

# 2-wire programmable transmitter 5334

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# 2-wire programmable transmitter 5334

- TC input
- H high measurement accuracy
- Galvanic isolation
- Programmable sensor error value
- For DIN form B sensor head mountings

## Application

- Linearised temperature measurement with TC sensor.
- Amplification of bipolar mV signals to a 4...20 mA signal, optionally linearised according to a defined linearisation function..

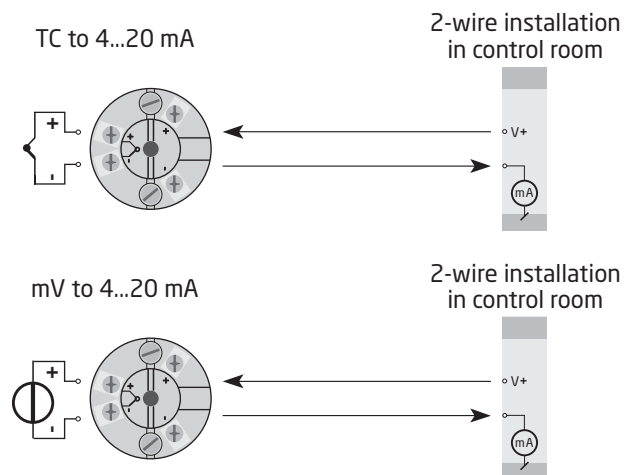
## Technical characteristics

- Within a few seconds the user can program PR5334 to measure temperatures within all TC ranges defined by the norms.
- Cold junction compensation (CJC) with a built-in temperature sensor.
- Continuous check of vital stored data for safety reasons.

## Mounting / installation

- For DIN form B sensor head mounting. In non-hazardous areas the 5334 can be mounted on a DIN rail with the PR fitting type 8421.

## Applications



## Order

| Type | Version                      | Ambient temperature | Galvanic isolation |
|------|------------------------------|---------------------|--------------------|
| 5334 | Zone 2 : A                   | -40°C...+85°C : 3   | 1500 VAC : B       |
|      | Zone 0, 1, 2, 21, 22, M1 : B |                     |                    |

## Electrical specifications

### Environmental conditions:

|   |                      |
|---|----------------------|
| Operating temperature . . . . .                   | -40°C to +85°C       |
| Calibration temperature. . . . .                  | 20...28°C            |
| Humidity. . . . .                                 | < 95% RH (non-cond.) |
| Protection degree, enclosure / terminals. . . . . | IP68 / IP00          |

### Mechanical specifications:

|                                |                                      |
|--------------------------------|--------------------------------------|
| Dimensions . . . . .           | Ø 44 x 20.2 mm                       |
| Weight . . . . .               | 50 g                                 |
| Max. wire size. . . . .        | 1 x1.5 mm <sup>2</sup> stranded wire |
| Screw terminal torque. . . . . | 0.4 Nm                               |
| Vibration. . . . .             | IEC 60068-2-6                        |
| 2...25 Hz. . . . .             | ±1.6 mm                              |
| 25...100 Hz. . . . .           | ±4 g                                 |

### Common specifications:

|  |                        |
|--|------------------------|
| Supply voltage, DC                           |                        |
| 5334A3B . . . . .                            | 7.2...35 VDC           |
| 5334B3B . . . . .                            | 7.2...30 VDC           |
| Internal power dissipation                   |                        |
| 5331A3B . . . . .                            | 25 mW...0.8 W          |
| 5331D3B . . . . .                            | 25 mW...0.7 W          |
| Voltage drop . . . . .                       | 7.2 VDC                |
| Isolation voltage, test / operation. . . . . | 1.5 kVAC / 50 VAC      |
| Warm-up time. . . . .                        | 5 min.                 |
| Power on to stable output . . . . .          | 4.5 s                  |
| Programming . . . . .                        | Loop Link              |
| Signal / noise ratio. . . . .                | Min. 60 dB             |
| Response time (programmable) . . . . .       | 1...60 s               |
| EEPROM error check . . . . .                 | < 3.5 s                |
| Signal dynamics, input . . . . .             | 18 bit                 |
| Signal dynamics, output . . . . .            | 16 bit                 |
| Effect of supply voltage variation. . . . .  | < 0.005% of span / VDC |

