

Rosemount™ 702 Wireless Discrete Transmitter



IEC CE **WirelessHART**

- An installation-ready solution that provides dual channel, discrete input, or discrete output options.
- Discrete single or dual switch input with logic for limit contact and opposing contact applications.
- Momentary inputs are continuously measured between wireless updates.
- Dual channels are each configurable for discrete input or discrete output.
- Self-organizing network delivers information rich data with >99 percent data reliability.

Emerson wireless solution

IEC 62591 (*WirelessHART®*) ... the industry standard

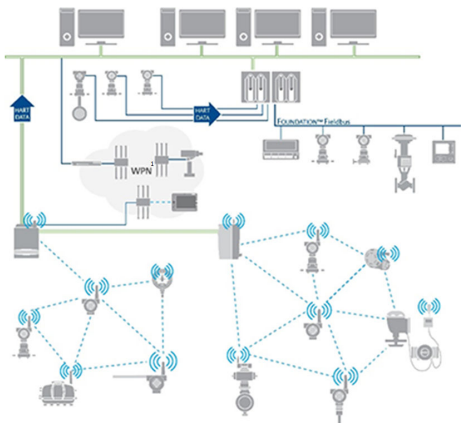
Self-organizing, adaptive mesh routing

- Backed by Emerson’s proven experience in wireless field instrumentation and expert technical support.
- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, then data will continue to flow because the device has other established paths.

Reliable wireless architecture

- Standard Institute of Electrical and Electronics Engineers (IEEE) 802.15.4 radios
- 2.4 GHz Industrial, Scientific, and Medical (ISM) band sliced into 15 radio channels
- Time-synchronized channel hopping
- *WirelessHART®* technology delivers high reliability in challenging radio environment

Figure 1: Web plant network



Emerson's wireless

- Seamless integration to all existing host systems
- Native integration into DeltaV™ and Ovation™ is transparent and seamless
- Gateways interface with existing host systems using industry standard protocols including OPC, Modbus® Transmission Control Protocol/Internet Protocol (TCP/IP), Modbus Remote Terminal Unit (RTU), and EtherNet/IP™

Layered security keeps your network safe

- Ensures data transmissions are received only by the Wireless Gateway.
- Network devices implement industry standard encryption, authentication, verification, anti-jamming, and key management.
- Third party security verification including Achilles and FIPS197, with password strength monitoring, user-based login, password reset requirements, automatic lockout, and password expiration requirements.

Contents

Emerson wireless solution.....	2
Ordering information.....	3
Specifications.....	8
Safety shower and eye wash monitoring.....	22
Product certification.....	24
Dimensional drawings.....	25

Ordering information

[CONFIGURE >](#)

[VIEW PRODUCT >](#)

Online product configurator

Many products are configurable online using our product configurator. Select the **Configure** button or visit [Emerson.com/global](https://emerson.com/global) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

Specification and selection of product materials, options, and/or components must be made by the purchaser of the equipment. See the Material selection section for more information.

Model code

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in [Figure 2](#).

Figure 2: Model code example



- 1. Required model components (choices available on most)
- 2. Additional options (variety of features and functions that may be added to products)

Required model components

Model

Code	Description	
702	Discrete transmitter	★

Transmitter type

Code	Description	
D	Wireless field mount	★

Output

Code	Description	
X	Wireless	★

Measurement

Code	Description	
32	Discrete dual input (dry contact), detects momentary inputs and counts	★
42	Discrete dual input or output, configurable	★
52	Plunger arrival detection (for use with ETC Cyclops™ Plunger Arrival Sensor)	★

Housing

Code	Description	
D	Dual compartment housing – aluminum	★
E	Dual compartment housing – SST	★

Conduit threads

Code	Description	
1	½–14 NPT	★

Certification

Code	Description	Measurement option code	
I5	U.S.A. intrinsically safe, Non-incendive, and Dust ignition- proof	32, 52	★
I6	Canada intrinsically safe	32, 52	★
I1	ATEX intrinsically safe	32, 52	★
IU	ATEX intrinsically safe for zone 2	32, 42, 52	★
I7	IECEx intrinsically safe	32, 52	★
IY	IECEx intrinsically safe for zone 2	32, 42, 52	★
I4	TIIS intrinsically safe	32, 42, 52	★
I3	China intrinsically safety	32	★
N5	U.S.A. division 2, Non-incendive	32, 42, 52	★
N6	Canada division 2, Non-incendive	32, 42, 52	★
I2	INMETRO Intrinsically Safe	32, 52	★
IZ	INMETRO Intrinsically Safe for Zone 2	42	★
KQ	USA, Canada, ATEX Intrinsic Safety Combination	32	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	32	★
NM	ATEX Intrinsic Safety for Mining	32, 52	★
IP	Korea Intrinsically Safe		★
NA	No approval	32, 42, 52	★

Wireless options

Wireless update rate, operating frequency, and protocol

Code	Description	
WA3	User configurable update rate, 2.4 GHz, IEC 62591 (<i>WirelessHART</i> ® protocol)	★

Omni-directional wireless antenna and SmartPower™ Solutions

Black power module must be shipped separately, order Model 701PBKKF. Refer to the [Emerson™ Wireless SmartPower™ Solutions Product Data Sheet](#) for more information on the blue power module.

