TEKTROL
Technology Solutions

# TEK-TEMP 2300A

## Explosion Proof Two Wire Temperature Transmitter

## Instruction Manual

**Document Number: IM-2300A**


www.tek-trol.com

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**NOTICE**

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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## Table of Contents

# 1 Safety Instructions

## 1.1 Intended Use

Tek-Temp 2300A is a temperature transmitter for Resistance Temperature Detectors (RTD), Thermocouples (TC), and resistance and voltage sensors. The unit is specifically used for mounting in-field applications.

## 1.2 Certifications

Tek-Temp 2300A has and FM, ATEX, IECEx, CSA, SIL, Marine Certifications.

## 1.3 Safety Instructions from the Manufacturer

### 1.3.1 Disclaimer

The manufacturer will not be accountable for any damage by using its product, including, but not limited to direct, indirect incidental, and consequential damages. Any product purchased from the manufacturer is warranted following the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice and will not be answerable in any way for the possible consequence of such changes.

### 1.3.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

### 1.3.3 Information Concerning the Documentation

To prevent any injury to the operator and damage to the device it is essential to read the information in this document and read the applicable national standards, and safety instructions.

These operating instructions contain all the information that is required in various stages, like product identification, incoming acceptance, and storage, from mounting, connection, operation, and commissioning through to troubleshooting, maintenance, and disposal.

## 1.4 Safety Precautions

You must read these instructions carefully before installing and commissioning the device. These instructions are an important part of the products and must be kept for further reference. For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.
Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured.

**Warnings and Symbols Used**

The following safety symbol marks are used in this operation manual and on the instrument.

**WARNING**

A warning highlights actions or procedures that, if not performed correctly, will lead to personal injury, a safety hazard, or the destruction of the instrument.

**CAUTION**

Caution highlights actions or procedures which, if not performed correctly, may lead to personnel injury, safety hazard, or destruction of the instrument.

**NOTE**

"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

## 1.5 Packaging, Transportation and Storage

### 1.5.1 Packaging

- Tek-Temp 2300A Two-Wire Temperature Transmitter
- Documentation

### 1.5.2 Transportation

- When the transmitter is delivered, visually check it to make sure that no damage occurred during the shipment.
- To avoid any damage, unpack the flowmeter only at the installation site.
- Avoid impact shocks, rain, and water during transportation.
- Do not throw or drop the device.
- Use original packaging for transport and ensure that the packaging does not get crushed or damaged by sharp objects or other boxes.
- The flow tube is shipped with end covers to protect it from mechanical damage and normal unrestrained distortion. End covers should not be removed until just before installation.
- Keep shipping plugs in conduit connections until conduits are connected and sealed.

### 1.5.3 Storage

The following precautions must be observed when storing the instrument, especially for a long period:

- Select a storage area that meets the following conditions:
  - It is not exposed to rain or water.
  - It suffers minimum vibration and shock.
  - If possible, it is preferable at normal temperature and humidity (Operating Temperature -40°F to 185°F (-40°C to +85°C))
- The relative humidity should be: 95% RH.
- When storing the transmitter, repack it in a similar way as it was packed when delivered from the factory.
- Make sure before storing that the sensor module, flange, and housing is securely mounted.

### 1.5.4 Nameplate

**NOTE**

Look at the device nameplate to ensure the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate

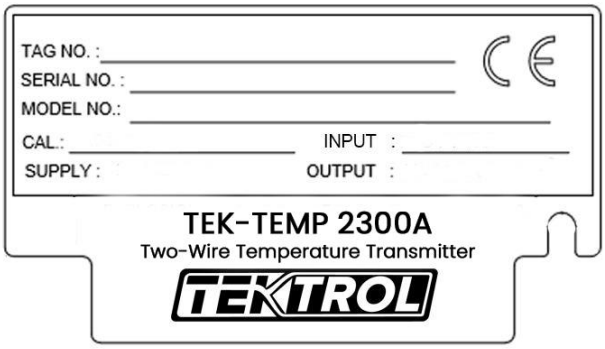


Fig 1. Nameplate

# 2 Product Description

## 2.1 Introduction

The Tek-Temp 2300A is a versatile and reliable temperature transmitter designed to meet the diverse needs of industrial applications. Engineered for precision and efficiency, it supports a wide range of sensor inputs, including Pt100...Pt1000, Ni100...Ni1000, and thermocouples (TC), enabling linearized temperature measurement and advanced functions like difference or average temperature calculations. Beyond temperature measurement, it converts linear resistance variations and amplifies bipolar mV signals to standard 4...20 mA current outputs, ensuring seamless integration into process control systems. With compatibility for HART communication and adherence to strict safety standards, including suitability for SIL installations and NAMUR NE 89 compliance, the 2300A is a robust solution for critical and high-safety applications.

