Rosemount™ 928 Wireless Gas Monitor

Integrated Wireless Gas Monitoring

The Rosemount 928 Wireless Gas Monitor is the first integrated WirelessHART® toxic gas monitoring solution with a tool-less hot-swappable sensor from Emerson. The Rosemount 928 Wireless Gas Monitor extends detection coverage to remote installations, eliminates wiring costs, and reduces installation and commissioning times.

- Hot-swappable electrochemical sensor module with end-of-life diagnostics can be installed in the field without tools.
- Hazardous location, performance, and functional safety approvals for worldwide use.
- Large liquid crystal display clearly shows gas concentration and transmitter diagnostics.
- Optional discrete output for activating field alarms.
Features

*WirelessHART® communication*

Traditional electrochemical sensor technology is proven and reliable, but conventional products require a wired infrastructure for power and signal communication. The Rosemount™ 928 requires no wired infrastructure and dramatically reduces installation and maintenance costs.

**Hot-swappable power module**

The device uses a replaceable, intrinsically safe lithium-thionyl chloride power module.

The power module has over three years of service life(1) and can be easily exchanged in the field in hazardous locations.

**High performance monitoring**

**Table 1: Monitoring Ranges by Gas**

<table>
<thead>
<tr>
<th>Gas</th>
<th>Range</th>
<th>Accuracy</th>
<th>T20</th>
<th>T50</th>
<th>T90</th>
<th>Default alarm</th>
<th>Zero drift</th>
<th>Relative humidity</th>
<th>Operating temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂S</td>
<td>0-100 ppm</td>
<td>±3 ppm or 10% of reading</td>
<td>&lt; 8 s</td>
<td>&lt; 10 s</td>
<td>&lt; 45 s</td>
<td>30 ppm</td>
<td>&lt; 5% per annum</td>
<td>10-95%</td>
<td>-40 to +122 °F -40 to +50 °C</td>
</tr>
<tr>
<td>CO</td>
<td>0-1000 ppm</td>
<td>±6 ppm or 10% of reading</td>
<td>&lt; 7 s</td>
<td>&lt; 12 s</td>
<td>&lt; 29 s</td>
<td>100 ppm</td>
<td>&lt; 5% per annum</td>
<td>10-95%</td>
<td>-22 to +122 °F -30 to +50 °C</td>
</tr>
<tr>
<td>O₂</td>
<td>0-25% by volume</td>
<td>±0.5% oxygen content of supply gas</td>
<td>&lt; 2 s</td>
<td>&lt; 4 s</td>
<td>&lt; 15 s</td>
<td>18.0%</td>
<td>&lt; 5% per annum</td>
<td>5-95%</td>
<td>-22 to +122 °F -30 to +50 °C</td>
</tr>
</tbody>
</table>

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(1) Power module service life depends on wireless update rate, local display settings, and ambient conditions.

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Emerson.com/Rosemount
Hot-swappable sensor

The Rosemount™ 928 Wireless Gas Monitor uses the Rosemount 628 series of hot-swappable electrochemical gas sensor modules that can be installed in the field with one hand and no tools.

The Rosemount 628 Universal Gas Sensor is a smart sensor. As such, it retains its own calibration information. It must be connected to a Rosemount 928 Transmitter to calibrate, but the calibration settings are stored in the sensor itself rather than in the transmitter. The Rosemount 628 Universal Gas Sensor may be uninstalled from one Rosemount 928 Transmitter and reinstalled in another transmitter without affecting its calibration.

The device automatically recognizes the sensor. Built-in end-of-life diagnostics alert you when sensor replacement is necessary.

Built for harsh environments

The Rosemount™ 928 Wireless Gas Monitor is designed to operate in ambient temperatures ranging from -40 °F to +122 °F (-40 °C to +50 °C). Ingress protection levels of IP66 are achieved with the ingress protection (IP) filter fitted to the Rosemount 628 Universal Gas Sensor.