Code	Description	
WK1	External antenna, adapter for black power module (I.S. Power module sold separately)	★
WM1	Extended range, external antenna, adapter for black power module (I.S. Power module sold separately)	★
WJ1	Remote antenna, adapter for black power module (I.S. Power module sold separately)	
WN1 ⁽¹⁾	High-gain, remote antenna, adapter for black power module (I.S. Power module sold separately)	

(1) *Limited availability, consult factory for details.*

Additional options

Extended product warranty

Code	Description	
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Display

Code	Description	
M5	LCD display	★

Mounting bracket

Code	Description	
B4	Universal L mounting bracket for two inch pipe mounting – SST bracket and bolts	★

Configuration

Code	Description	
C1	Factory configure date, descriptor, message fields, and wireless parameters	★

Cable gland

Code	Description	
G2	Cable gland (7.5–11.9 mm)	★
G4	Thin wire cable gland (3–8 mm)	★

Switches and kits

Code	Description	
SS01	Universal safety shower/eyewash kit with UL switches	★
SS02	Universal safety shower/eyewash kit for insulated pipe with UL switches	★
SS03	Universal safety shower/eyewash kit with CSA switches	★
SS04	Universal safety shower/eyewash kit for insulated pipe with CSA switches	★

Spare Parts and Accessories

Part number	Description
00702-9010-0001	Universal safety shower/eyewash kit with UL switches
00702-9010-0002	Universal safety shower/eyewash kit for insulated pipe with UL switches
00702-9010-0003	Universal safety shower/eyewash kit with CSA switches

Part number	Description
00702-9010-0004	Universal safety shower/eyewash kit for insulated pipe with CSA switches
03151-9270-0003	Mounting Bracket Kit, SST

Specifications

Functional specifications

Discrete input

Single or dual SPST dry contacts, or single SPDT dry contacts. To maintain I.S. ratings, contacts must be limited to simple switches only.

Switching threshold, measurement option code 32 and 42

Open > 100 K Ohm

Closed < 5 K Ohm

Momentary discrete input, measurement option code 32 and 42

Detects momentary discrete inputs of 10 millisecond or more duration. At each wireless update, device reports current discrete state and accumulating count of close-open cycles. Accumulating count registers from 0 to 999,999, then re-sets to zero.

Discrete output, measurement option Code 42

Maximum rating: 26 Vdc, 100 mA

On resistance: typical 1 Ohm

Wireless output

IEC 62591 (*WirelessHART*®) 2.4 GHz

Radio frequency power output from antenna

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

Remote (WJ option) antenna: Maximum of 17 mW (12.3 dBm) EIRP

High-gain, remote (WN option) antenna: Maximum of 40 mW (16 dBm) EIRP

Local display

The optional integral LCD display can show discrete state and diagnostic information. Display updates at each wireless update.

Note

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

Humidity limits

0–100 percent relative humidity

Wireless update rate, measurement option code 32, 42, 52

User selectable, 1 second to 60 minutes

Wireless latching time, measurement option code 32, 42, 52

User selectable, 1 second to 10 minute

Physical specifications

Material selection

Emerson provides a variety of Rosemount products with various product options and configurations, including materials of construction that can be expected to perform well in a wide range of applications.

The product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser’s sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration, or materials of construction selected.

Electrical connections

Power Module

The Emerson SmartPower™ Power Module is field replaceable, featuring keyed connections that eliminate the risk of incorrect installation.

The power module is an Intrinsically Safe solution, containing Lithium-thionyl chloride with a polybutadine terephthalate (PBT) enclosure.

The transmitter has power module life time rating of 10 years with a one-minute update rate, at reference conditions.

Note

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

Continuous exposure to ambient temperature limits (–40 or 185 °F; –40 or 85 °C) may reduce specified life by up to 20 percent.

Sensor terminals

Screw terminals permanently fixed to terminal block

Field Communicator terminal connections

Clips permanently fixed to terminal block, designated by the text “COMM.”

Materials of construction

Enclosure

Housing:	low-copper aluminum, or stainless steel
Paint:	Polyurethane
Cover O-ring:	Buna-N
Terminal and power module pack	PBT
Antenna	PBT/PC integrated omni-directional antenna

Conduit entries

½–14 NPT

Weight

Low-copper aluminum

Rosemount 702 without LCD display - 4.6 lb. (2.0 kg)

Rosemount 702 with M5 LCD display - 4.7 lb. (2.1 kg)

Stainless steel

Rosemount 702 without LCD display - 8.0 lb. (3.6 kg)

Rosemount 702 with M5 LCD display - 8.1 lb. (3.7 kg)

Enclosure ratings (702)

NEMA® 4X and IP66/67

Mounting

Transmitters may be attached directly to switch, brackets also permit remote mounting. See [Dimensional drawings](#) for more information.

Performance specifications

Electromagnetic compatibility (EMC)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21. Maximum deviation <1% span during EMC disturbance.⁽¹⁾

Vibration effect

Wireless output unaffected when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10–60 Hz 0.21 mm displacement peak amplitude/60–2000 Hz 3 g).

Wireless output unaffected when tested per 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 2 g).

(1) During surge event device may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.

