



# MANUAL

## P5315

### Precision Programmable Transmitters with Galvanic Isolation



- Precision transmitter for resistance and thermocouple sensors and potentiometers
- Linearized output signal 4 to 20 mA
- Accuracy 0.07 % for ranges down to 1/5 of input range (for calibrated range up to 0.05 %)
- Span adjustability from 1 to 100 %
- Galvanic isolation 1000 VAC
- Double channel version for a DIN rail with exchangeable screw or spring terminals
- Adjustability by handheld configurator LHPConf or by LHPWinConf program and standard HART modem
- Extended warranty 5 years.

This document applies to serial numbers 10118500 and higher.

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# 1. General instructions and information

## 1.1 Symbols used



Warning symbol; for safe use proceed according to the instructions



The symbol CE approves conformity of the product with legal requirements



Symbol "Output"



Symbol "Power supply"



This product does not belong to public waste and it is subjected to separate collection



Remote communication protocol for reading and changing of the configuration

## 1.2 Safety cautions and warnings



The transmitter shall be powered from a safe voltage source that meets all requirements of the standard EN 61010-1 and installed in compliance with national requirements and standards providing safety.

The equipment may only be installed by a qualified personnel who are familiar with national and international laws, directives, standards and with the instructions manual. The instrument may not be used for other purposes than as specified in this instructions manual.

For elimination of a risk of injury from electric shock or fire the maximum operational parameters of the instrument may not be exceeded, particularly range of operating temperature because of exposure to heat from connected or surrounding technological equipment must not be exceeded!

The transmitter should be installed in suitable environment without any direct sunlight, occurrence of dust, high temperatures, mechanical vibrations and shocks and protected against rain and excessive moisture.

## 1.3 Scope of delivery

With the product is delivered:

- Manual for installation, operation and maintenance
- Certificate of calibration (only with calibrated transmitters)

## 1.4 Description of the delivery and packing

The product is packaged in a protective cover and provided with an identification label with a mark of the output control. The product must not be exposed to direct rain, vibrations and shocks during transport.

## 1.5 Storage

The products shall be stored at temperatures from -40 to +80 °C without condensation of water vapours.

## 1.6 Installation and commissioning

During installation, commissioning, operation and maintenance follow the instructions in chapter 4.

## 1.7 Spare parts

Any of the compact parts of the product can be also ordered as a spare part if there are not required special procedures or technological operations for the exchange.

## 1.8 Repairs

Products are repaired by the manufacturer. The products for repair should be sent with description of the fault or defect in a packing that guarantees damping of shocks and vibrations and protects against damage during transport.

## 1.9 Warranty

Products are covered by a warranty for a period of 5 years from the delivery date on the delivery note. The manufacturer guarantees technical and operational parameters of the products within scope of the applicable documentation. Warranty period is specified with individual items and begins from the day of takeover of the goods by the purchaser or delivery to the carrier. Any claims concerning to defects of the goods together can be filed in writing with the manufacturer within the warranty period and the claimed product shall be presented. The claiming party shall give identification of the product, number of the delivery note and description of the fault or defect.

The manufacturer is not responsible for any defects caused by improper storage, incorrect connection, damages caused by external effects, in particular by effects of factors with excessive values, unqualified installation, improper operation or common wearing.

## 2. End of service and disposal

### 2.1 End of service

 Dismounting and disposal of the device is possible after disconnecting of power supply voltage.

### 2.2 Disposal

 The product does not contain any environmentally harmful parts. When disposing the packing and destroyed or irreparably damaged product proceed according to the local regulations.

## 3. Product description



### P5315 Precision Programmable Transmitters with Galvanic Isolation

- Precision transmitter for resistance and thermocouple sensors and potentiometers
- Linearized output signal 4 to 20 mA
- Accuracy 0.07 % for ranges down to 1/5 of input range (for calibrated range up to 0.05 %)
- Span adjustability from 1 to 100 %
- Galvanic isolation 1000 VAC
- Double channel version for a DIN rail with exchangeable screw or spring terminals
- Adjustability by handheld configurator LHPConf or by LHPWinConf program and standard HART modem
- Extended warranty 5 years.