## 2.2 Measuring Principle

A **Hockey Puck Temperature Transmitter** operates based on the principle of converting a temperature reading from a thermocouple or RTD (Resistance Temperature Detector) into a standardized output signal, such as 4-20mA or digital communication protocols like HART

## 2.3 Specifications

| | |
|---|---|
| Accuracy | Better than 0.05% of the selected range |
| Sensor Type | **RTD:** Pt 100, Ni100, lin. R<br>**TC:** B, E, J, K, L, N, R, S, T, U, W3, W5<br>**Voltage:** -800... +800 mV |
| Operating Temperature | -40°F to 185°F (-40°C to +85°C) |
| Compensated Temp | 68°F to 82°F (20°C to 28°C) |
| Power supply | 8.0 VDC to 30VDC |
| Output Signal | 4...20 mA |
| Response Time | 01 Sec to 60 Sec |
| Weight | 0.11 lbs (50g) |
| Enclosure Rating | IP00 |
| Programming | HART |
| Humidity | <95% RH (non-cond.) |
| Agency Approval | ATEX, IECEx, FM, CSA, DNV Marine, SIL |

### 2.3.1 Temperature Sensor Range and Accuracy

| **General Values** | | |
|---|---|---|
| Input Type | Absolute Accuracy | Temperature Coefficient |
| All | ≤±0.05% of span | ≤±0.005% of span /°C |

| **Basic Values** | | |
|---|---|---|
| Input Type | Basic Accuracy | Temperature Coefficient |
| Pt100 & Pt1000 | ≤±0.1 °C | ≤±0.005% of span °C /°C |
| Nil100 | ≤±0.2 °C | ≤±0.005% of span °C /°C |
| Lin. R | ≤±0.1 Ω | ≤±5 mΩ /°C |
| Volt | ≤±10 µV | ≤±0.5 µV /°C |
| TC type:<br>E,J,K,L,N,T,U | ≤±0.5 °C | ≤±0.005% of span °C /°C |
| TC type:<br>B,R,S,W3,W5 | ≤±1 °C | ≤±1 °C /°C |

EMC – immunity influence.....≤±0.1 % of span
Extended EMC immunity
NAMUR NE 21, A criterion,burst.....≤±1 % of span

**Electrical Specifications, input:**

Max. offset.....50% of selec. Numerical max. va

**Electrical Specifications, input:**

| RTD type | Min. value | Max. value | Min. span | Standard |
|---|---|---|---|---|
| Pt100 | -200 °C | +850°C | 10°C | IEC 60751 |
| Ni100 | -60 °C | +250°C | 10°C | DIN 43760 |
| Lin. R | 0 Ω | 7000 Ω | 25 Ω | ----- |

### 2.3.2 Electrical Specifications

| Power Supply | Output Signal | HART Loop Resistance | Isolation |
|---|---|---|---|
| 8.0 VDC to 30 VDC | 4...20 mA | 4-20mA, HART 5 | 1.5 kAVC/50VAC |

### 2.3.3 Performance Specifications

| | |
|---|---|
| **Accuracy** | Better than 0.05% of selected range |
| **Operating Temperature** | -40°F to 185°F (-40°C to +85°C) |
| **Compensated Temperature** | 68°F to 82.4°F (20°C to 28°C) |
| **Power Supply Effect** | ≤0.005% of span / VDC |
| **Humidity** | ≤95% RH (non-cond) |
| **Repeatability** | ≤±1% Span |