Temperature limits

Description	Operating limit	Storage limit
Without LCD display	-40 to 185 °F -40 to 85 °C	-40 to 185 °F -40 to 85 °C
With LCD display	-4 to 175 °F -20 to 80 °C	-40 to 185 °F -40 to 85 °C

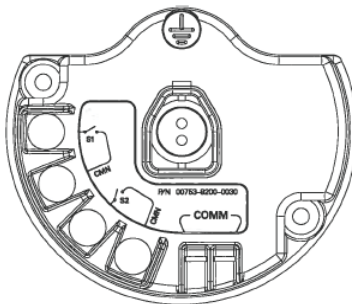
Wireless output specifications

Dry contact switch inputs, measurement option code 32, and 42

Terminal block connections

The transmitter has a pair of screw terminals for each of two channels, and a pair of communication terminals. These terminals are labeled as follows:

- CH1+: Channel one positive
- CMN: Common
- CH2+: Channel two positive
- CMN: Common
- COMM: Communication terminals



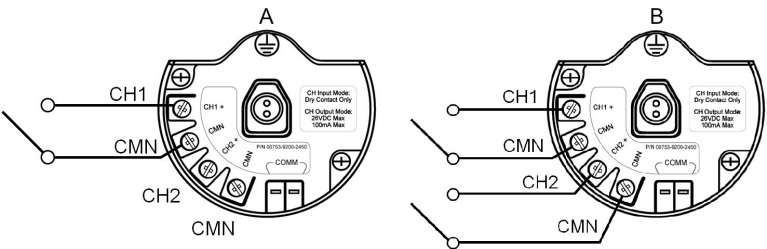
Single input or dual input independent

The transmitter will accept the input from one or two single pole single throw switches on inputs CH1 and CH2. The wireless output of the transmitter will be both a primary variable (PV) and a secondary variable (SV). The PV is determined by the CH1 input. The SV is determined by the CH2 input. A closed switch drives a TRUE output. An Open switch drives a FALSE output.

Note

Any dry contact input can be inverted by the device, so as to give the opposite effect. This is useful, for instance, if a normally open switch is used to replace a normally closed switch.

Figure 3: Single and Dual Input



- A. Single input
- B. Dual input

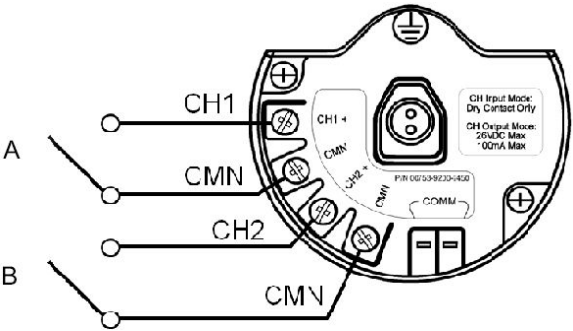
Table 1: Single or Dual Input, No Logic

Switch input	Wireless output	Switch input	Wireless output
CH1	PV	CH2	SV
Closed	TRUE (1.0)	Closed	TRUE (1.0)
Open	FALSE (0.0)	Open	FALSE (0.0)

Dual input, limit contact logic

When configured for Limit Contact Logic, the transmitter will accept the input from two single pole single throw switches on inputs CH1 and CH2, and will use limit contact logic for the determination of the wireless outputs.

Figure 4: Dual Input, Limit Contacts



- A. True
- B. False

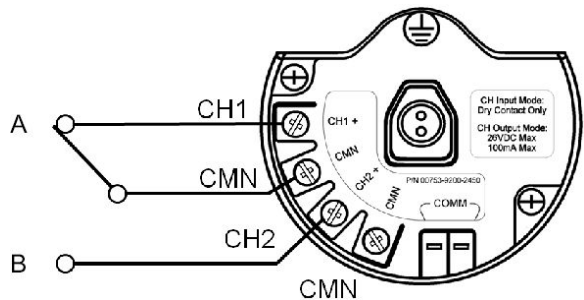
Table 2: Dual Input, Limit Contact Logic

Switch inputs		Wireless outputs	
CH1	CH2	PV	SV
Open	Open	TRAVEL (0.5)	TRAVEL (0.5)
Open	Closed	FALSE (0.0)	FALSE (0.0)
Closed	Open	TRUE (1.0)	TRUE (1.0)
Closed	Closed	FAULT (NaN)	FAULT (NaN)

Dual input, opposing contact logic

When configured for opposing contact logic, the transmitter will accept the input from a double pole single throw switch on inputs CH1 and CH2, and will use opposing contact logic for the determination of the wireless outputs.

Figure 5: Dual Input, Opposing Contact



- A. True
- B. False

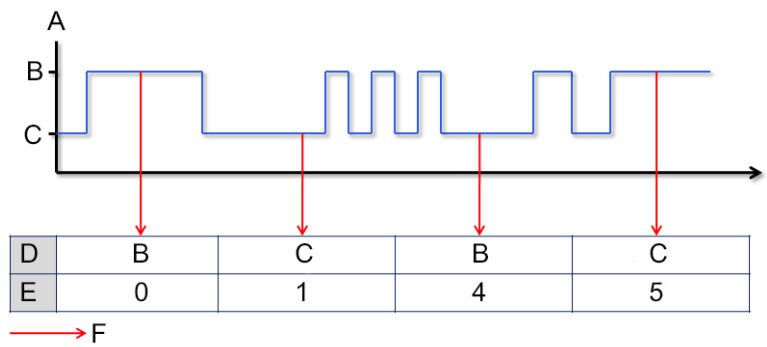
Table 3: Dual Input, Opposing Contact Logic

Switch inputs		Wireless outputs	
CH1	CH2	PV	SV
Open	Open	FAULT (NaN)	FAULT (NaN)
Open	Closed	FALSE (0.0)	FALSE (0.0)
Closed	Open	TRUE (1.0)	TRUE (1.0)
Closed	Closed	FAULT (NaN)	FAULT (NaN)