### 3.1 Application

Transmitters P5315 H10 and P5315 Lxx are used for conversion of a resistance or voltage temperature signal from a resistance or thermocouple temperature sensor to a linearized current loop output signal 4 to 20 mA. The transmitter type H10 is designed for installation into an industrial sensor head type A or B according to DIN 43729. Transmitters P5315 include galvanic isolation of inputs and outputs and are suitable for also in applications with many measuring points and for thermocouples.

### 3.2 Description

Input signals, switched over according to the input configuration are processed by an A/D transmitter and transformed into a digital signal that is transferred to a micro-computer; according to the preset configuration and after filtration of noise there are calculated all measured variables. These values are then used for calculation of the primary variable (temperature) and according to selected range, the output current is also calculated.

One resistance sensor (two-, three- or four-wire) can be connected to the input. In case of a two-wire connection, entering of a constant value of the loop resistance compensation during configuration of the transmitter can compensate the resistance of input leads. In other cases, the leads resistance is compensated automatically.

A thermocouple can be also connected to the input. Temperature of the thermocouple cold junction is compensated according to configuration, either by the inner temperature sensor of terminal block, by the entered constant temperature or by external sensor. The inner sensor guarantees maximum accuracy and stability of cold junction temperature measurement of P5315 H10.

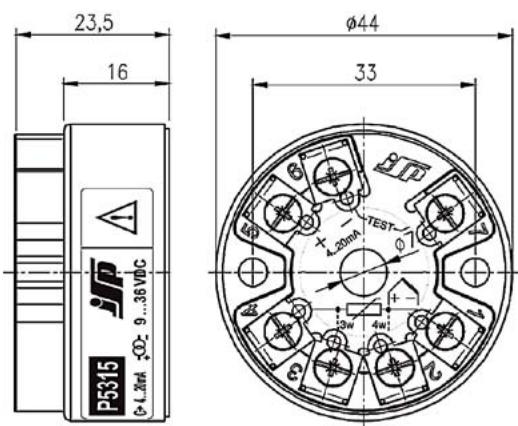
For accurate measurement of thermocouples by transmitters P5315 Lxx for a DIN rail is needed to use setting for external compensation and use compensation terminal CTB3, respectively CTB4..

In addition to standard resistance sensors, there may be also processed signals of potentiometer positions that are measured in percents. One limit position is 0 % and the other is 100 %, independently on the value of the total resistance. In case there is necessary to measure position of the potentiometer as a resistance, there may be used the configuration for measurement of the resistance.

Output of the transmitter is analogue signal of the current loop 4 to 20 mA. The current output can be also used for testing of the current loop and associated apparatus. The transmitter can be set up using a manual configurator LHPConf (HARTConf) or a PC with the program LHPWinConf and HART modem HARTMod (MH-02) or equivalent communication interface.