### 2.3.4 Physical Specifications

| | |
|---|---|
| **Housing Class** | IP00 |
| **Response Time** | 01 sec to 60 sec |
| **Sensor** | RTD, Thermocouple |
| **Weight** | 0.11lbs (150g) |
| **Programming** | Loop Link & HART |

## 2.4 Dimensional Drawing

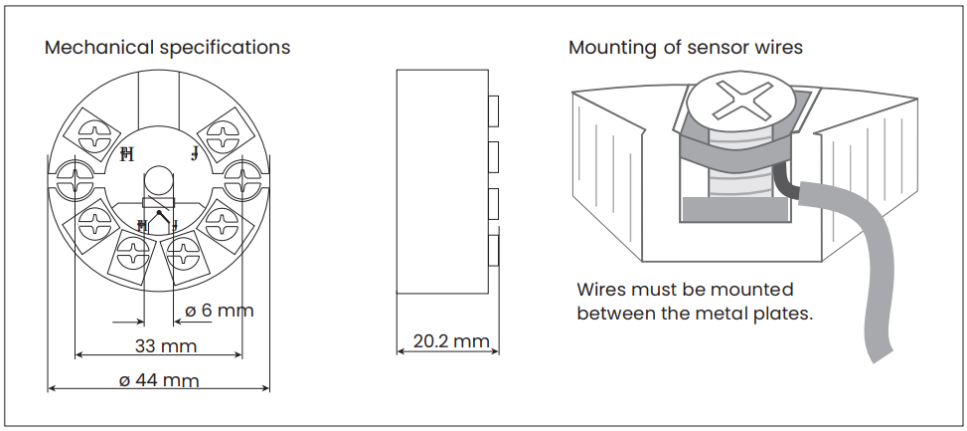


Fig 2. Dimensional Drawing

## 2.5 Model Chart

| Example | Tek-Temp 2300A | D | Tek-Temp 2300A-D |
|---|---|---|---|
| Series | Tek-Temp 2300A | | Two Wire Temperature Transmitter |
| | | D | ATEX, IECEx, FM, CSA, DNV Marine, SIL |

# 3 Installation

**CAUTION**

• Installation of the device must be carried out by trained; qualified specialists authorized to perform such work by the facility's owner-operator. The specialist must have read and understood these Operating Instructions and must follow the instructions they contain
• When removing the instrument from hazardous processes, avoid contact with the fluid and the interior of the meter.
• All installations shall comply with local installation requirements and local electrical codes.
• When the following notes are not observed, flow measurements may not be correct and can damage the instrument. Please make the correct piping design according to the present guidelines.

**WARNING**

This section offers installation, wiring, operation, and troubleshooting instructions. The user must read this manual carefully before installation and operation, because improper installation may cause incorrect measurement and even damage the flowmeter

**NOTE**

Improper installation has the potential to cause injury and to damage the instrument. Periodically inspect the power cables, transducer cables, cable glands, and the enclosure for signs of damage. Inspect transducer installation and mounting hardware for loose connections.

## 3.1 Mounting

- For DIN form B sensor head mounting. In non-hazardous areas, the Tek-Temp 2300A can be mounted on a DIN rail with the PR fitting type 8421.

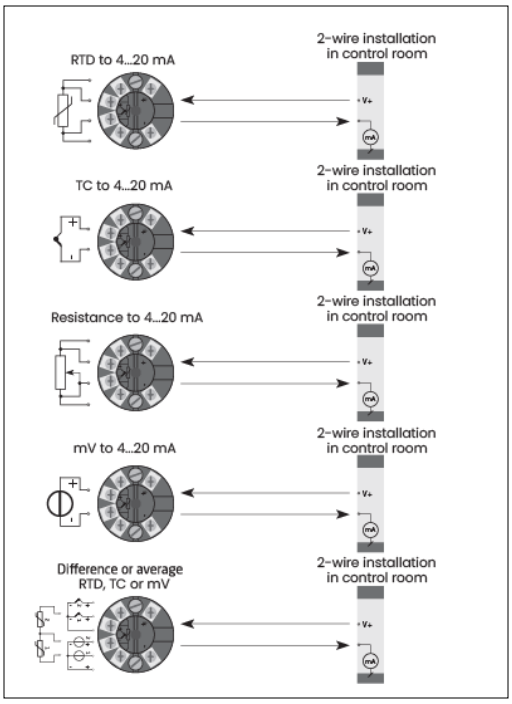


Fig 3. Mounting

# 4 Electrical Installations

**WARNING**

Explosion can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- In an explosive environment, check the transmitter is installed according to safety regulations before connecting the HHT to the transmitter.
- Transmitter covers must be fully engaged to meet explosion-proof requirements.
- Only a suitable trained and qualified person must establish the transmitter.
- Avoid contact with the leads and terminals. High voltage may be present on leads and can cause electrical shock.