Ordering information

Standard options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

<table>
<thead>
<tr>
<th>Product description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>928     Wireless Gas Monitor</td>
<td>★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmitter output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X      Wireless</td>
<td>★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor options</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>Sensor specified separately and shipped with the transmitter (requires specification of the Rosemount™ 628 Universal Gas Sensor).</td>
</tr>
<tr>
<td>UT</td>
<td>Universal transmitter (no sensor specified)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discrete output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No discrete output; wireless communication only</td>
</tr>
<tr>
<td>01</td>
<td>Discrete output and wireless communications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Housing material</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>Aluminum ½-14 NPT conduit</td>
</tr>
<tr>
<td>2S</td>
<td>Stainless steel ½-14 NPT conduit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product certifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I5</td>
<td>USA Intrinsically Safe</td>
</tr>
<tr>
<td>I6</td>
<td>Canada Intrinsically Safe</td>
</tr>
<tr>
<td>I4</td>
<td>Japan Intrinsically Safe</td>
</tr>
<tr>
<td>I1</td>
<td>ATEX Intrinsically Safety</td>
</tr>
<tr>
<td>I3</td>
<td>China Intrinsically Safety</td>
</tr>
</tbody>
</table>
## Wireless options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

<table>
<thead>
<tr>
<th>Wireless update range, operating frequency, and protocol</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WA3</td>
<td>User configurable update rate, 2.4 GHz DSSS, IEC 65291 (WirelessHART®)</td>
</tr>
</tbody>
</table>

### Omnidirectional wireless antenna and SmartPower™ solutions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WK1</td>
<td>External antenna, adapter for black power module. (I.S. power module sold separately)</td>
</tr>
<tr>
<td>WM1</td>
<td>Extended range, external antenna</td>
</tr>
<tr>
<td>WJ1</td>
<td>Remote antenna, adapter for black power module (I.S. power module sold separately)</td>
</tr>
<tr>
<td>WN1</td>
<td>High-gain remote antenna, adapter for black power module (I.S. power module sold separately)</td>
</tr>
</tbody>
</table>

## Other options

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

### Mounting bracket

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B4</td>
<td>Universal L mounting bracket for 2-in, (5.08 cm) pipe mounting, stainless steel bracket, and bolts</td>
</tr>
</tbody>
</table>

### Configuration

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Factory configuration date, descriptor, message fields, and wireless parameters</td>
</tr>
</tbody>
</table>

### Quality documentation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Certificate of Compliance</td>
</tr>
</tbody>
</table>

**Typical model number:** 928 X 55 00 2A 15 WA3 WK1 B4

## Rosemount™ 628 Universal Gas Sensor ordering information

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred options are subject to additional delivery lead time.

### Product description

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>628</td>
<td>Universal Gas Sensor</td>
</tr>
</tbody>
</table>

June 2019
Sensor technology

<table>
<thead>
<tr>
<th>EC</th>
<th>Electrochemical</th>
</tr>
</thead>
</table>

Gas type

| T02 | Hydrogen sulfide |
| A03 | Oxygen |
| T04 | Carbon monoxide |

Unit of measurement

<table>
<thead>
<tr>
<th>2</th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>% by volume</td>
</tr>
</tbody>
</table>

Sensor range

<table>
<thead>
<tr>
<th>F</th>
<th>0-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>0-25</td>
</tr>
<tr>
<td>K</td>
<td>0-1000</td>
</tr>
</tbody>
</table>

Typical model number: 628 EC T02 2 F

Spare parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingress Protection (IP) filter</td>
<td>00628-9000-0001</td>
</tr>
<tr>
<td>Spare B4 mounting bracket for Rosemount™ 928 Wireless Gas Monitor</td>
<td>03151-9270-0004</td>
</tr>
</tbody>
</table>

Specifications

Functional specifications

Measurement type

Gas concentration levels
- Hydrogen sulfide (H₂S): 0 - 100 ppm
- Carbon monoxide (CO): 0 - 1,000 ppm
- Oxygen depletion (O₂): 0 - 25% by volume

Sensor type
- Tool-less hot-swappable electrochemical cell module

Discrete output, models 928XSS01, 928XUT01
- Maximum rating: 28 Vdc, 100 mA
- On resistance: typical 1 Ohm
**Wireless output**
IEC 62591 (WirelessHART®) Compliant, 2.4 GHz

**Antenna radio frequency power output**
External (WK option) antenna: Maximum of 10 mW (10 dBm) EIRP
Extended range, external (WM option) antenna: Maximum of 18 mW (12.5 dBm) EIRP
High gain, remote (WN option) antenna: Maximum of 40 mW (16 dBm) EIRP
Remote, extended (WJ option) antenna: Maximum of 18 mW (12.5 dBm) EIRP

**Local display**
The integral LCD display can display alert state and diagnostic information. Configurable to display updates at each wireless update.