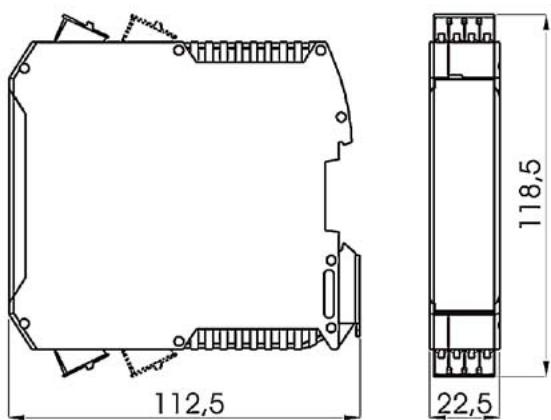
### 3.3 Dimensional drawings

Version P5315 H10

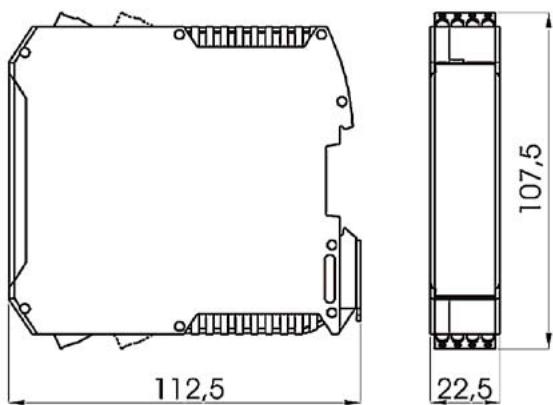


Version P5315 L10/L20

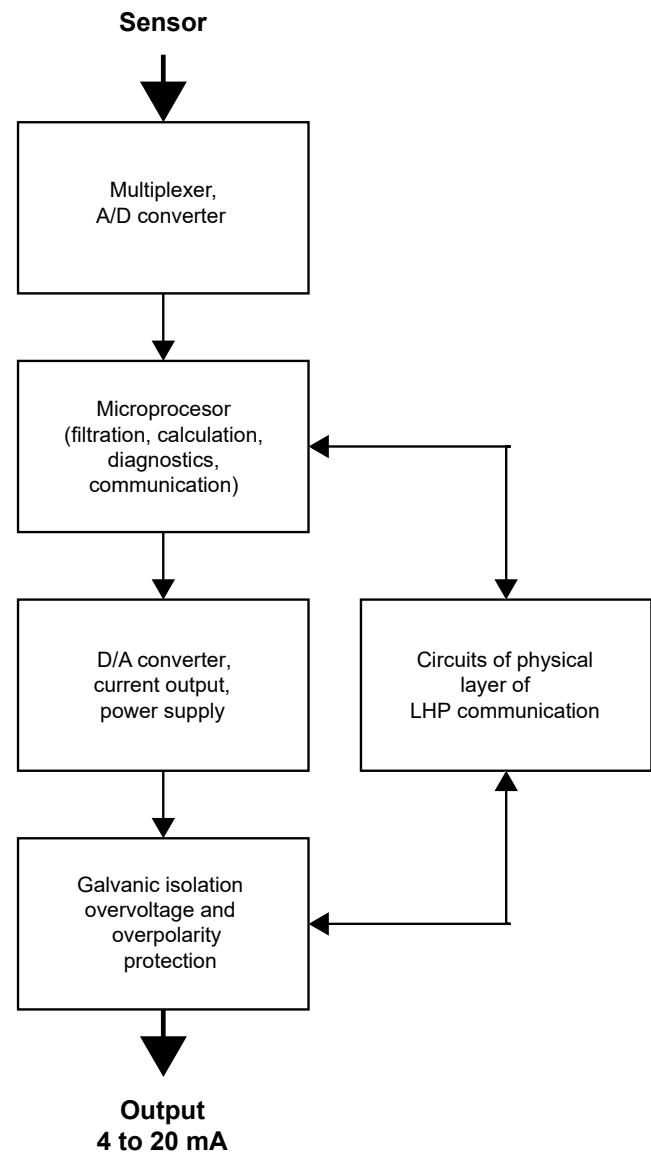
Case with mounted spring terminals



Case with mounted screw terminals



### 3.4 Block diagram



## 4. Installation, operation and maintenance

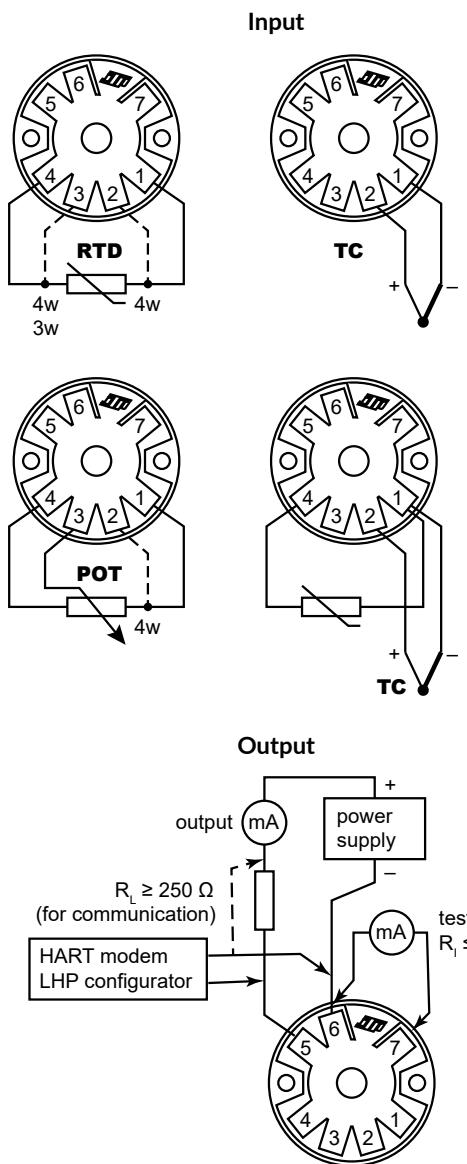
### 4.1 Installation and commissioning

#### 4.1.1 General

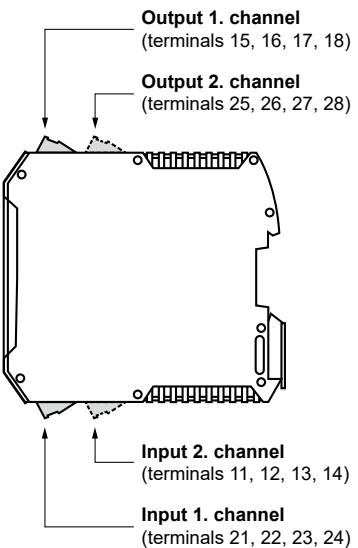
After mounting and correct connection, switch on the power supply. During the installation of transmitters in environment with higher level of interference, protection of transmitters against interference and induced overvoltage must be ensured. According to the standard