Momentary discrete inputs, measurement option code 32 and 42

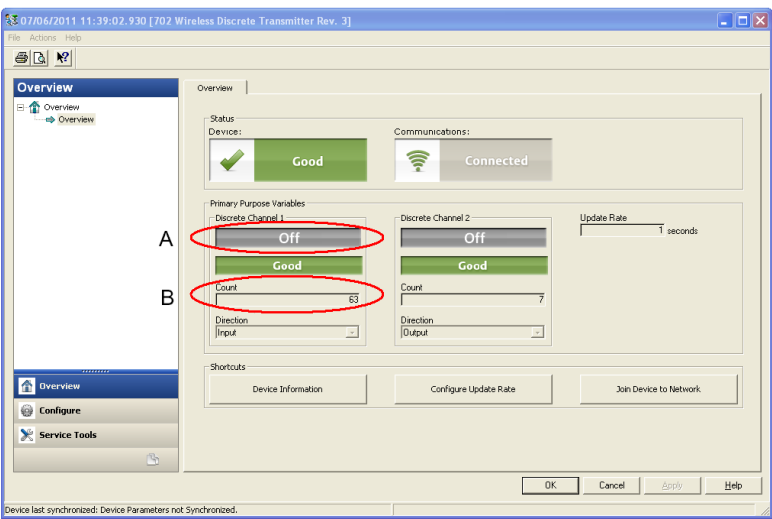
The transmitter is capable of detecting momentary discrete inputs of 10 millisecond or more in duration, regardless of the wireless update rate. At each wireless update, the device reports current discrete state along with an accumulating count of close-open cycles for each input channel.

Figure 6: Momentary Inputs and Accumulating Count



- A. Input switch state
- B. Closed
- C. Open
- D. State
- E. Count
- F. Wireless updates

Figure 7: Reporting of Current Discrete State and Count in AMS Device Manager



- A. Current state
- B. Count

Variable reporting and mapping

In the Enhanced variable reporting mode, the transmitter will provide both current state of the discrete channels, and a count of the discrete state change cycles. [Table 4](#) shows the variable mapping for both cases. Variable Reporting can be set in AMS Device Manager by going to **Configure** → **Manual Setup** → **HART**.

Table 4: Variable Mapping

Variable reporting	Variable mapping			
	PV	SV	TV	QV
Enhanced – Discrete state with count	CH1 state	CH2 state	CH1 count	CH2 count

Discrete output circuits, measurement option Code 42

The transmitter has two channels that can each be configured for discrete input or output. Inputs must be dry contact switch inputs and these were described in a preceding section of this document. Outputs are a simple switch closure to activate an output circuit. The transmitter output does not provide any voltage or current, the output circuit must have power of its own. The transmitter output has maximum switch capacity per channel of 26 volts DC and 100 milliamps. A typical power supply for powering an output circuit can be 24 volts or lower.

Note

It is very important that the polarity of the output circuit is as shown in the wiring diagrams, with the positive (+) side of the circuit wired to the CH1+ or the CH2+ terminal, and the negative (-) side of the circuit wired to the CMN terminal. If the output circuit is wired backwards, it will remain active (switch closed) regardless of the state of the output channel.

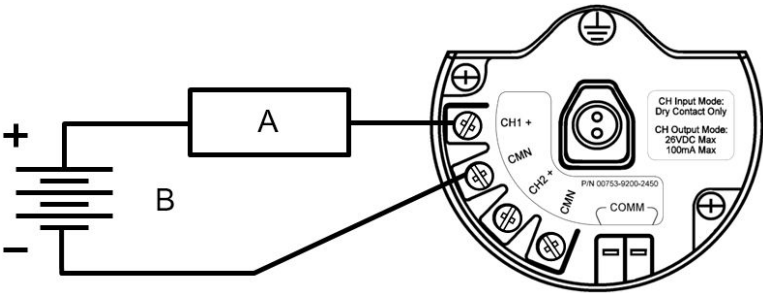
Discrete output switch functionality

The discrete output of the transmitter is driven by the host control system, through the Gateway, and out to the transmitter. The time required for this wireless communication from the Gateway to the transmitter is dependent on many factors, including the size and topology of the network and the total amount of downstream traffic on the wireless network. For a network that is constructed to our best practices, typical delays in communication of a discrete output from the Gateway to the Transmitter are 15 seconds or less. Remember this delay is only part of the latency that will be observed in a control loop.

