all times. The temperature transmitter delivers exceptionally high measurement accuracy and HART 7 functionality with HART 5 compatibility.

### Configuration options

LOI*  PC with HART modem  HART COMMUNICATION FOUNDATION
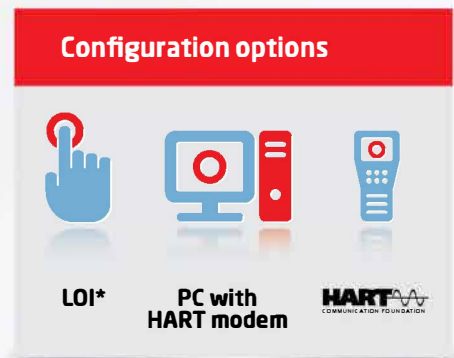
*\* Local Operator Interface*

## Monitoring view

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Through the glass, you can easily monitor the process value, and the radial bar graph indicates the process magnitude at a glance. A custom device tag, process value tag and unit fields make it easy to identify the displayed process point.

## Diagnostics view

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**SE1.ER**
Sensor 1 error...

If a sensor or device error occurs, a red or white flashing backlight, specific error text, and scrolling error messages help you provide quick troubleshooting.

## Programming view

Pt Type
Pt 50
Pt 100
Pt 200
Select Pt100 as...

User-friendly menu structure provides a guided configuration path that makes setting up the transmitter fast and intuitive.

The field display is equipped with many hazardous area and marine approvals for applications worldwide.

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# Unique capabilities
## *for high performance*

### Field mounted enclosure

With a single compartment Ex d explosion proof / flame proof design, the field mounted housing is perfect for Zone 0 with intrinsically safe Ex ia approval and Class 1, Division 1 applications. Metric and SAE threading make it usable in a wide range of applications worldwide.

### HART programmable field display

Simply touch the enclosure window using the three optical buttons to configure the display and transmitter. This system is so robust and practical, you can even configure the display while wearing gloves. On top of that, our new technology is immune to extraneous light sources or shadows, and dynamically adapts to the accumulation of contaminants on the window.

- Digital interface between the transmitter and display
- High definition display with 5 digit read-out
- Easy-to-follow menus guide you through programming with scrolling help texts
- An energy-efficient backlight will flash if an error or fault occurs

### Temperature transmitter

The built-in temperature transmitter has a proven track record with thousands of devices installed across multiple industries. It can be configured to measure 2, 3 and 4 wire RTDs, 13 different thermocouple types as well as bipolar mV and resistance signals, and provides an analog output. The transmitter also self-calibrates every few seconds for exceptional long-term stability, and exceeds the EN 61326-1 EMC immunity standard.