## 4.1 General Considerations

This transmitter uses temperature sensors. It transfers electrical signal minutely to 4 to 20mA HART. Thus, mount the transmitter close to the process and use a minimum of sensor length to achieve best accuracy. However, keep in mind the need for easy access, safety of personnel, practical field calibration, and a suitable transmitter environment. In general, install the transmitter so as to minimize vibration, shock, and temperature fluctuations.

## 4.2 Connection of Sensor

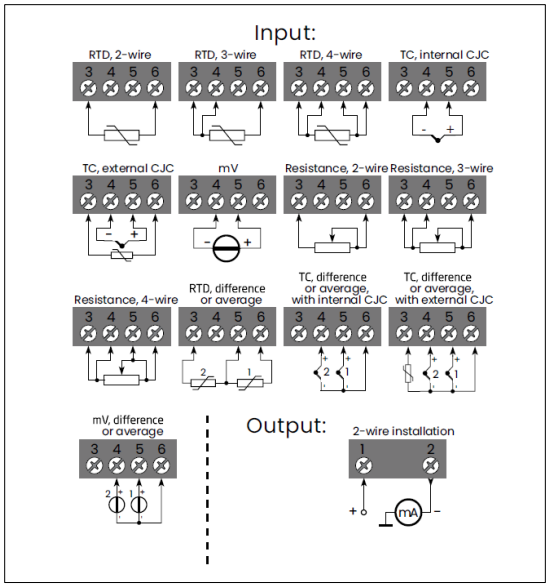


Fig 4. Connection of Sensor

# 5 Operation

## 5.1 Programming

1. With communications interface Loop Link and Preset PC configuration software.
2. With a HART modem and Preset PC configuration software.
3. With a HART communicator with A/S' DDL driver.

**1. HART Modem**

For programming, please refer to the drawing below and the help functions in Preset.