Accuracy, the greater of general and basic values:

| General values |                   |                         |
|----------------|-------------------|-------------------------|
| Input type     | Absolute accuracy | Temperature coefficient |
| All            | ≤ ±0.05% of span  | ≤ ±0.01% of span / °C   |

| Basic values  |                      |                                    |
|---|----------------------|------------------------------------|
| Input type  | Basic accuracy       | Temperature coefficient            |
| Volt  | $\leq \pm 10 \mu V$  | $\leq \pm 1 \mu V / ^\circ C$      |
| TC type:<br>E, J, K, L, N, T, U   | $\leq \pm 1^\circ C$ | $\leq \pm 0.05^\circ C / ^\circ C$ |
| TC type: B, R, S,<br>W3, W5, Lr   | $\leq \pm 2^\circ C$ | $\leq \pm 0.2^\circ C / ^\circ C$  |
| EMC - immunity influence. . . . . $< \pm 0.5\%$ of span                                 |                      |                                    |
| Extended EMC immunity:<br>NAMUR NE 21, A criterion, burst . . . . . $< \pm 1\%$ of span |                      |                                    |

**Electrical specifications, input:**

**TC input:**

| Type | Min. temperature | Max. temperature | Min. span | Standard     |
|------|------------------|------------------|-----------|--------------|
| B    | +400°C           | +1820°C          | 100°C     | IEC584       |
| E    | -100°C           | +1000°C          | 50°C      | IEC584       |
| J    | -100°C           | +1200°C          | 50°C      | IEC584       |
| K    | -180°C           | +1372°C          | 50°C      | IEC584       |
| L    | -100°C           | +900°C           | 50°C      | DIN 43710    |
| Lr   | -200°C           | +800°C           | 50°C      | GOST 3044-84 |
| N    | -180°C           | +1300°C          | 50°C      | IEC584       |
| R    | -50°C            | +1760°C          | 100°C     | IEC584       |
| S    | -50°C            | +1760°C          | 100°C     | IEC584       |
| T    | -200°C           | +400°C           | 50°C      | IEC584       |
| U    | -200°C           | +600°C           | 50°C      | DIN 43710    |
| W3   | 0°C              | +2300°C          | 100°C     | ASTM E988-90 |
| W5   | 0°C              | +2300°C          | 100°C     | ASTM E988-90 |

Max. offset . . . . . 50% of selec. max. value

Cold junction compensation . . . . .  $< \pm 1.0^\circ C$

Sensor error detection . . . . . Yes

Sensor error current:

When detecting . . . . . Nom. 33  $\mu A$

Else. . . . . 0  $\mu A$

**Voltage input:**

Measurement range . . . . . -12...150 mV

Min. span . . . . . 5 mV

Max. offset . . . . . 50% of selec. max. value

Input resistance . . . . . 10 M $\Omega$

**Output:**

**Current output:**

Signal range. . . . . 4...20 mA

Min. signal range . . . . . 16 mA

Updating time . . . . . 440 ms

Output signal at EEprom error . . . . .  $\leq 3.5$  mA

Load resistance. . . . .  $\leq (V_{supply} - 7.2) / 0.023 [\Omega]$

Load stability . . . . .  $< \pm 0.01\%$  of span / 100  $\Omega$

**Sensor error detection:**

Programmable . . . . . 3.5...23 mA

Namur NE43 Upscale . . . . . 23 mA

Namur NE43 Downscale . . . . . 3.5 mA

Of span = Of the presently selected range

**Observed authority requirements:**

|                  |                              |
|------------------|------------------------------|
| EMC . . . . .    | 2014/30/EU & UK SI 2016/1091 |
| ATEX . . . . .   | 2014/34/EU & UK SI 2016/1107 |
| RoHS . . . . .   | 2011/65/EU & UK SI 2012/3032 |
| EAC . . . . .    | TR-CU 020/2011               |
| EAC Ex . . . . . | TR-CU 012/2011               |

**Marine approval:**

|                                |            |
|--------------------------------|------------|
| DNV, Ships & Offshore. . . . . | TAA0000101 |
|--------------------------------|------------|

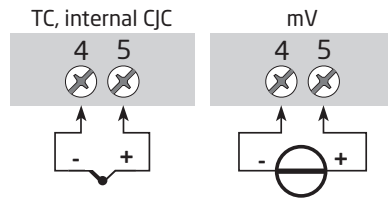
**Ex / I.S. approvals:**

ATEX:

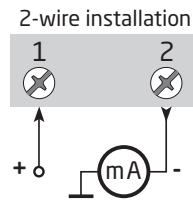
|                   |                         |
|-------------------|-------------------------|
| 5334A . . . . .   | DEKRA 20ATEX0096X       |
| 5334B . . . . .   | DEKRA 20ATEX0095X       |
| IECEX . . . . .   | DEK 20.0059 X           |
| INMETRO . . . . . | DEKRA 23.0019X          |
| EAC Ex . . . . .  | RU C-DK.HA65.B.00355/19 |

# Connections

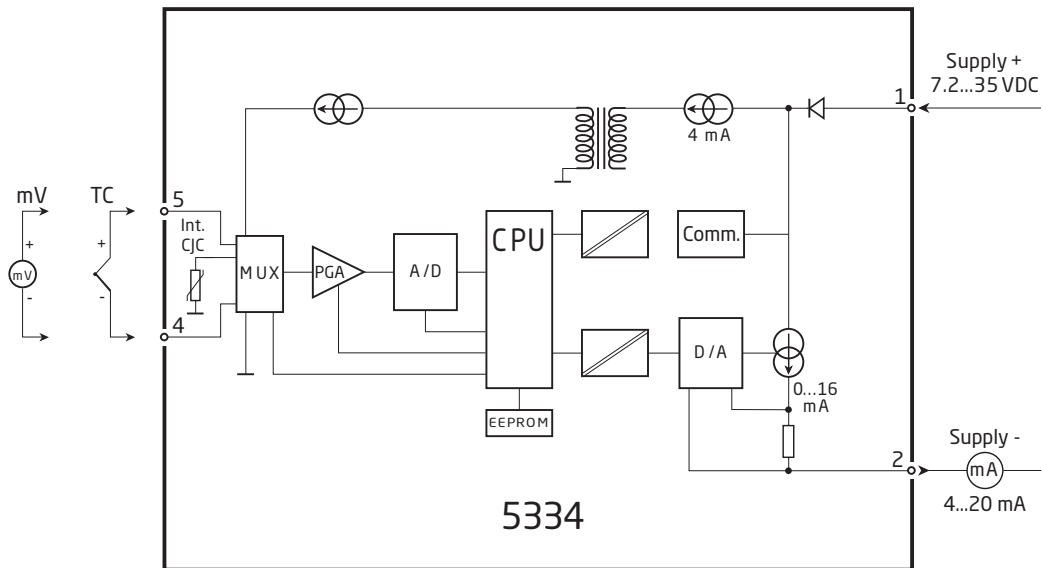
Input:



Output:

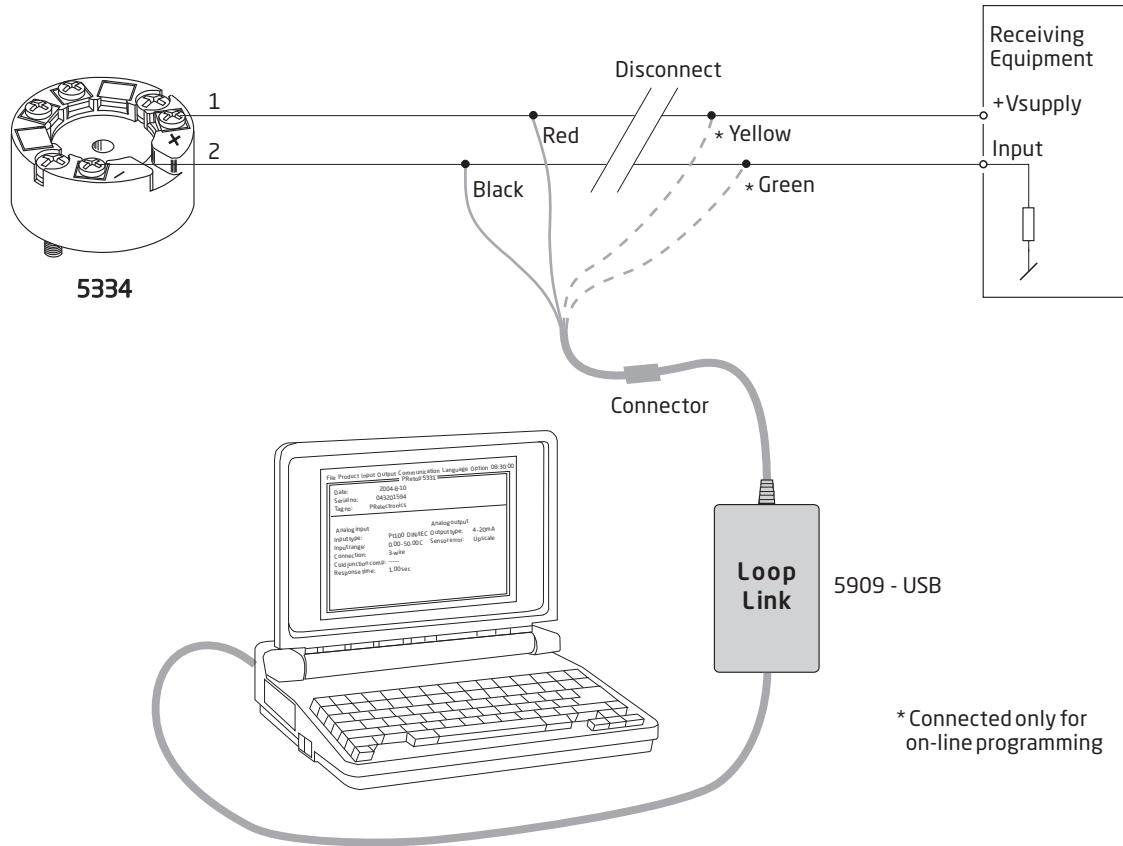


# Block diagram

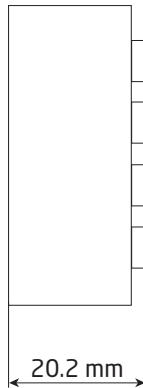
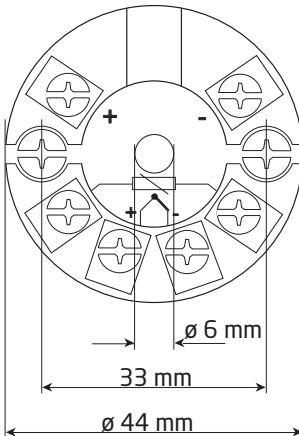


# Programming

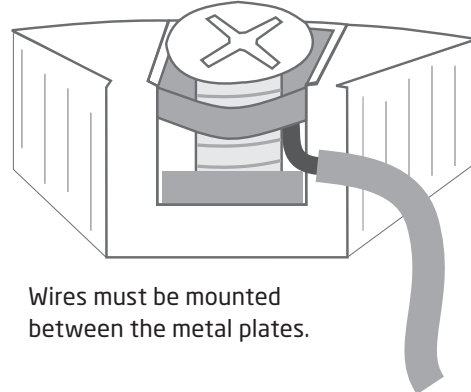
- Loop Link is a communications interface that is needed for programming 5334.
- For programming please refer to the drawing below and the help functions in PReset.
- Loop link is not approved for communication with devices installed in hazardous (Ex) areas.



## Mechanical specifications



## Mounting of sensor wires



# ATEX-installation drawing 5331QA02-V3R0

For safe installation of 5331A or 5334A the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Year of manufacture can be taken from the first two digits in the serial number.

ATEX Certificate      DEKRA 20ATEX0096 X

Marking



II 3 G Ex nA [ic] IIC T6 ... T4 Gc  
 II 3 G Ex ec [ic] IIC T6 ... T4 Gc  
 II 3 G Ex ic IIC T6 ... T4 Gc  
 II 3 D Ex ic IIIC Dc

Standards

EN 60079-0: 2018, EN 60079-11: 2012,  
 EN 60079-15: 2010, EN 60079-7:2015 +A1: 2018

|  |   |   |                                      |
|--|---|---|--------------------------------------|
| Terminal 3,4,5,6   | Terminal 1,2  | Terminal 1,2  | Terminal 1,2                         |
| Ex ic IIC, Ex ic IIIC  | Ex ic IIC, Ex ic IIIC                               | Ex ic IIC, Ex ic IIIC                               | Ex nA, Ex ec                         |
| Uo: 9.6 V<br>Io: 25 mA<br>Po: 60 mW<br>Lo: 33 mH<br>Co: 2.4 μF | Ui = 35 V<br>Ii = 110 mA<br>Ci = 1 nF<br>Li = 10 μH | Ui = 24 V<br>Ii = 260 mA<br>Ci = 1 nF<br>Li = 10 μH | Umax ≤ 35 VDC<br>or<br>Umax ≤ 24 VDC |

