

PROGRAMMABLE TRANSMITTER



- Input for RTD, TC, mV, linear resistance, mA, and V
- 3-port 3.75 kVAC galvanic isolation
- Current and voltage output
- Universal voltage supply
- 1- and 2-channel versions
- Loop supply > 17.1 V in Ex zone 0



Application:

Electronic temperature measurement with resistance sensor or thermocouple sensor. ● Ex barrier for temperature sensors, potentiometers, and current / voltage signals. ● Ex power supply for 2-wire transmitters in zone 0, 1, 2, 20, 21 and 22. ● Amplification of mV signals. ● Conversion of linear resistance variation. ● Galvanic isolation of analogue signals. ● Measurement of floating signals. ● Linearisation of non-linear Ohm, mV, mA, or voltage signals. ● Separation of circuits in PELV/SELV installations.

Technical characteristics:

The unit is based on a microprocessor core with an efficient program operation. The basic calibration data and present set-up are stored in an EEPROM thereby avoiding the loss or change of data at power off. The 2-channel version has a full galvanic isolation between the channels. By way of jumpers on the PCB the input in the standard version can be programmed either for a temperature or a current / voltage input. This means that one channel can work as for instance a temperature transmitter and the other can work as an isolation amplifier. Measurement range, signal parameters, and output span are configured to the present task by way of a PC and PR electronics A/S' communications interface Loop Link.

Input types:

Temperature input - jumpers in position 1:

Thermocouple input (TC) for standard thermocouples type B, E, J, K, L, N, R, S, T, U, W3, W5, LR according to the norms IEC 584, DIN 43710, ASTM E988-90, and GOST 3044-84.

The CJC can be selected in 3 different ways: internally in the terminal, externally by way of a Pt100 / Ni100 sensor, or externally with a constant temperature. If internal compensation is selected, a connector with a built-in temperature sensor must be ordered separately (PR type no. 5910 and 5913). Sensor error detection is available.

RTD input for Pt100...Pt1000 according to the norm IEC 751 and Ni100...Ni1000 according to the norm DIN 43760.

Automatic cable compensation at a 3- or 4-wire connection. At a 2-wire connection the cable resistance can be entered or measured by the configuration program and sent to the module which then compensates by the entered cable resistance. Sensor error detection is available.

Resistance input for resistance measurement with cable compensation as described under the RTD input. Sensor error detection is available.

The mV input is programmable in the range -150...+150 mV.

Current / voltage input - jumpers in position 2:

The **current input** is programmable in the range 0...100 mA, for instance 4...20 mA.

The **voltage input** is programmable in the range 0...250 VDC.

Auxiliary supplies are selected in the configuration program:

Loop transmitter supply > 17.1 VDC.

Reference voltage of 2.5 VDC, for instance as a supply for potentiometers.

Output:

The analogue standard current / voltage output is programmable in the range 0...20 mA, for instance 4...20 mA and 0...10 VDC. The output voltage can be ordered for a maximum of 12 VDC by a special shunt resistance. The output signal is proportional and linear to the value of the input signal. Special set-ups can be selected in the configuration program, for instance a customised linearisation, a reversed output, a limiter according to the selected output span, and selection of an output value in case of a sensor error. Maximum load on the current output is 600 Ω. Minimum load on the voltage output is 500 kΩ.

Loop 4...20 mA current output:

By wiring the current signal alternatively, the output works as a loop output. If the supply voltage for the 5114 disappears, the output current drops to < 4 mA.

Sensor error detection:

The output can be set up at an RTD, thermocouple and linear resistance input to go to *max.*, to *min.* or *entered value* at sensor error detection. If the output is set to 4...20 mA it is also possible to select NAMUR NE43 Upscale or Downscale.