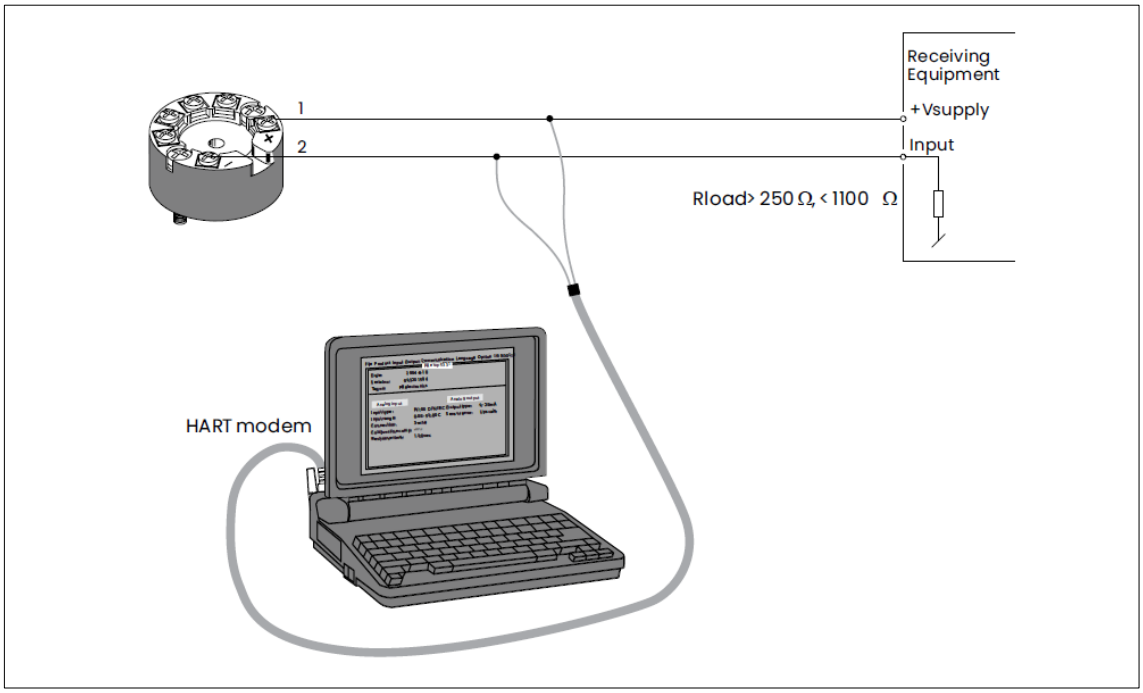


Fig 5. HART Modem

## 2. Loop Link

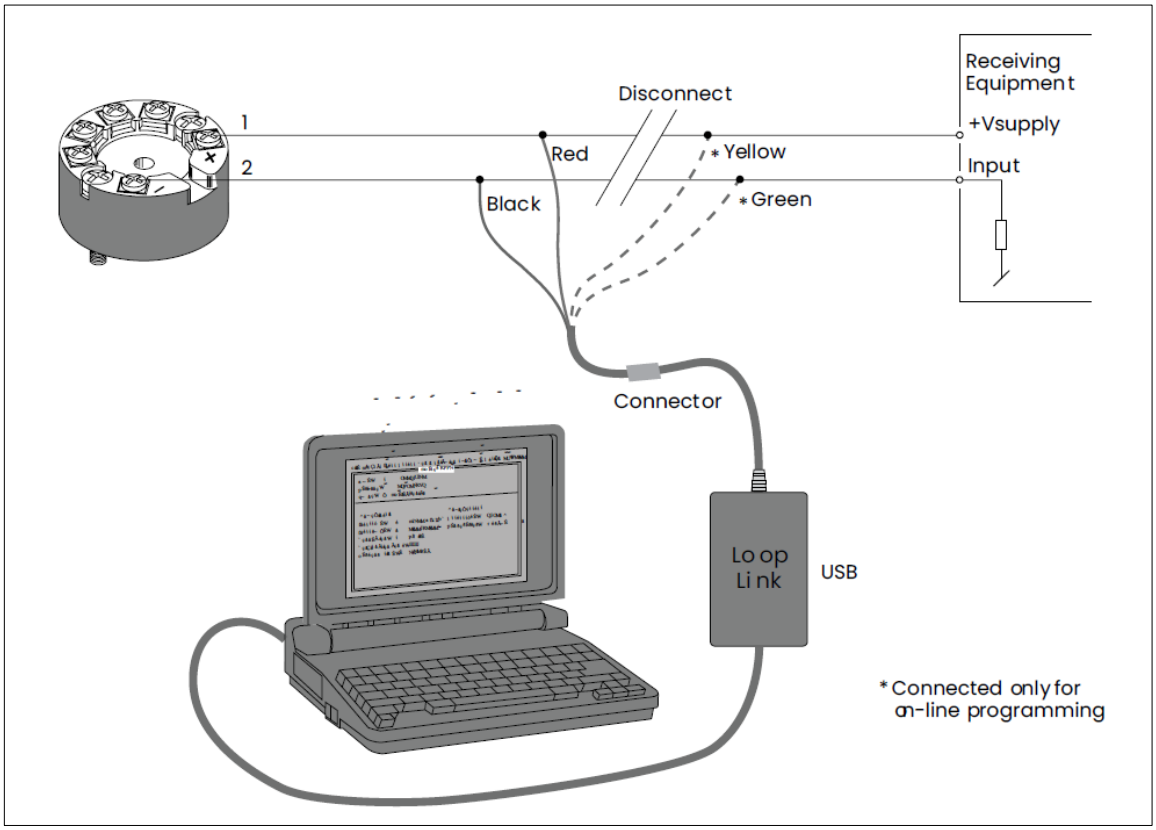


Fig 6. Loop Link

For programming, please refer to the drawing below and the help functions in Preset. Loop Link is not approved for communication with devices installed in hazardous (Ex) areas.