Note

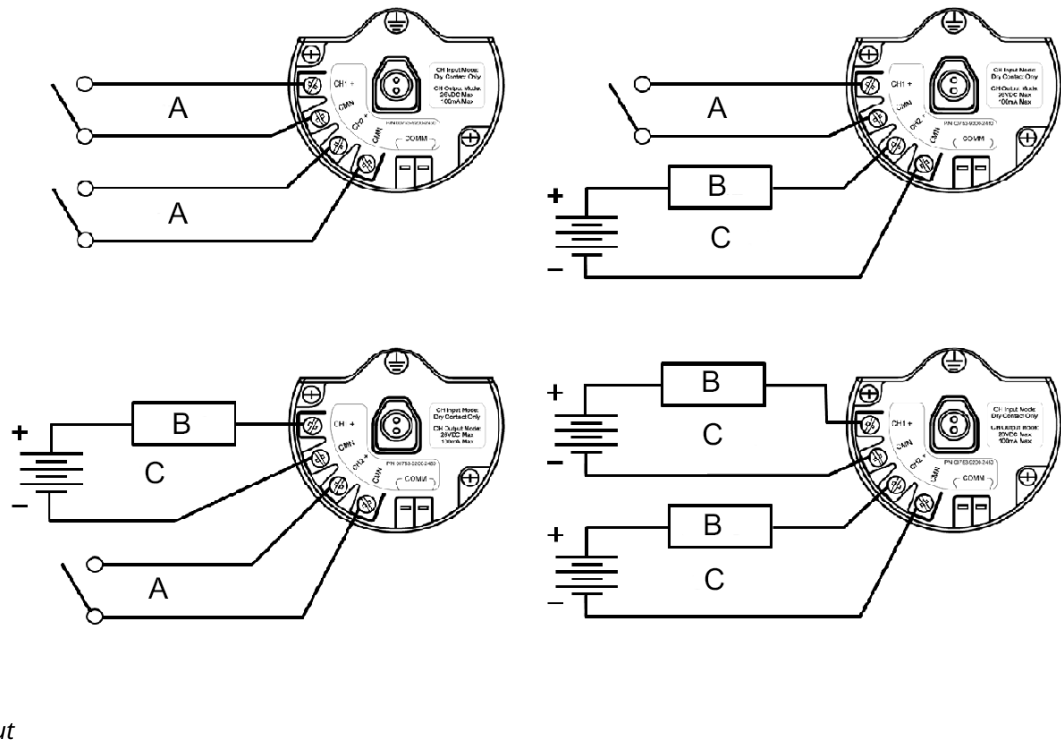
The output switch functionality of the transmitter requires that the network is managed by a version 3 Gateway with v3.9.7 firmware, or a version 4 Gateway with v4.3 or higher firmware installed.

Figure 8: Output Circuit Wiring



- A. Load
- B. Output

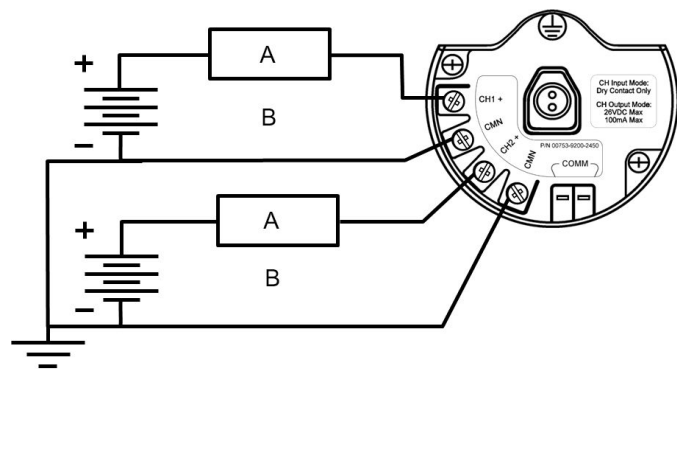
Figure 9: Possible Configurations for Both Channel 1 and Channel 2



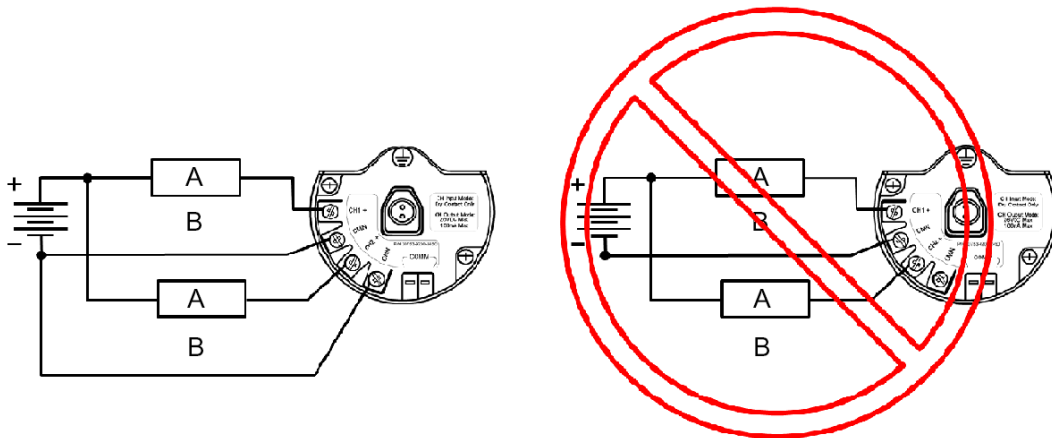
Special considerations for dual output circuits

If both channels are connected to output circuits, it is very important that the CMN terminal of each circuit be at the same voltage. Employing a common ground for both output circuits is one way to ensure that both circuits have CMN terminals at the same voltage.

Figure 10: Dual Output Circuits with a Common Ground



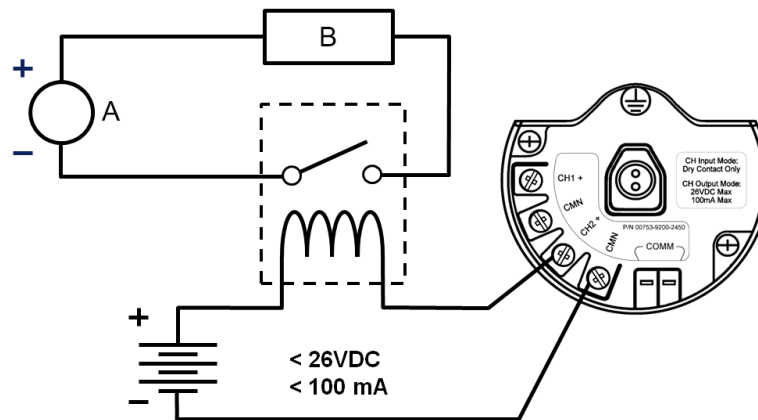
If two output circuits are connected to a single transmitter with a single power supply, both CH + and CMN terminals must be connected to each output circuit. The negative power supply wires must be at the same voltage and connected to both CMN terminals.