- Up to 60 point linearization
- Custom Callendar Van Dusen RTD coefficients can be easily loaded into the 7501 for optimal sensor-to-transmitter matching
- A low temperature coefficient of 50 ppm / °C (0.005% / °C) ensures accurate measurement over a wide ambient temperature range
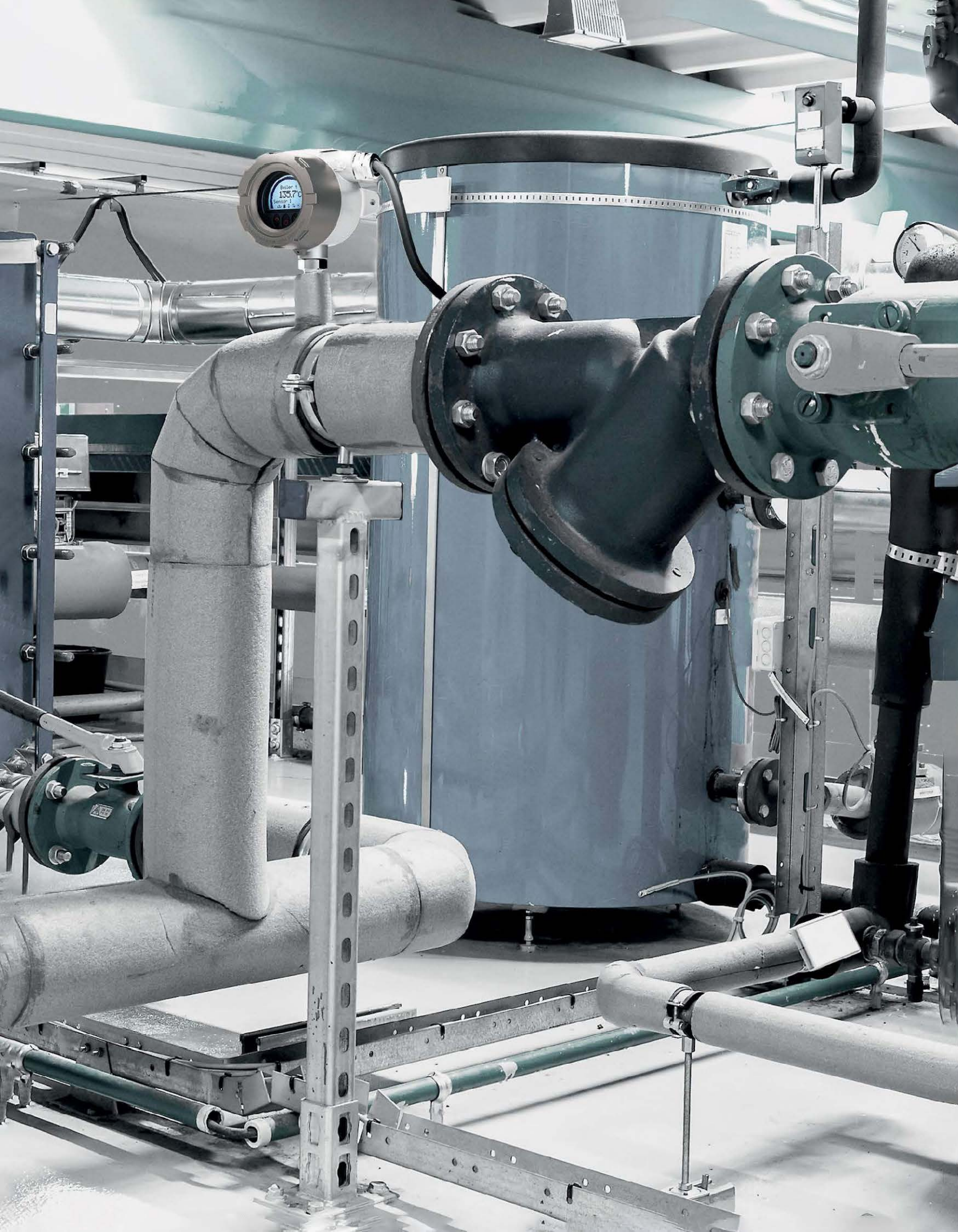
# The details that
## *make the difference*

### Many advanced features in one device

The Field mounted HART temperature transmitter can be mounted in 3 ways: on the temperature sensor, on a pipe, or on a bulkhead. The display can be rotated in 90-degree increments for easy vertical or horizontal viewing.

**Selectable white/red backlight**
The selectable backlight enables you to view process values in all lighting conditions without a flashlight, and can flash if an error occurs.

**Radial bar graph**
The clearly visible radial bar graph indicates the process magnitude at a glance.

**Explosion proof glass**
The unique optical buttons enable programming through the 10 mm thick explosion proof glass.

**Optical buttons**
Configuration is easy and logical with scrolling help texts and three optical buttons: up arrow, down arrow and OK. Thanks to the user-friendly Menu Guide, it is possible to configure the device directly from the front in less than 1 minute. Password protection prevents unauthorized access.

**Low loop voltage requirement**
The programmable field display requires only 1.5 volts when the backlight is off and 3.5 volts when the backlight is on. Combined with the transmitter, the total is 10 and 12 volts respectively.

**Durable housing**
The housing is available in stainless steel (8PS 316 SS) or low copper aluminum (8PA ADC3), and is coated with either epoxy or epoxy with polyurethane overcoating for both indoor and outdoor applications.