**Humidity limits**
See Table 1.

**Maximum inputs for the Rosemount™ 928 Transmitter (ordinary and IS environments)**
28 Volts
95 milliamps
650 milliwatts

**Wireless update rate**
User selectable, 1 second to 60 minutes

**Diagnostics**
End-of-life sensor diagnostics

**Physical specifications**

**Electrical connections wireless power module**
Replaceable, intrinsically safe lithium-thionyl chloride power module with PBT polymer enclosure. 5.8 years of life at one minute update rate. (2)

**Materials of construction**
Enclosure:
- Housing: low-copper aluminum or stainless steel
- Paint: polyurethane
- Cover O-ring: Buna-N

(2) Reference conditions are 70 °F (21 °C) and routing data for three additional network devices.

**Note**
Continuous exposure to ambient temperature limits (less than -40 °F or greater than 122 °F [less than -40 °C or greater than 50 °C]) may reduce specified power module life by less than 20 percent.
Terminal block and power module pack: PBT
Antenna: PBT/PC integrated omnidirectional antenna
Conduit entries: ½-14 NPT

Environmental

Switch terminals, models 928XSS01, 928UXT01
Screw terminals permanently fixed to terminal block

Field Communicator connections
Communication terminals
Clips permanently fixed to terminal block

Rosemount™ 928 Transmitter weight
Low-copper aluminum housing (2A ordering option): 73 ounces (2076 grams)
Stainless steel housing (2S ordering option): 143 ounces (4055 grams)

Rosemount™ 928 Transmitter enclosure ratings
NEMA 4X and IP66

Performance specifications

Electromagnetic compatibility (EMC)
All models: meet all relevant requirements of EN-61326-2-3: 2006

Vibration effect
Wireless output unaffected when tested according to the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.2 mm displacement peak amplitude/60-2000 Hz 3g).
Wireless output unaffected when tested according to the requirements of IEC60770-1 field with general application or pipeline with low vibration level (10-60 Hz 0.15 mm displacement peak amplitude/60-500 Hz 2g).

Temperature guidelines

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Operating limit</th>
<th>Transmitter storage limit</th>
<th>Sensor storage recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂S</td>
<td>-40 to 122 °F</td>
<td>-40 to 185 °F</td>
<td>34 to 45 °F</td>
</tr>
<tr>
<td></td>
<td>-40 to 50 °C</td>
<td>-40 to 80 °C</td>
<td>1 to 7 °C</td>
</tr>
<tr>
<td>O₂</td>
<td>-22 to 122 °F</td>
<td>-40 to 185 °F</td>
<td>34 to 45 °F</td>
</tr>
<tr>
<td></td>
<td>-30 to 50 °C</td>
<td>-40 to 80 °C</td>
<td>1 to 7 °C</td>
</tr>
<tr>
<td>CO</td>
<td>-22 to 122 °F</td>
<td>-40 to 185 °F</td>
<td>34 to 45 °F</td>
</tr>
<tr>
<td></td>
<td>-30 to 50 °C</td>
<td>-40 to 80 °C</td>
<td>1 to 7 °C</td>
</tr>
</tbody>
</table>
The electrochemical cells in sensor modules have a limited shelf life. Store sensor modules in a cool location that is not excessively humid or dry. Storing sensor modules for long periods may shorten their useful service life.

**Wireless transmission rate**
User selectable from 1 second to 60 minutes.

**Accuracy**
Refer to Table 1.

**Product certifications**

Rev 3.1

**European Directive information**
The most recent revision of the EC Declaration of Conformity can be found at www.Emerson.com/Rosemount under Documentation.

**Telecommunication compliance**
All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

**FCC and IC**
This device complies with Part 15 of the FCC rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 7.81 in. (20 cm) from all persons.