engineering practice, it is recommended to separate signal and power wires into separate gutters and use shielded signal cables with twisted wires. In case of outdoor wires, it is necessary to solve the overvoltage protection of the transmitter as a part of overall solution of protecting system from the effects of atmospheric electricity.

#### 4.1.2 Electrical connection

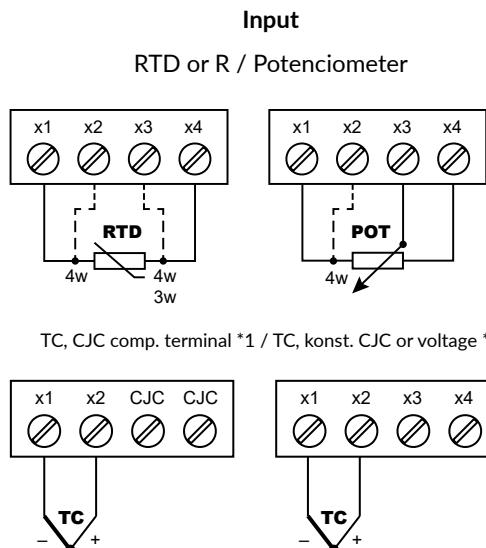
##### Version P5315 H10



##### Version P5315 L10/L20

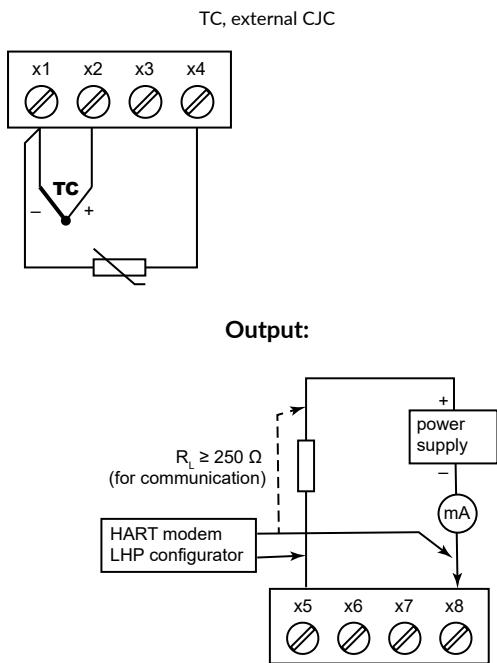


Symbol "x" in description of terminals represents the number of channel. In case of single channel version is symbol "x" always substituted by symbol "1", and in case of dual channel version this represents the number of channel, i.e. "1" or "2".