**Conduits**
The 8PA / 8PS supports the following conduits: M20x1.5 6H and ½ NPT (std).

**Proven in use**
The onboard Ex ia temperature transmitter is proven in use and provides exceptionally high measurement accuracy.

**One HART address**
The digital interface uses one HART address between the transmitter and the display. HART 7 functionality with HART 5 compatibility.

**Single compartment housing**
With an affordable, single compartment design, the field mounted enclosure enables fast installation and configuration.

**Ex d explosion proof / flame proof**
Perfect for Zone 0 (Ex ia) Class 1, Division 1 hazardous applications.

**IP66 enclosure**
The field mounted enclosure is rated IP66 for protection against strong jets of water, allowing the field display to be used in harsh environments.

# Performing with *an advantage*

## Benefit from high accuracy and cost savings

The state-of-the-art, patent-pending 7501 Field mounted HART temperature transmitter has many unique features, plus the added benefit of having a lower cost than comparable solutions.

## Patent for: Optical buttons combined with 10 mm explosion proof window

By combining highly advanced, patent-pending optical sensing and adaptive filtering technologies, we have managed to create very robust optical buttons. They are immune to false triggering caused by extraneous light sources, shadows, contaminants, etc. And they ensure easy and fast configuration, even when wearing gloves, simply by touching the 10 mm thick explosion proof window.

