

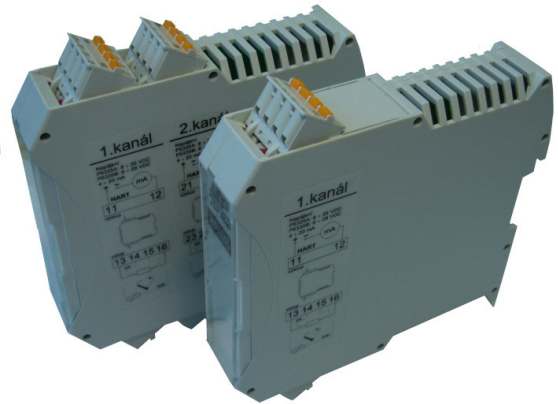


P5335

Universal Single- and Double-channels Transmitters to DIN Rail with HART Communication

- Universal input for all common resistance and thermocouple temperature sensors, linear resistance and mV
- Accuracy 0.05 %
- Measurement of difference or average of two sensors
- Current output signal 4 to 20 mA with HART communication
- Galvanic isolation 1.5 kVAC
- Removable spring or screw terminals
- Width from 12 mm per channel
- High immunity against interference (industrial environment)
- Intrinsically safe version
 -  II (1) G [Ex ia Ga] IIC,
 -  II (1) D [Ex ia Da] IIIC



Application

Transmitters P5335 can be used to convert resistance or voltage temperature signals from resistance or thermocouple temperature sensors into linearised current output signals of a current loop 4 to 20 mA with digital communication HART. Transmitters P5335 include galvanic isolation of input and output and can be also used for applications with many measuring points and for thermocouples. High measurement accuracy and the option of calculations of differences or averages from two input sensors predetermine use of the instrument in the most demanding applications.

Description

The transmitter P5335 can be ordered in two alternatives, single- or double-channel version for installation on a DIN rail. In both alternatives this includes a box with removable terminals. These are available as spring or threaded terminals or threaded terminals with a compensation terminal for measurement of thermocouples (see the ordering table. Individual terminals are fitted with locks for unique determination of position. Input signals are processed by an A/D converter and converted into a digital signal that is transferred to a microcomputer and according to the preset configuration all the measured values are calculated. These values are then used for further calculation of a primary quantity (temperature) and according to the preset range also the output current. Other quantities are accessible through digital communication HART. One resistance sensor (two-, three- or four-wire) or two sensors (two-wire) can be connected to the input. Resistance of the input wires of the two-wire connection can be compensated

by entering a constant value of the loop resistance when configuring the transmitter, even for two resistance sensors. In other cases the resistance of input wires is compensated automatically. In case of three- and four-wire connection there can be entered the maximal values of resistance of the line and the measured resistance of the line is then compared during measurement. A thermocouple can also be connected to the input. Compensation of temperature of the comparative thermocouple connection is carried out according to the configuration, by a constant temperature of the cold end, external sensor Pt100 or Ni100 or using a compensation terminal for measurement of the thermocouple. The compensation terminal includes a built-in sensor Pt100A and is designed for direct connection of an extension or compensation line. The compensation terminal is included in designs P5335 L10 and L20 and can be ordered independently, separately for each channel (code CTB, see the ordering table).

The transmitter provides analog output signal of the current loop 4 to 20 mA with HART digital communication. The current output can be also used for tests of the current loop and the associated apparatus. The transmitter allows connecting more instruments on one current loop - multidrop mode. For the mode multidrop it is necessary to set a unique address within the range 1 to 15 within the common loop. In this mode the analog output of the transmitter is constant (4 mA) and the measured quantities can be obtained only through digital communication HART.

The transmitter can be configured using the tools that are usual for the interface HART. Such configuration can be carried out e.g. using a manual HART configurator or using a PC with a programme and HART modem.