Figure 11: Dual Output Circuits with One Power Supply

- A. Load
B. Output

Switching greater currents or voltages

It is important to note that the maximum output switching capacity is 26 volts DC and 100 milliamps. If a greater voltage or current is to be switched, an interposing relay circuit can be used. Below is an example of a circuit to switch higher currents or voltages.

Figure 12: Wiring an Interposing Relay to Switch Greater Currents or Voltages

- A. Power supply
B. Load

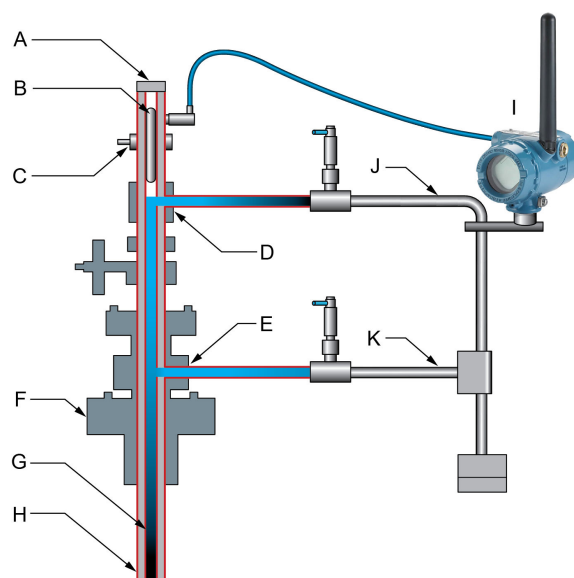
Plunger arrival detection

Product description

The Rosemount 702 Wireless Discrete Transmitter for plunger arrival detection is designed to work with the ETC Cyclops™ plunger arrival sensor (ET-11000). The transmitter provides power to the plunger arrival sensor, reads and communicates the sensor state via *WirelessHART*®. Features of the transmitter include:

- Simple and easy installation practices currently being used for robust installations
- Flexibility to meet the most demanding applications
- Sensor state latching for host system compatibility
- Provides power to external plunger arrival sensor
- The integral LCD display conveniently displays the latched plunger sensor state, power output state, and diagnostics of the transmitter

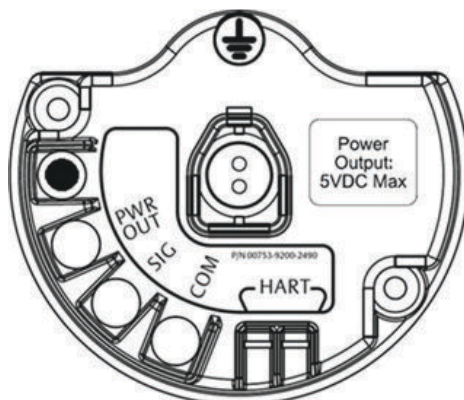
Figure 13: Rosemount 702 Wireless Discrete Transmitter for Plunger Arrival



- A. Plunger arrival sensor (ETC Cyclops™)
- B. Rosemount 702 Wireless Discrete Transmitter Plunger Arrival
- C. Lubricator
- D. Plunger
- E. Wastewater
- F. Upper lubricator outlet
- G. Lower lubricator outlet
- H. Well casing
- I. Production gas
- J. Well casing/production tube
- K. Well casing

Terminal block connections

The plunger arrival detection configuration for measurement option code 52 is intended for use with the ETC Cyclops™ Plunger Arrival Sensor.

Figure 14: Plunger Arrival Terminal Diagram

The wiring connections to the ETC Cyclops™ Sensor are made according to [Figure 15](#).

Figure 15: Wiring Configuration

Plunger arrival sensor

ETC Cyclops™ Sensor



- A. PWR
- B. SIG
- C. COM

For mounting and maintenance of the ETC Cyclops™ Sensor, refer to the ETC Cyclops™ Plunger Arrival Sensor [Manual](#).

Latching feature

The Rosemount 702 Wireless Discrete Transmitter has a latching feature that, when enabled, allows detection of momentary state changes to be held for a configurable latch period. The latching feature can be configured to detect either high or low state changes. By default, the Plunger state (channel 1) is enabled to latch high state changes for a period of one minute.

The following are some examples to demonstrate how the latching time works.

Note

Hold time is set to four seconds for illustration in the following examples.

Short events (less than latch hold time) of the measured value will be latched to the reported value for the duration of latch hold time.

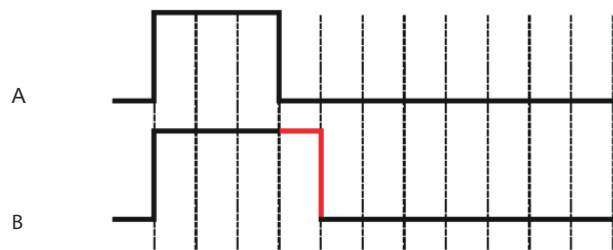
Figure 16: Latch Time Short Events



A. Measured
B. Reported

The start of the latch hold timer begins when the measured signal first transitions to active state.