\*1 ... Connection of the thermocouple to compensation terminal CTB3 / CTB4. Compensation terminal includes a built-in sensor Pt1000A for accurate temperature measurement of cold junction of connected thermocouple. When using the compensation terminals, it is necessary to set the compensation configuration of cold junction by an external sensor Pt1000, it means by the built-in sensor of the compensation terminal! Compensation terminals are provided as standard in the delivery of the P5315 L10 and L20 versions and can also be ordered separately, separately for each channel (code CTB3 and CTB4, see ordering table).

\*2 ... This connection is possible to use only for measurement of thermocouples with constant temperature of cold junction or for measurement of thermocouple B.



## 4.2 Description of setting and configuration using the communicator LHPWinCom

The communicator LHPWinCom consists of program LHPWinConf, modem HARTMod (MH-02) and connection cables. Before use is necessary to connect the modem to a PC using the connection cable, install and run the program LHPWinConf. Program finds the modem on the respective communication port by itself. In case, that the program issues a message that the modem is not connected, enter the respective port on the HART driver panel.

The program includes two main configuration panels. The panel "Calibrator Configuration" is used for fast setting of the range using a sensor simulator or using a calibrator. The panel "Keyboard Configuration" allows setting of all the available transmitter parameters directly on the keyboard without any necessity to use a calibrator. Individual steps of the optimal user procedure are given on both panels that should be followed. Configuration can be saved as a file or print it as a "Transmitter Configuration Protocol".

On the panel "Options" you can change the program language and run the fixed output mode. This mode changes the transmitter into a simulator of output current with the range 3.5 to 22 mA. In this mode the output current is determined by the entered value only and is not influenced by changes of the input quantity. The fixed output mode can be closed by the program button or by disconnecting of the transmitter power supply.

## 4.3 Description of setting and configuration using a handheld configurator LHPConf or HARTConf

LHPConf and HARTConf are a field handheld configurators for setting of all parameters of transmitters with LHP communication. A detailed description of setting and control is given in the configurators instruction manual.

## 4.4 Description of setting and configuration using HART communicator Rosemount 375/475

It's possible to set some of the parameters of LHP transmitters by generic description file, which is standard part of HART communicators. By Rosemount 475 or 375 it is possible to set the start and end of the range directly to numeric value or by application of input variable. Further it's possible to change the content of text items TAG and DESCRIPTOR.

## 4.5 Operation and maintenance

Provided that the instrument is installed correctly, the operator can read setting and measured values using a configurator.

Setting of the instrument may be changed only if a sudden change of the output current cannot cause any failure of the technological equipment or regulation (switch over the possible regulator to manual control)!

The instrument does not need any maintenance.