| Ex ic IIC, Ex ic IIIC<br>Temperature<br>Class | Ambient temperature range |                |
|---|---------------------------|----------------|
|   | Ui=35 V                   | Ui=24 V        |
| <b>T6</b>                                     | -40°C to +54°C            | -40°C to +63°C |
| <b>T5</b>                                     | -40°C to +69°C            | -40°C to +78°C |
| <b>T4</b>                                     | -40°C to +85°C            | -40°C to +85°C |

| Ex ec, Ex nA<br>Temperature<br>Class | Ambient temperature range |                |
|--------------------------------------|---------------------------|----------------|
|                                      | Vmax=35 V                 | Vmax=24 V      |
| <b>T6</b>                            | -40°C to +43°C            | -40°C to +55°C |
| <b>T5</b>                            | -40°C to +85°C            | -40°C to +85°C |
| <b>T4</b>                            | -40°C to +85°C            | -40°C to +85°C |



## **Installation notes**

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex ic, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to EN 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Dc, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to EN 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer. Ambient temperature range: -40°C to +85°C.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex nA or Ex ec, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP54 according to EN 60079-0, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex nA or Ex ec, the equipment shall only be used in an area of not more than pollution degree 2, as defined in EN 60664-1.

# ATEX-installation drawing 5331QA01-V3R0



For safe installation of 5331D or 5334B the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Year of manufacture can be taken from the first two digits in the serial number.

ATEX Certificate      DEKRA 20ATEX0095 X

Marking



II 1 G Ex ia IIC T6...T4 Ga  
 II 2 D Ex ia IIIC Db  
 I M1 Ex ia I Ma

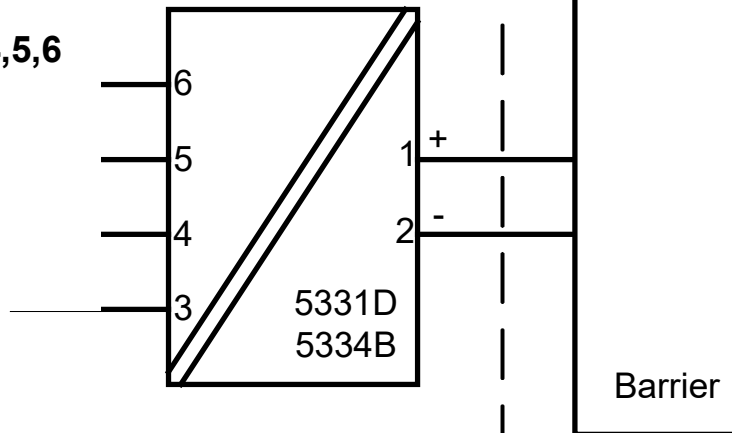
Standards              EN 60079-0: 2018, EN 60079-11: 2012

Hazardous area  
 Zone 0, 1, 2, 21, 22

Non Hazardous Area

**Terminal: 3,4,5,6**

Uo: 9.6 VDC  
 Io: 25 mA  
 Po: 60 mW  
 Lo: 33 mH  
 Co: 2.4 µF



**Terminal: 1,2**

Ui: 30 VDC  
 li: 120 mA  
 Pi: 0.84 W or 0.75 W  
 Li: 10 µH  
 Ci: 1.0 nF

| Temperature Class | Ambient temperature range |                |
|-------------------|---------------------------|----------------|
|                   | Pi: 0.84 W                | Pi: 0.75 W     |
| <b>T6</b>         | -40°C to +47°C            | -40°C to +50°C |
| <b>T5</b>         | -40°C to +62°C            | -40°C to +65°C |
| <b>T4</b>         | -40°C to +85°C            | -40°C to +85°C |

### Installation notes

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to EN 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga or Ma, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Db, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to EN 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.  
Ambient temperature range: -40°C to +85°C.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ma, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP54 according to EN 60529, and that is suitable for the application and correctly installed.  
Ambient temperature range: -40°C to +85°C.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature  $\geq 60^\circ\text{C}$ , heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

The sensor circuit is not infallibly galvanically isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500 VAC for 1 minute.