## Patent for: Extremely power-efficient digital communication

The 7501 features new patent-pending technology that allows for simultaneous operation of a large backlit graphical display in combination with a high speed digital communication interface, all with very low power consumption. This unique technology also ensures an extremely low overall loop voltage drop.
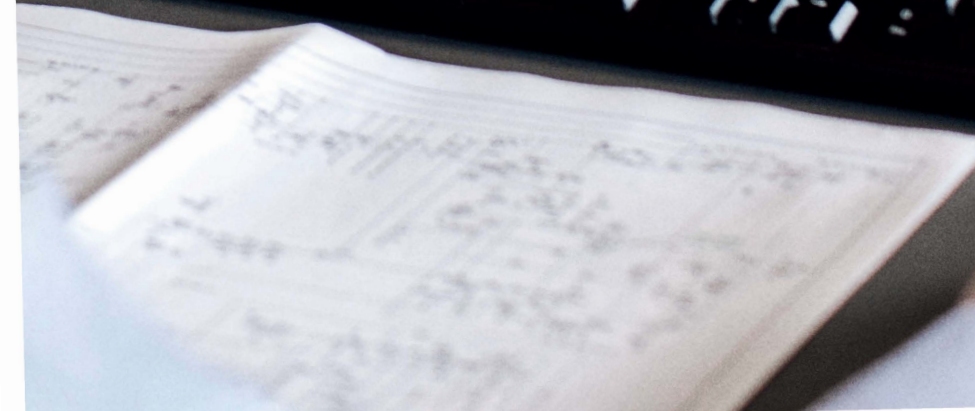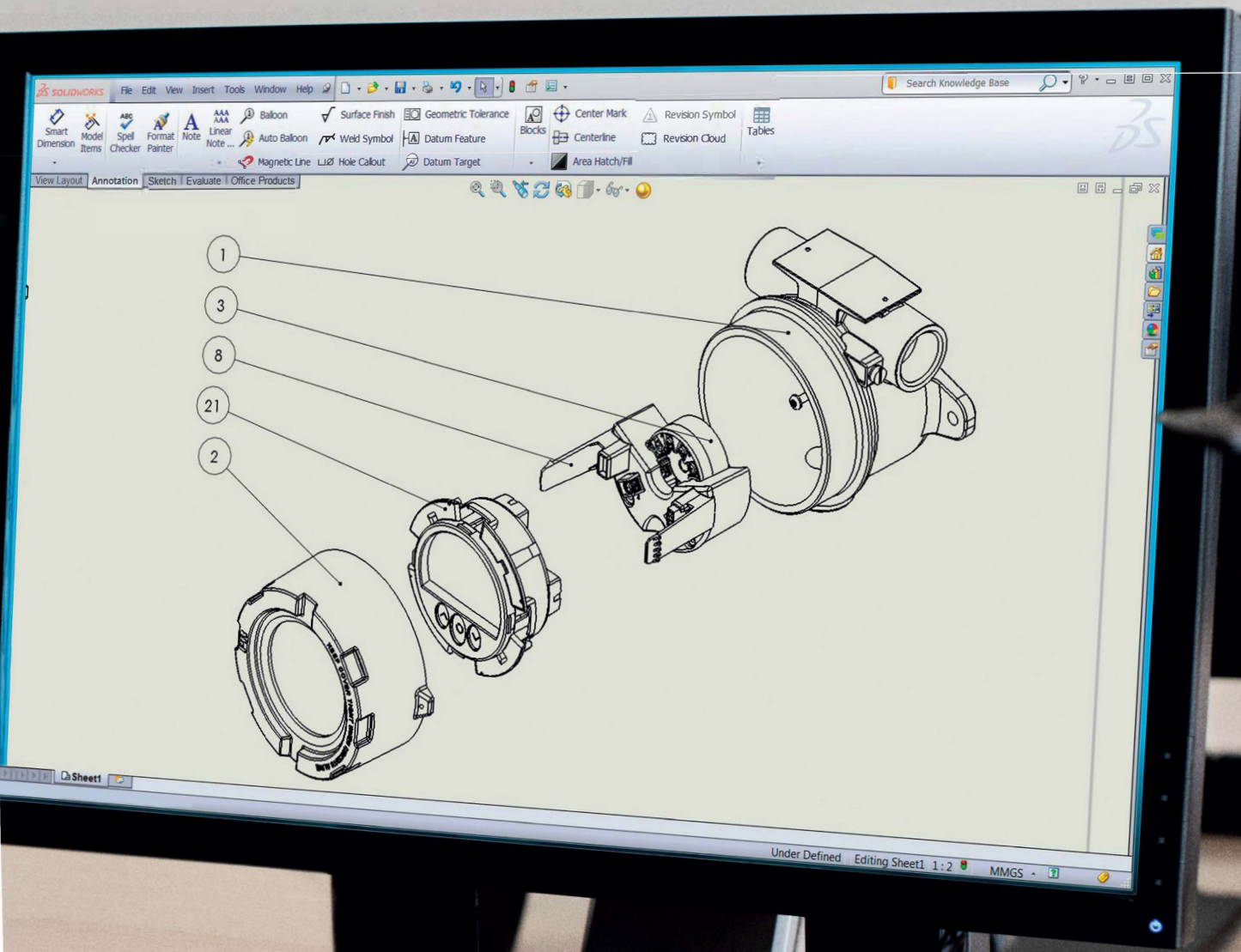
| | |
|---|---|
| Accuracy | Better than 0.05% of selected range |
| Response time (analog) | 1-60 seconds |
| Temperature coefficient | 50 ppm / °C (0.005% / °C) |
| Input types | RTD: Pt50, Pt100, Pt200, Pt500, Pt1000, Ni50, Ni100, Ni120, Ni1000<br>Thermocouple: B, E, J, K, L, Lr, N, R, S, T, U, W3, W5<br>Bipolar mV signals<br>Resistance signals |
| Output types | 4-20 mA |
| Voltage drop | 10 VDC (backlight off)<br>12 VDC (backlight on) |
| Operating temperature | -40°C to +85°C |
| Humidity | 0-100% relative humidity |
| EMC | EMC immunity influence < ±0.1% of selected range<br>Extended EMC: NAMUR NE21 burst, A criterion – as well as NE43 and NE89<br>EN 61326-1 certification |
| Configuration types | LOI, PC with HART or HART terminal |
| Display type / diameter | Dot matrix / 60 mm |
| Number of process value digits | 5 |
| Buttons | Three optical buttons: up arrow, down arrow and OK |
| Backlight color | Selectable red or white |

**Ordering information**

To order assembled to a JMS sensor, use code 8PA for aluminum and 8PS for SS housing. To order transmitter only, use Series 88 in the JMS Ordering Catalog or use JMS Part # DWG 22777A for the Aluminum housing or DWG2277S for the Stainless Steel housing.