## 5. Product specifications

### 5.1 Technical specifications:

<b>Supply voltage:</b>	9 až 35 V DC (internally protected against polarity inversion and short- term overvoltage)	
<b>Range of ambient temperatures:</b>	-40 to 85 °C	
<b>Reference ambient temperature:</b>	23 ± 5 °C	
<b>Housing:</b>	<ul style="list-style-type: none"> <li>version H10 IP 40, terminals IP 00 after installation to the head the housing is given by the design of the head</li> <li>version Lxx IP20</li> </ul>	
<b>Humidity:</b>	<ul style="list-style-type: none"> <li>version H10 0 až 100 % RH with condensation after installation to the head</li> <li>version Lxx 10 až 80 % RH without cond.</li> </ul>	
<b>Connection of wires:</b>	<ul style="list-style-type: none"> <li>version H10 Screw terminals for cross section 0.5 to 1.5 mm<sup>2</sup>, torque 0.5 Nm</li> <li>version Lxx Spring or screw terminals for cross section 0.5 to 1.5 mm<sup>2</sup>, torque 0.5 Nm</li> </ul>	
<b>Warm-up time:</b>	5 s	
<b>Type of DIN rail:</b>	TS 35 according DIN 46277	
<b>Dimensions (HxWxD):</b>	<ul style="list-style-type: none"> <li>H10 pr. 44 x 24 mm</li> <li>Lxx 107 x 120 x 23 mm</li> </ul>	
<b>Material of cases:</b>	<ul style="list-style-type: none"> <li>H10 polycarbonate</li> <li>Lxx polyamide</li> </ul>	
<b>Weight:</b>	<ul style="list-style-type: none"> <li>H10 40 g</li> <li>Lxx 100 g</li> </ul>	
<b>Working position:</b>	arbitrary	
<b>Input</b>		
<b>Input ranges:</b>		
<b>Input type</b>	<b>Basic range</b>	<b>Standard</b>
RTD input	0 to 400 Ω	---
RTD input	0 to 4000 Ω	---
potentiometer *	40 to 400 Ω	---
potentiometer *	400 to 4000 Ω	---
voltage input	-15 to 70 mV	---
Pt100	-200 to 850 °C	IEC 60751
Pt500	-200 to 850 °C	IEC 60751
Pt1000	-200 to 850 °C	IEC 60751
Ni100 (6180 ppm/K)	-60 to 250 °C	DIN 43760

<b>Input type</b>	<b>Basic range</b>	<b>Standard</b>
Ni1000 (6180 ppm/K)	-60 to 250 °C	DIN 43760
thermocouple "J"	-200 to 1200 °C	IEC 584-1
thermocouple "K"	-200 to 1300 °C	IEC 584-1
thermocouple "N"	-200 to 1300 °C	IEC 584-1
thermocouple "R"	-50 to 1700 °C	IEC 584-1
thermocouple "S"	-50 to 1700 °C	IEC 584-1
thermocouple "T"	-250 to 400 °C	IEC 584-1
thermocouple "B"	100 to 1800 °C**	IEC 584-1
thermocouple "E"	-200 to 950 °C	IEC 584-1
thermocouple "L"	-200 to 900 °C	DIN 43710
thermocouple "C"	0 to 2300 °C	N.I.S.T. Monograph 175

\* ... total resistance

\*\* ... range can be set from 0 °C

<b>Digital accuracy:</b>	
range 0 to 400 Ω	≤ ±0,07 % MH or ≤ ±0,06 Ω or corresponding temperature
range 0 to 4000 Ω	≤ ±0,07 % MH or ≤ ±0,6 Ω or corresponding temperature
range -15 to 70 mV	≤ ±0,07 % MH or ≤ ±0,015 mV or corresponding temperature
	(the greatest value is valid; accuracy of measured value of digital output LHP; SR ... Span of set range)

#### Input signal:

Resistance signal of temperature sensor or potentiometer, voltage signal of thermocouple

#### Sensor connection:

Resistance sensor	two-, three-, four-wire
Voltage sensor (TC)	two-wire
Potentiometer	three-wire or four-wire
Compensation using an external sensor	two-wire

#### Maximum wire resistance for resistance ranges:

< 20 Ohm (each wire)

#### Current through resistance sensor:

< 0,15 mA

#### Input overloading:

Max. 24 VDC or max. 18 mA between any inputs (max. 60 s)

#### Cold junction compensation error:

< ±0,7 °C

#### Effect of wire resistance for resistance ranges:

Two-wire connection	can be compensated by constant value
Three-wire connection	no effect with identical values of wire resistance
Four-wire connection	no effect with specified wire resistance range