### 3. HART Communicator

Please refer to the drawing below for programming. The PR electronics A/S DDL driver needs to be loaded onto the HART communicator to access product-specific commands. You can purchase this from PR Electronics A/S or the HART Communication Foundation.

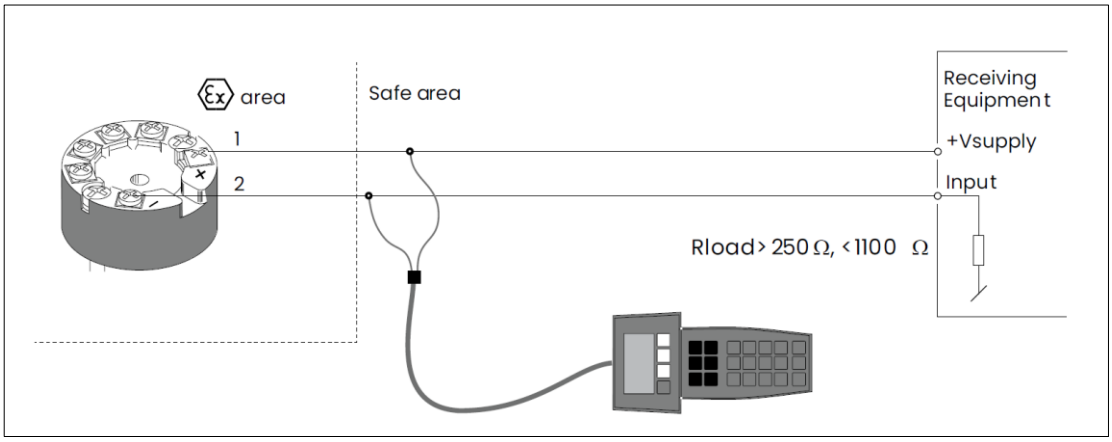


Fig 7. HART Communicator

### Connection of Transmitters in Multidrop Mode

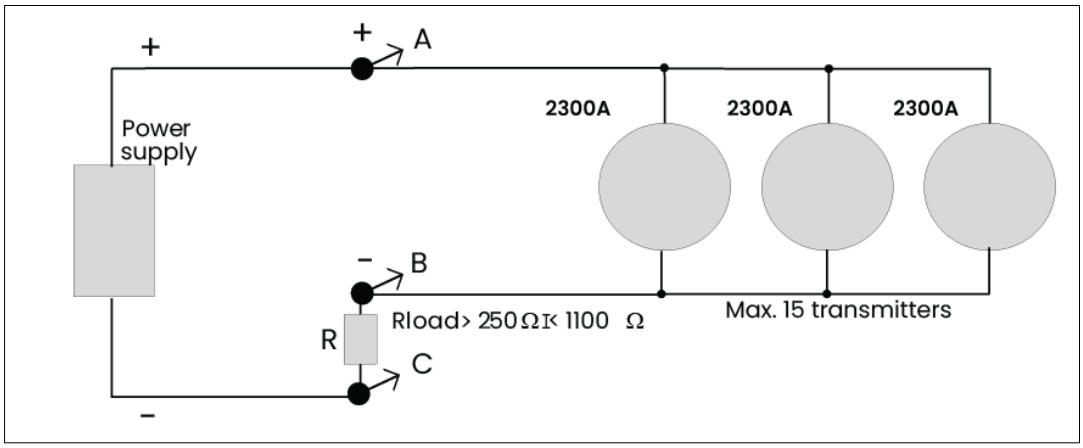


Fig 8. Connection of Transmitters in Multidrop Mode

- The HART communicator or a PC modem can be connected across AB or BC.
- The outputs of max. 15 transmitters can be connected in parallel for a digital HART communication on 2-wires.
- Before it is connected, each transmitter must be configured with a unique number from 1 to 15. If 2 transmitters are configured with the same number, both will be excluded. The transmitters must be programmed for multidrop mode (with a fixed output signal of 4 mA). Maximum current in the loop is therefore 60 mA.
- The communication is either by means of a HART communicator or a HART modem.
- The HART PC configuration software can configure the individual transmitter for multidrop mode and provide it with a unique polling address.



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