## Field mounted HART temperature transmitter

# 8PA / 8PS

– RTD, TC, Ohm, and bipolar mV input and analog output
– High definition local operator interface (LOI) with 3 optical buttons
– Selectable red or white backlight
– Ex d explosion proof / flame proof
– HART 7 functionality with HART 5 compatibility

**High defintion display**
- 0, 90, 180, & 270 degree position adjustments.
- Monitoring, programming and diagnostics view.
- Extensive diagnostics with flashing red or white backlight
- Supports 7 languages.

**Local operator interface (LOI)**
- 3 optical buttons; up, down and enter.
- Dynamically adaptive to wear or accumulation of dirt.
- Immune to interference from ambient light sources.
- Useable with or without gloves.

**Configuration**
- From the LOI through guided menu.
- Preset and HART modem.
- HHC, DCS or AMS via HART.

**Mounting / installation**
- For installation in zone 0, 1, 2 and zone 20, 21, 22 and in Class 1, Division 1 and 2 applications.
- Hardware assessed for use in SIL 2 applications.
- Mounting on 1.5"–2" pipe bracket or on wall / bulkhead.

**Application**
- Linearized temperature measurement with TC and RTD sensors e.g. Pt100 and Ni100.
- HART communication and 4...20 mA analog PV output for individual, difference or average temperature measurement of up to two RTD or TC input sensors.
- Conversion of linear resistance to a standard analog current signal, e.g from valves or Ohmic level sensors.
- Amplification of bipolar mV signals to standard 4...20 mA current signals.
- Up to 63 transmitters (HART 7) can be connected in a multidrop communication setup.

**Technical characteristics**
- NAMUR NE43 and NE89.
- HART protocol revision can be changed by user configuration to either HART 5 or HART 7 protocol.

## Connections

Input signals:   For full overview of input connections, refer to manual

RTD to 4...20 mA
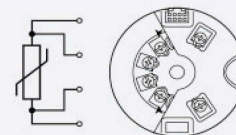
TC to 4...20 mA
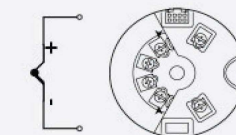
Resistance to 4...20 mA
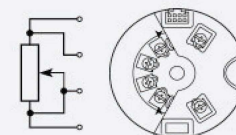
mV to 4...20 mA
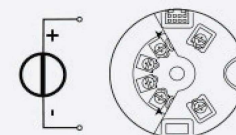
Difference or average RTD, TC or mV
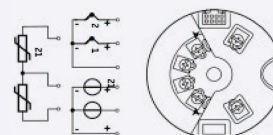
2-wire output and HART:
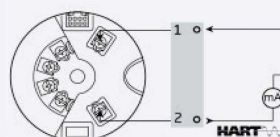
Ex:     10...30 VDC (12...30 VDC with backlight)
Other:  10...35 VDC (12...35 VDC with backlight)

4...20 mA

HART

## Environmental Conditions

| | |
|---|---|
| Specifications range....................................... | -40°C to +85°C (with silicone O-ring) |
| Specifications range....................................... | -20°C to +85°C (with FKM O-ring) |
| Storage temperature....................................... | -40°C to +85°C |
| Calibration temperature................................. | 20...28°C |
| Relative humidity........................................... | 0...100% RH (condensing) |
| Protection degree.......................................... | IP54 / IP66 / IP68 / type 4X |

## Mechanical specifications

| | |
|---|---|
| Dimensions................................................... | Ø 110 mm |
| Dimensions (HxWxD)..................................... | 109 x 145 x 125.5 mm |
| Weight approx............................................... | 1.3 kg |
| Wire size...................................................... | 0.13 x1.5 mm$^2$ / AWG 26...16 stranded wire |
| Screw terminal torque.................................... | 0.4 Nm |
| Vibration....................................................... | IEC 60068-2-6 : 2007 |
| Vibration: 2...25 Hz...................................... | ±1.6 mm |
| Vibration: 25...100 Hz................................... | ±4 g |
| Display resolution.......................................... | 96 x 64 pixels |
| Number of digits............................................ | 5 |
| Backlight....................................................... | Selectable ON/OFF |
| Backlight color............................................... | Selectable white or red |