**Ordinary location certification**
As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

**Installing in North America**
The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division-marked equipment in Zones and Zone-marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.
USA

I5 U.S.A. Intrinsically Safe (IS)

Certificate  CSA 70138122


Markings  IS CL I, DIV 1, GP A, B, C, D T4;
T4 (-40 °C ≤ Ta ≤ +50 °C) when installed according to Rosemount™ drawing 00928-1010;
Class 1, Zone 0, AEx ia IIC T4 Ga;
Type 4X

Table 2: Entity Parameters

<table>
<thead>
<tr>
<th>Input (power) parameters</th>
<th>Output (alarm) parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ui - 28 Vdc</td>
<td>Uo - 28 Vdc</td>
</tr>
<tr>
<td>li - 93.3 mA</td>
<td>Io -93.3 mA</td>
</tr>
<tr>
<td>Pi - 653 mW</td>
<td>Po - 653 mW</td>
</tr>
<tr>
<td>Ci - 5.7 2nF</td>
<td>Co - 77 nF</td>
</tr>
<tr>
<td>Li - 0</td>
<td>Lo - 2 mH</td>
</tr>
</tbody>
</table>

Table 3: HART® Comm Parameters

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Uo - 1.9 Vdc</td>
<td></td>
</tr>
<tr>
<td>Io - 32 µA</td>
<td></td>
</tr>
</tbody>
</table>

Special Conditions for Safe Use (X):

1. For use only with the Emerson Model 701PBKKF, the Computation Systems, Inc. MHM-89004, or the Perpetuum Ltd. IPM71008/IPM74001.

2. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic discharge buildup, it must not be rubbed or cleaned with solvents or dry cloth.

3. Substitution of components may impair Intrinsic Safety.

Canada

I6 Canada Intrinsically Safe (IS)

Certificate  CSA 70138122


Markings  IS CL I, DIV 1, GP A, B, C, D T4;
Ex ia IIC T4 Ga;
T4 (-40 °C ≤ Ta ≤ +50 °C) when installed according to Rosemount™ drawing 00928-1010;
Type 4X

Refer to Table 2.
Special Conditions for Safe Use:

1. For use only with the Emerson Model 701PBKKF, the Computations Systems, Inc. MHM-89004, or the Perpetuum Ltd. IPM1008/IPM74001.

2. The surface resistivity of the antenna is greater than 1 GΩ. To avoid electrostatic discharge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.

3. Substitution of components may impair Intrinsic Safety.

Europe

I1 ATEX Intrinsically Safe (IS)

Certificate

Sira17ATEX2371X

Standards


Markings

Ex ia IIC T4 Ga;
T4 (-40 °C ≤ Ta ≤ +50 °C)
Type IP66

Refer to Table 2 and Table 3.

Special conditions for safe use (X):

1. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition capable of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.

2. The transmitter may contain more than 10% aluminum and is considered a potential risk ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

3. The equipment shall be powered by Emerson 701PBKKF. An alternative power source shall be the CSI MHM-89004 as these devices have output parameters that are equal or less onerous than the parameters of the 701PBKKF.

4. Only the 375, 475, or AMS Trex Communicators may be used with the Rosemount™ 928.

International

I7 IECEx Intrinsically Safe (IS)

Certificate

IECEx SIR 17.0091X

Standards


Markings

Ex ia IIC T4 Ga;
T4 (-40 °C ≤ Ta ≤ +50 °C)
Type IP66
Refer to Table 2 and Table 3.

**Special conditions for safe use (X):**

1. Under extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.

2. The transmitter may contain more than 10% aluminum and is considered a potential risk ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

3. The equipment shall be powered by Emerson 701PBKKF. An alternative power source shall be the CSI MHM-89004 as these devices have output parameters that are equal or less onerous than the parameters of the 701PBKKF.

4. Only the 375, 475, or AMS Trex Communicators may be used with the Rosemount™ 928.
Figure 1: Rosemount™ 928 Wireless Gas Monitor Intrinsically Safe Installation Drawing
China

I3 NEPSI Intrinsically Safe (IS)

Certificate: GYJ18.1438X
Standards: GB 3836.1-2010, GB 3836.4-2010, GB 3836.20-2010
Markings: Ex ia IIC T4 Ga (Ta= -40 °C to +50 °C)

Special conditions for safe use (X):
See certificate.

Japan

I4 CML Intrinsically Safe (IS)

Certificate: CML 18JPN2345X
Markings: Ex ia IIC T4 Ga;
          T4 (-40 °C ≤ Ta ≤ +50 °C)

Special conditions for safe use (X):
See certificate.
Dimensional drawings

Figure 2: Rosemount™ 928 Wireless Gas Monitor
Figure 3: Rosemount™ 928 Wireless Gas Monitor Mounting Configurations

A. 2-in. bolt for pipe mounting (clamp shown)
B. ⅛-in. x ⅛-in. bolts for transmitter mounting

Dimensions are in inches (millimeters).