Universal Single- and Double-channels Transmitters to DIN Rail with HART Communication

Technical specifications

Supply voltage:
 standard version 8.0 to 35 VDC
 version EI1 8.0 to 30 VDC

Range of ambient temperatures:
 -40 to +85 °C

Humidity:
 < 95 % RH (without condensation)

Working position:
 arbitrary

Maximal cross section of wires:
 2.5 mm²

Housing:
 case without terminals IP00
 case with terminals IP20

Dimensions:
 107 x 120 x 23 mm

Weight (case with terminals):
 P5335 L1x 135 g
 P5335 L2x 205 g

Case material:
 polyamide

Ignitability class:
 V0 (according to UL 94)

Reference ambient temperature:
 20 to 28 °C

Input

Input signal:
 resistance signal of temperature sensor or potentiometer,
 voltage signal of thermocouple, difference and diameter of
 resistance signals, difference and diameter of voltage signals

Sensor connection:
 Resistance sensor Two-, three-, four-wire,
 difference or diameter
 (two-wire)
 Voltage sensor (thermocouple) Two-wire, difference
 or diameter (two-wire)
 External compensation sensor Two-wire

Dynamic range of input signal:
 22 bit

Max. wire resistance:
 5 Ω

Current through resistance sensor:
 0.2 mA

Effect of wire resistance (3- / 4- wire):
 < 0.002 Ω / Ω

Input resistance:
 10 MΩ

Cold junction compensation:
 < ±1 °C

External compensation of cold junction with Ni100 or Pt100:
 $-40 \leq T_{amb} \leq 135 \text{ °C}$

Basic ranges:

Type	Minimal value	Maximal value	Minimal Span	Standard
Pt100, Pt1000	-200 °C	850 °C	10 °C	EN 60751
Ni100	-60 °C	250 °C	10 °C	DIN 43760
Thermocouple B	+400 °C	1820 °C	100 °C	IEC 584
Thermocouple E	-100 °C	1000 °C	50 °C	IEC 584
Thermocouple J	-100 °C	1200 °C	50 °C	IEC 584
Thermocouple K	-180 °C	1372 °C	50 °C	IEC 584
Thermocouple L	-100 °C	900 °C	50 °C	DIN 43710
Thermocouple N	-180 °C	1300 °C	50 °C	IEC 584
Thermocouple R	-50 °C	1760 °C	100 °C	IEC 584
Thermocouple S	-50 °C	1760 °C	100 °C	IEC 584
Thermocouple T	-200 °C	400 °C	50 °C	IEC 584
Thermocouple 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
Linear resistance	0 Ohm	7000 Ohm	25 Ohm	
Voltage	-800 mV	800 mV	2.5 mV	

Universal Single- and Double-channels Transmitters to DIN Rail with HART Communication

Output

Output signal:

Two-wire current 4 to 20 mA or 20 to 4 mA with HART protocol

Total accuracy (higher value applies):

Input	Basic accuracy	Temperature coefficient
All inputs	$\leq \pm 0.05$ % of span	$\leq \pm 0.005$ % of span / °C
Pt100, Pt1000	$\leq \pm 0.1$ °C	$\leq \pm 0.005$ °C / °C
Ni100	$\leq \pm 0.2$ °C	$\leq \pm 0.005$ °C / °C
TC, type E, J, K, L, N, T, U	$\leq \pm 0.5$ °C	$\leq \pm 0.025$ °C / °C
TC, type B, R, S, W3, W5	$\leq \pm 1$ °C	$\leq \pm 0.1$ °C / °C
Linear resistance	$\leq \pm 0.1$ Ω	$\leq \pm 5$ mΩ / °C
Voltage	$\leq \pm 10$ μV	$\leq \pm 0.5$ μV / °C

Characteristics:

Linear with temperature or linear with input quantity, other upon request

Adjustability of the range:

16 bit

Přestavitelnost rozpětí:

1 % to 100 % of the basic range

Time constant (95 %):

adjustable 1 to 60 s

Minimal output span:

16 mA

Renewal period:

440 ms (660 ms for difference two sensors)

Fixed output:

in the range 4 to 20 mA

Load resistance of output:

$\leq (V_{\text{supply}} - 8) / 0.023$ [Ω]

Output stability:

$< \pm 0.01$ % of span / 100 Ω

Electrical strength of isolation between input and output circuit:

test 1,5 kVAC
constatnt 50 VAC

Electrical strength between channels (only for double-channel version):

test 2.5 kVAC

Supplementary parameters

Output current limitation:

Signal 3.8 to 20.5 mA according to NAMUR NE43
Limitation of error current to approximately 23 mA

Supply voltage effects:

< 0.005 % of span / VDC

EMC effects (immunity):

$< \pm 0.1$ % of span

Extended EMC immunity (NAMUR NE21, A criterion, burst):

$< \pm 1$ % of span

Indication of sensor error:

Optionally by current > 21 mA or < 3.6 mA acc. to NAMUR NE43, or optionally in range 3.5 to 23 mA

Current of sensor at sensor error detection:

33 μA

Sensor error detection:

resistance ranges: if beginning of measure range > 30 Ω or adequate temperature
voltage ranges: if beginning of measure range > 5 mV or adequate temperature

Warming time:

30 s

Error checking EEPROM:

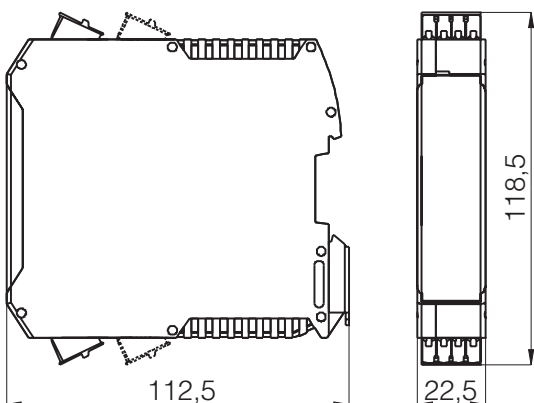
< 10 s

Output signal at EEPROM error:

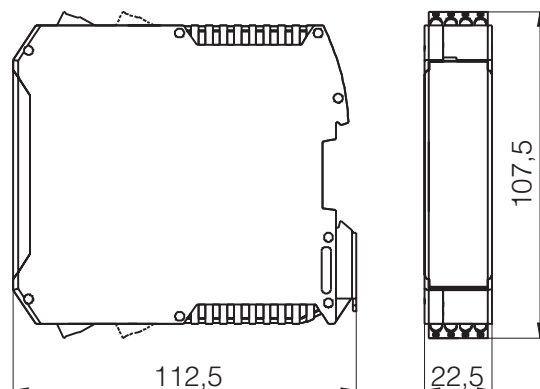
≤ 3.5 mA

Dimensional drawings

Case with mounted spring terminals:

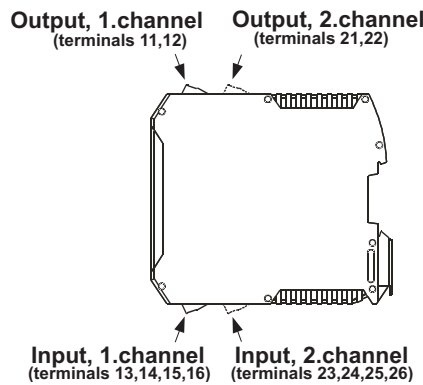
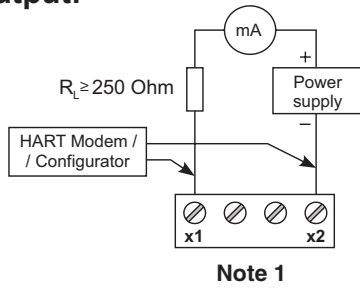


Case with mounted screw terminals:



Electrical connection

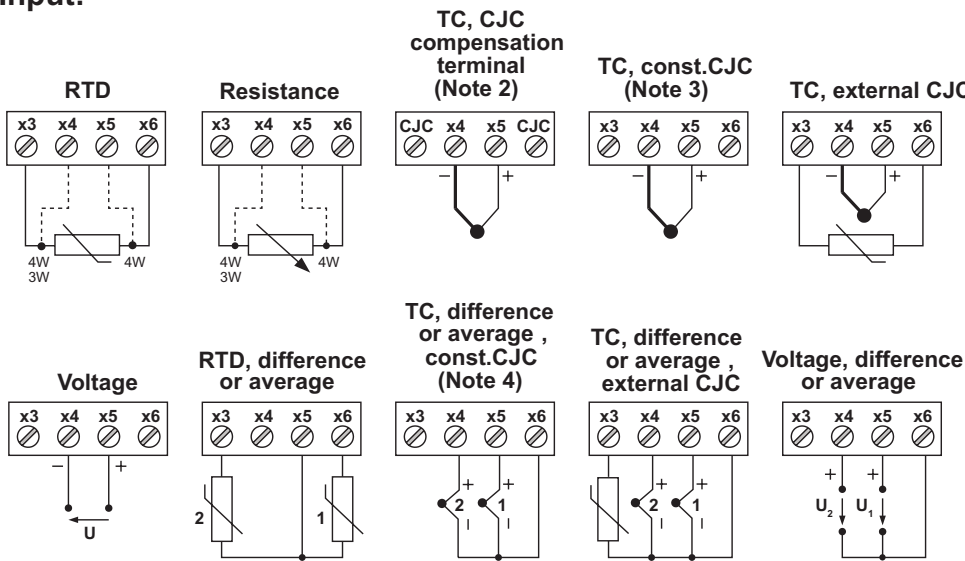
Output:



Note. 1) The symbol "x" in the description of terminal represents a channel number. In case of a single-channel design this symbol "x" is always replaced by "1" and in case of a double-channel design this represents the channel number, i.e. "1" or "2".

Note 2) Connection of the thermocouple to the compensation terminal - the compensation terminal includes a built-in sensor Pt100A for measurement of temperature of the cold end. When using the compensation terminal it is **necessary** to set a compensation of the cold end **by an external sensor Pt100** in configuration of the transmitter, i.e. by a sensor built-in in the compensation terminal! The compensation terminal is included in the design P5335 L10 a L20 and can also be ordered independently, separately for each channel (code CTB, see the ordering table).

Input:



Note 3) This connection can be used **only** for measurement of a thermocouple with constant temperature of the cold end.

Note 4) This connection can be used **only** for measurement of differences of averages of temperatures of thermocouples with constant temperature of the cold end.

Type	Description
• P5335	Single-channel and double-channel universal transmitter for a DIN rail with HART communication
Code	Version
• L10	Single-channel transmitter with removable screw terminals (plus compensation terminal CTB1)
• L11	Single-channel transmitter with removable screw terminals
• L12	Single-channel transmitter with removable spring terminals
• L20	Double-channel transmitter with removable screw terminals (plus compensation terminals CTB1 and CTB2)
• L21	Double-channel transmitter with removable screw terminals
• L22	Double-channel transmitter with removable spring terminals
Code	Setting requirements
• NR	Without requirements for the range and input setting (preset - Pt100, 3-wire sensor connection, 0 to 100 °C)
• QR	Range and other parameters setting according to configuration sheet DB0998
Code	Calibration
KPP5	Certificate of calibration, transmitter calibration in five equally spaced points in the set range
Code	Optional version
• EI1 ¹⁾	ATEX (Ex) II (1) G [Ex ia Ga] IIC, (Ex) II (1) D [Ex ia Da] IIC
Code	Optional accessories
• CTB1	Compensation terminal for measuring thermocouple sensors, channel No.1
• CTB2	Compensation terminal for measuring thermocouple sensors, channel No.2
• HARTWinCom	Set of PC configuration software HARTWinConf (CZ+EN) and modem HARTMod
• HARTConf	HART-USB modem and field handheld configurator for transmitters with HART and LHP communication, function of transmitter supply, supplied from USB or accumulator, charged from USB
• HARTMod	Miniature HART modem with galvanic isolation

5 years warranty

Example of order: P5335 L10 NR HARTConf

For code QR configuration sheet DB0998 is required to the order.

• ... Ex stock version ° ... Marked version can be dispatched up to 5 working days (with calibration up to two weeks)

¹⁾ ... Transmitter must not be placed in potentially explosive atmospheres. In a potentially explosive atmosphere can lead only input and output wires.