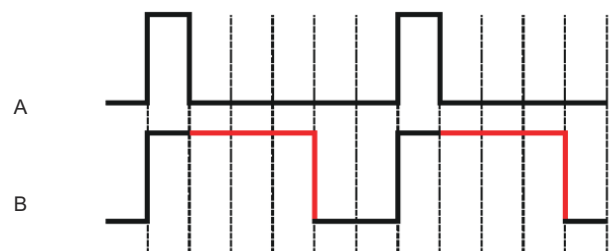
Figure 17: Latch Hold Time Start



A. Measured
B. Reported

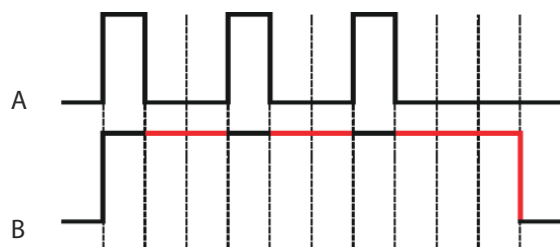
The latch only applies to transitions into the active state. As soon as the reported value is no longer latched, the device is armed for the next event.

Figure 18: Latch Applies to Transitions into Active State



A. Measured
B. Reported

If the measured value goes inactive and active again before the initial latch hold timer expires, the latch hold timer will restart from the beginning of the most recent event.

Figure 19: Latch Hold Timer Restarts

A. *Measured*

B. *Reported*

Safety shower and eye wash monitoring

The Rosemount 702 Wireless Discrete Transmitter can be used to monitor safety showers and eye wash stations by using switch kits provided by TopWorx™, an Emerson company. These kits are ordered as a part of the transmitter model code and are available for both insulated and un-insulated pipes. These kits contain the switches, brackets and cables that are necessary to install the transmitter to monitor both the safety shower and the eye wash in a single station. Because each has two input channels, one transmitter can be used to monitor both a safety shower and an eye wash.

Each safety shower monitoring kit contains:

- Two TopWorx GO™ Switch magnetic proximity switches
- Two cables, six-foot and 12-foot
- Two black polymer cable glands
- Mounting kit for safety shower and eye wash

UL and CSA switches

Safety shower and eye wash monitoring kits are available with either UL or CSA switches. This designation refers to the ordinary location certification of the GO Switch in the kit. These are not hazardous locations certificates. The Go Switch is regarded as a simple apparatus and does not require its own hazardous locations certificate. Either GO Switch is suitable for installation in hazardous locations when wired to the Rosemount 702 Wireless Discrete Transmitter with an appropriate hazardous locations certificate. The CSA GO Switch is for applications in Canada, the UL GO Switch is for applications in all other world areas.

Installation drawings and instructions

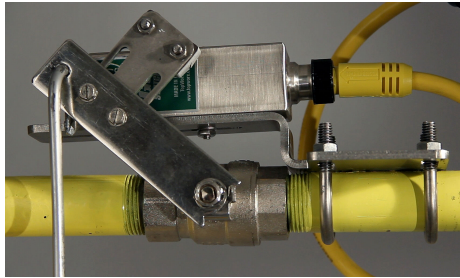
Installation drawings and instructions for safety shower and eye wash kits are included in the [Rosemount 702 Wireless Discrete Transmitter Reference Manual](#). This manual can be downloaded at the [Rosemount 702 Transmitter product page](#).

Safety shower monitoring

When the shower valve is activated (valve open) by pulling down on the handle, the TopWorx switch is activated (closed switch) and the Rosemount 702 Wireless Discrete Transmitter senses that switch closure. This switch state is then transmitted by the transmitter to the Gateway, which then sends that information to the control host or alert system. When the shower valve is closed, the switch remains in the activated state until it is reset by a technician. The switch can be reset only by placing a ferrous metal object on the far side of the sensing area of the switch.

Figure 20: TopWorx Switch Installed on a Safety Shower



Figure 21: Detail of Switch Installation on Safety Shower**Figure 22: Safety Shower Valve in Activated Position**

Eye wash monitoring

When the eye wash valve is activated (valve open) by pushing down on the hand paddle, the TopWorx switch is activated (closed switch) and the Rosemount 702 Wireless Discrete Transmitter senses that switch closure. This switch state is then transmitted by the transmitter to the Gateway, which then sends that information to the control host or alert system. When the eye wash valve is closed, the switch remains in the activated state until it is reset by a technician. The switch can be reset only by placing a ferrous metal object on the far side of the sensing area of the switch.

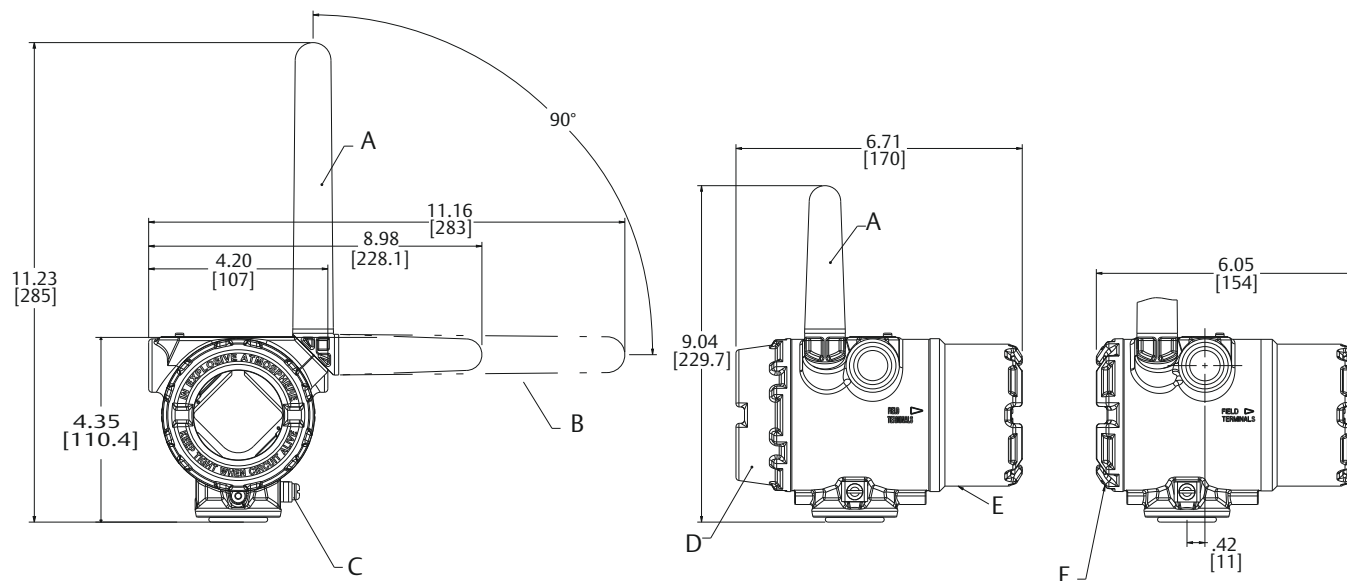
Figure 23: TopWorx Switch Installed on an Eye Wash Station**Figure 24: Eye Wash in Activated Position**