## Common specifications

**Supply**

| | |
|---|---|
| Supply voltage, DC: Ex ia, intrinsically safe............................................. | 10 (12 - with backlight)...30 VDC |
| Supply voltage, DC: Other............................. | 10 (12 - with backlight)...35 VDC |

**Isolation voltage**

| | |
|---|---|
| Isolation voltage, test / working............................................. | 1.5 kVAC / 50 VAC |

**Response time**

| | |
|---|---|
| Response time (programmable).................... | 1...60 s |
| Signal / noise ratio........................................ | > 60 dB |
| Programming.................................................. | HART |
| Start-up time, transmitter to display........................................................ | Max. 5 s |
| Long-term stability, better than............................................................... | ±0.1% of span / Year |
| Accuracy....................................................... | Better than 0.05% of selected range |
| Signal dynamics, input................................... | 22 bit |
| Signal dynamics, output................................. | 16 bit |
| EMC immunity influence................................. | < ±0.1% of span |
| Extended EMC immunity: NAMUR NE 21, A criterion, burst................................ | < ±1% of span |

## Input specifications

**Common input specifications**

| | |
|---|---|
| Max. offset................................................... | 50% of selected max. value |

**RTD input**

| | |
|---|---|
| RTD type....................................................... | Pt50, Pt100, Pt200, Pt500, Pt1000, Ni50, Ni100, Ni120, Ni1000 |
| Cable resistance per wire (max.)................................................... | 5 Ω (up to 50 Ω per wire is possible with reduced measurement accuracy) |
| Sensor current.............................................. | Nom. 0.2 mA |

**Linear resistance input**

| | |
|---|---|
| Linear resistance min....max......................... | 0 Ω...7000 Ω |

**TC input**

| | |
|---|---|
| Thermocouple type........................................ | B, E, J, K, L, N, R, S, T, U, W3, W5, LR |
| Cold junction compensation (CJC)............................................................ | Constant, internal or external via a Pt100 or Ni100 sensor |

**Voltage input**

| | |
|---|---|
| Measurement range....................................... | -800...+800 mV |
| Min. measurement range (span).................... | 2.5 mV |
| Input resistance............................................ | 10 MΩ |

## Output specifications

**Current output**

| | |
|---|---|
| Signal range................................................. | 4...20 mA |
| Min. signal range........................................... | 16 mA |
| Load (@ current output)................................. | ≤ (Vsupply - 10) / 0.023 [Ω] |
| Load resistance, with backlight...................... | ≤ (Vsupply - 12) / 0.023 [Ω] |
| Sensor error indication.................................. | Programmable 3.5...23 mA |
| NAMUR NE 43 Upscale/Downscale................ | 23 mA / 3.5 mA |

**Common output specifications**

| | |
|---|---|
| Updating time................................................ | 440 ms |
| HART protocol revisions................................ | HART 5 and HART 7 |

## Observed authority requirements

| | |
|---|---|
| EMC.............................................................. | 2014/30/EU |

## Approvals

| | |
|---|---|
| EAC............................................................... | TR-CU 020/2011 |
| EU RO Mutual Recognition Type Approval......................................................... | MRA0000009 |
| ATEX 2014/34/EU.......................................... | DEKRA 15 ATEX 0058 X |
| IECEx............................................................ | IECEx DEK 15.0039 X |
| FM................................................................. | 3055380 |
| CSA............................................................... | 70024231 |
| EAC Ex TR-CU 012/2011................................ | RU C-DK.GB08.V.01316 |
| INMETRO....................................................... | DEKRA 15.0014 X |
| NEPSI............................................................ | GYJ15.1336X, GYJ15.1337X and GYJ15.1338X |