# IECEx-installation drawing 5331QI02-V2R0

For safe installation of 5331A and 5334A the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Year of manufacture can be taken from the first two digits in the serial number.

Certificate IECEx DEK 20.0059X

Marking Ex nA [ic] IIC T6 ... T4 Gc  
Ex ec [ic] IIC T6 ... T4 Gc  
Ex ic IIC T6 ... T4 Gc  
Ex ic IIIC Dc

Standards IEC 60079-0: 2017, IEC 60079-11: 2011,  
IEC 60079-15: 2010, IEC 60079-7:2017

|  |   |   |                                      |
|--|---|---|--------------------------------------|
| Terminal 3,4,5,6   | Terminal 1,2  | Terminal 1,2  | Terminal 1,2                         |
| Ex ic IIC, Ex ic IIIC  | Ex ic IIC, Ex ic IIIC                               | Ex ic IIC, Ex ic IIIC                               | Ex nA, Ex ec                         |
| Uo: 9.6 V<br>Io: 25 mA<br>Po: 60 mW<br>Lo: 33 mH<br>Co: 2.4 µF | Ui = 35 V<br>Ii = 110 mA<br>Ci = 1 nF<br>Li = 10 µH | Ui = 24 V<br>Ii = 260 mA<br>Ci = 1 nF<br>Li = 10 µH | Umax ≤ 35 VDC<br>or<br>Umax ≤ 24 VDC |

| Ex ic IIC, Ex ic IIIC<br>Temperature<br>Class | Ambient temperature range |                |
|---|---------------------------|----------------|
|   | Ui=35 V                   | Ui=24 V        |
| <b>T6</b>                                     | -40°C to +54°C            | -40°C to +63°C |
| <b>T5</b>                                     | -40°C to +69°C            | -40°C to +78°C |
| <b>T4</b>                                     | -40°C to +85°C            | -40°C to +85°C |

| Ex ec, Ex nA<br>Temperature<br>Class | Ambient temperature range |                |
|--------------------------------------|---------------------------|----------------|
|                                      | Vmax=35 V                 | Vmax=24 V      |
| <b>T6</b>                            | -40°C to +43°C            | -40°C to +55°C |
| <b>T5</b>                            | -40°C to +85°C            | -40°C to +85°C |
| <b>T4</b>                            | -40°C to +85°C            | -40°C to +85°C |

## **Installation notes**

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex ic, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to IEC 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Dc, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to IEC 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.  
Ambient temperature range: -40°C to +85°C.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex nA or Ex ec, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP54 according to IEC 60079-0, and that is suitable for the application and correctly installed.