Product certification

Refer to the [Rosemount 702 Wireless Discrete Transmitter Quick Start Guide](#) for product certification information.

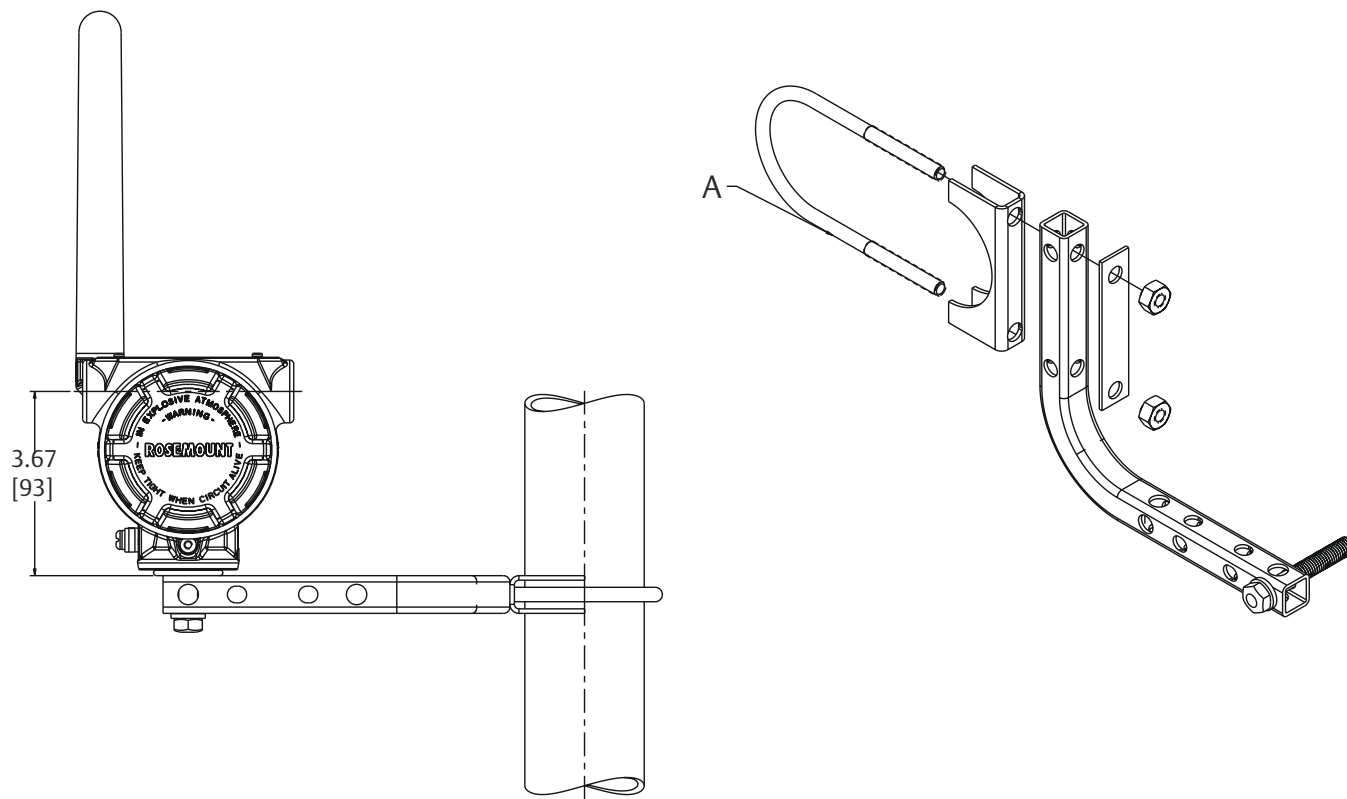
Dimensional drawings

Figure 25: Rosemount 702 Wireless Discrete Transmitter



- A. 2.4 GHz/WirelessHART® extended range antenna
- B. Possible antenna rotation
- C. Ground screw assembly
- D. Digital display cover
- E. Field terminals (this side)
- F. Transmitter electronics (this side), no display cover

Dimensions are in inches (millimeters).

Figure 26: Mounting Configuration with Optional Mounting Bracket

A. 2-in. U-bolt for pipe fitting

Dimensions are in inches (millimeters).

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