#### Input resistance:

> 10 MΩ

**Output****Output signal:**

Two-wire 4 to 20 mA or 20 to 4 mA

**Total measurement error on the analog output of P5315:**

Range 0 to 400 Ohm	$\leq \pm 0.07\% \text{ SR}$ or $\leq \pm 0.06 \text{ Ohm}$ or corresponding temperature
Range 0 to 4000 Ohm	$\leq \pm 0.07\% \text{ SR}$ or $\leq \pm 0.06 \text{ Ohm}$ or corresponding temperature
Range -15 to 70 mV	$\leq \pm 0.07\% \text{ SR}$ or $\leq \pm 0.015 \text{ mV}$ or corresponding temperature
Range Pt100, Pt1000, Ni100, Ni1000	$\leq \pm 0.07\% \text{ SR}$ or $\leq \pm 0.15 \text{ }^\circ\text{C}$
Range Pt500	$\leq \pm 0.07\% \text{ SR}$ or $\leq \pm 0.3 \text{ }^\circ\text{C}$
Range TC J, K, T, E, L	typ. $\leq \pm 0.07\% \text{ SR}$ or $0.5 \text{ }^\circ\text{C}$
Range TC R, S, B, C	typ. $\leq \pm 0.07\% \text{ SR}$ or $1 \text{ }^\circ\text{C}$ (the greatest value is valid)

**Characteristics:**

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

**Adjustability of the range:** $\pm 1\%$  to  $\pm 100\%$  of the input range**Adjustability:**Inside the input range (the given measurement errors apply for suppression of the beginning  $\leq 100\%$  of the range)**Time constant (95 %):**Adjustable 0.5 s (for damping 0 s) to 60 s  
(approx. 3 measurements per second)**Load resistance:**

$$R_L [\Omega] \leq (U_N [V] - 9) / 0,022$$

**Electric strength of galvanic isolation of P5315:**

1000 V AC (test)

**Electric strength of between channels P5315 L2x:**

2500 V AC (test)

**Isolation resistance of galvanic isolation of P5315:**min. 100 M $\Omega$ **5.2 Supplementary parameters****Output current limitation:**Signal 3.8 to 20.5 mA according to NAMUR NE43  
Limitation of error current to approx. 22 mA**Indication of sensor or transmitter error:**Optionally by current  $> 21 \text{ mA}$  or  $< 3.6 \text{ mA}$   
according to NAMUR NE43**Supply voltage effect:** $\leq \pm 0,005\% / \text{V}$ **Influence of ambient temperature changes:**

range 0 to 400 $\Omega$ ( $\leq \pm 0,1\% \text{ NR}$ or $\leq \pm 0,08 \text{ }^\circ\text{C}$ or corresponding temperature) / $10 \text{ }^\circ\text{C}$
range 0 to 4000 $\Omega$ ( $\leq \pm 0,1\% \text{ NR}$ or $\leq \pm 0,8 \text{ }^\circ\text{C}$ or corresponding temperature) / $10 \text{ }^\circ\text{C}$
range -15 to 70 mV ( $\leq \pm 0,1\% \text{ NR}$ or $\leq \pm 0,02 \text{ mV}$ or corresponding temperature) / $10 \text{ }^\circ\text{C}$ (the greatest value is valid)

**Long-term stability:** $\leq 0,2\%$  of the preset range per 2 years**Electromagnetic compatibility:**

radiation and immunity acc. to EN 61326-2-3

MH ... measured value,

NR ... span of set range

## 6. Tests, certificates and standards

### 6.1 Tests, certificates

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Electromagnetic compatibility:

Emission and immunity acc. to EN 61326-2-3

### 6.2 Standards

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Transmitter is designed and manufactured according these standards: EN 61010-1

### 6.3 Marking and type tag information

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Standard version:

P5315 type number

Model: version

S/No: serial number

Czech Republic country of origin

logo of JSP, s.r.o. + contact for manufacturer

## 7. Ordering information

### 7.1 Ordering table

Type		1 2 3
1. Code	Description	
<b>P5315</b>	Precise programmable transmitter with LHP communication with galvanic isolation	
Version		1 2 3
2. Code	Description	
<b>H10</b>	into head B according to DIN	
<b>L10</b>	single-channel for a rail DIN TS 35, removable screw terminals (compensation terminal CTB3 included)	
<b>L20</b>	double-channel on a rail DIN TS 35, removable screw terminals (compensation terminals CTB3 and CTB4 included)	
Setting requirements		1 2 3
3. Code	Description	
<b>NR</b>	without requirements for the range and input setting (preset for C2 R11 RL 0 °C RH 100 °C DP 4s ECH)	
<b>QR</b>	range and other parameters setting according to configuration sheet DB2298wq <sup>*1</sup>	
1* When the QR Code is selected, the DB2298 Questionnaire is filled in with the order.		
Calibration		
Code	Description	
<b>KPP5</b>	certificate of calibration, transmitter calibration in five equally spaced points of input range	
<b>KPP52</b>	certificate of calibration, KPP5 calibration to 0.05% accuracy for ranges from 20% to 100% of max. range	
Optional accessories		
Code	Terminals	
<b>TB1</b>	two exchangeable spring terminals, only for version P5315 L10	
<b>TB2</b>	four exchangeable spring terminals, only for version P5315 L20	
<b>CTB3</b>	compensation terminal for measuring thermocouple sensors, channel No. 1, only for version P5315 Lxx	
<b>CTB4</b>	compensation terminal for measuring thermocouple sensors, channel No. 2, only for version P5315 Lxx	
<b>PT1000A</b>	compensation resistor Pt1000 (-30 to +150 °C) for external compensation of thermocouple	
Code	Communication and settings	
<b>LHPWinCom USB1</b>	set of configuration program LHPWinConf (CZ+EN) for PC, modem HARTMod and interface USB-RS232C	
<b>LHPConf</b>	field configurator for LHP transmitters, function of transmitter supply, without charging	
<b>HARTConf</b>	HART-USB modem and field communicator for LHP and HART transmitters, function of transmitter supply supplied from USB or built-in accumulator, charged from USB	
<b>HARTMod</b>	HART modem with interface RS232 and with galvanic isolation	
<b>USB-RS232C</b>	communication interface RS232 for to USB port	
Code	Mounting accessories	
<b>S51</b>	box for wall mounting of one transmitter to explosive atmosphere (IP 68) (Ex) II 2G Ex db IIC T6, T5 Gb + (Ex) II 2D Ex tb IIIC T50/60/80°C Db 2 cable glands KMEx have to be ordered	
<b>S52</b>	box for wall mounting of one transmitter with LED display, to explosive atmosphere (IP 68) (Ex) II 2G Ex db IIC T6, T5 Gb + (Ex) II 2D Ex tb IIIC T50/60/80°C Db 2 cable glands KMEx have to be ordered	
<b>S54</b>	wall mounted box (100x100x58 mm), housing IP 65 for version code H1x, not for EI1, EN2   for mounting of one transmitter	
<b>S55</b>	wall mounted box (170x145x85 mm), housing IP 55 for version code L1x, not for EI1, EN2   for mounting of up to three transmitters	
<b>S56</b>	wall mounted box (100x100x58 mm), housing IP 65 for version code H1x, not for EI1, EN2   for mounting of up to two transmitters	

Code	Mounting accessories	
<b>VH1</b>	cap for head form B for transmitter mounting	for H1x versions
<b>APT1</b>	adapter for flat head	
Code	Cable outlets	
<b>KME1</b>	nickel-plated brass cable outlet, Ex d, IP 68, for fixed assembly with cable diameter 4.5 to 8.5 mm	
<b>KME2</b>	nickel-plated brass cable outlet, Ex d, IP 68, for fixed assembly with cable diameter 7 to 12 mm	
<b>KME3</b>	stainless steel cable outlet, Ex d, IP 68, for fixed assembly cable diameter 4 to 8 mm	

Example of order:

**① ② ③ → P5315 H10 NR**



**JSP Industrial Controls**

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