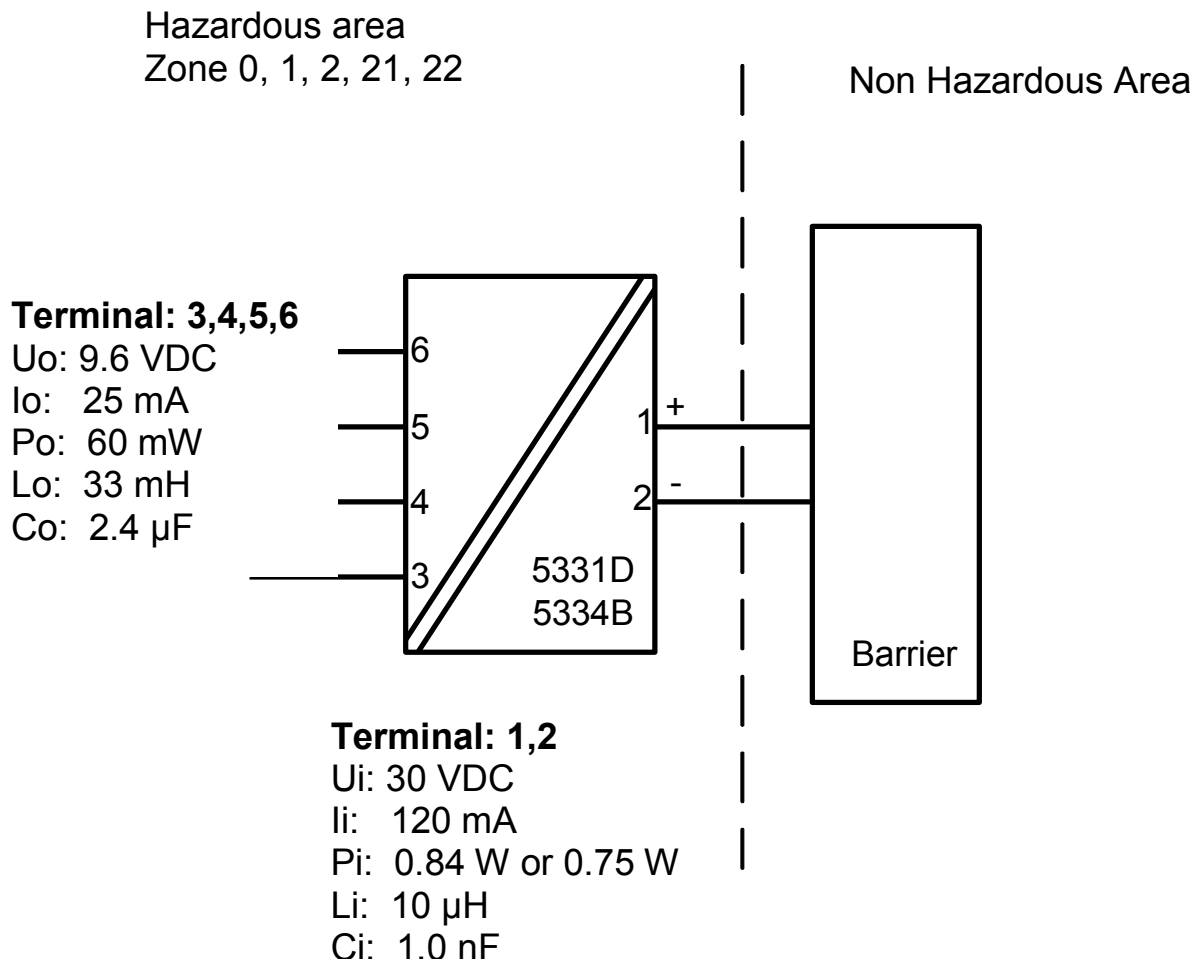
If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex nA or Ex ec, the equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.

# IECEX-installation drawing 5331QI01-V2R0



For safe installation of 5331D or 5334B the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Year of manufacture can be taken from the first two digits in the serial number.

|             |   |
|-------------|---|
| Certificate | IECEX DEK 20.0059X                                  |
| Marking     | Ex ia IIC T6...T4 Ga<br>Ex ia IIIC Db<br>Ex ia I Ma |
| Standards   | IEC 60079-0: 2017, IEC 60079-11: 2011               |



| Temperature Class | Ambient temperature range |                |
|-------------------|---------------------------|----------------|
|                   | Pi: 0.84 W                | Pi: 0.75 W     |
| <b>T6</b>         | -40°C to +47°C            | -40°C to +50°C |
| <b>T5</b>         | -40°C to +62°C            | -40°C to +65°C |
| <b>T4</b>         | -40°C to +85°C            | -40°C to +85°C |

### Installation notes

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP20 according to IEC 60529, and that is suitable for the application and correctly installed.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga or Ma, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Db, the transmitter shall be mounted in a separately certified enclosure that provides a degree of protection of at least IP5X according to IEC 60079-0, and that is suitable for the application and correctly installed. The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.  
Ambient temperature range: -40°C to +85°C.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ma, the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP54 according to IEC 60529, and that is suitable for the application and correctly installed.  
Ambient temperature range: -40°C to +85°C.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature  $\geq 60^{\circ}\text{C}$ , heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

The sensor circuit is not infallibly galvanically isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500 VAC for 1 minute.

## Document history

The following list provides notes concerning revisions of this document.

| <b>Rev. ID</b> | <b>Date</b> | <b>Notes</b>  |
|----------------|-------------|---|
| 108            | 1345        | IECEX and INMETRO approvals added.  |
| 109            | 1514        | PESO/CCOE approval added.<br>GOST approval replaced with EAC approval.    |
| 110            | 1707        | INMETRO installation drawings updated.                                    |
| 111            | 2004        | PESO/CCOE approval discontinued.<br>INMETRO installation drawing updated. |
| 112            | 2145        | ATEX and IECEX approvals updated - Ex na changed to Ex ec.                |
| 113            | 2245        | UKCA added.   |
| 114            | 2402        | INMETRO approval updated - Ex nA replaced by Ex ec.                       |