Configuration:

The transmitter is configured to the present task by way of a PC and PR electronics A/S' communications interface Loop Link. The transmitter can be configured with or without a connected supply voltage as the communications interface supplies the necessary voltage to the set-up. The communications interface is galvanically isolated to protect the PC port. Communication is 2-way to allow the retrieval of the transmitter set-up into the PC and to allow the transmission of the PC set-up to the transmitter. For users who do not wish to do the set-up themselves, the 5114 can be delivered configured according to customer specifications: input type, measurement range, sensor error detection, and output signal.

Electrical specifications:

Specifications range:

-20°C til +60°C

Common specifications:

Supply voltage, universal 21.6...253 VAC, 50...60 Hz
 or 19.2...300 VDC
 Internal consumption..... ≤ 2 W (2 channels)
 Max. consumption..... ≤ 3 W (2 channels)
 Fuse..... 400 mA SB / 250 VAC
 Isolation voltage, test / operation..... 3.75 kVAC / 250 VAC
 Communications interface Loop Link
 Signal / noise ratio..... Min. 60 dB (0...100 kHz)
 Updating time:
 Temperature input..... 115 ms
 mA / V / mV input 75 ms
 Response time (0...90%, 100...10%), programmable:
 Temperature input..... 400 ms...60 s
 mA / V / mV input 250 ms...60 s
 Signal dynamics, input 22 bit
 Signal dynamics, output..... 16 bit
 Calibration temperature..... 20...28°C
 Accuracy, the greater of the 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
mA	≤ ±4 µA	≤ ±0.4 µA / °C
Volt	≤ ±10 µV	≤ ±1 µV / °C
RTD	≤ ±0.2°C	≤ ±0.01°C / °C
Lin.R	≤ ±0.1 Ω	≤ ±10 mΩ / °C
TC type: E, J, K, L, N, T, U	≤ ±1°C	≤ ±0.05°C / °C
TC type: B, R, S, W3, W5, LR	≤ ±2°C	≤ ±0.2°C / °C

EMC immunity influence	< ±0.5% of span
Extended EMC immunity: NAMUR NE 21, A criterion, burst	< ±1% of span

Auxiliary supplies:

Reference voltage..... 2.5 VDC ±0.5% / 15 mA
 Loop supply (pin 44...42 & 54...52).... 28...17.1 VDC/0...20 mA
 Max. wire size..... 1 x 2.5 mm² stranded wire
 Screw terminal torsion..... 0.5 Nm
 Relative humidity < 95% RH (non-cond.)
 Dimensions (HxWxD)..... 109 x 23.5 x 130 mm
 DIN rail type..... DIN 46277
 Protection degree..... IP20
 Weight 225 g

Electrical specifications, temperature input:

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

TC input:

Type	Min. value	Max. value	Min. span	Standard
B	+400°C	+1820°C	200°C	IEC 60584-1
E	-100°C	+1000°C	50°C	IEC 60584-1
J	-100°C	+1200°C	50°C	IEC 60584-1
K	-180°C	+1372°C	50°C	IEC 60584-1
L	-100°C	+900°C	50°C	DIN 43710
N	-180°C	+1300°C	100°C	IEC 60584-1
R	-50°C	+1760°C	200°C	IEC 60584-1
S	-50°C	+1760°C	200°C	IEC 60584-1
T	-200°C	+400°C	50°C	IEC 60584-1
U	-200°C	+600°C	75°C	DIN 43710
W3	0°C	+2300°C	200°C	ASTM E988-90
W5	0°C	+2300°C	200°C	ASTM E988-90
LR	-200°C	+800°C	50°C	GOST 3044-84

Sensor error current Nom. 30 µA
 CJC ≤ ±1°C
 Sensor error detection..... Yes

mV input:

Measurement range -150...+150 mV
 Min. measurement range..... 5 mV
 Input resistance..... Nom. 10 MΩ

RTD and linear resistance input:

Type	Min. value	Max. value	Min. span	Standard
Pt100	-200°C	+850°C	25°C	IEC 60751
Ni100	-60°C	+250°C	25°C	DIN 43760
Lin. R	0 Ω	5000 Ω	30 Ω	----

Max. cable resistance per wire..... 10 Ω
 Sensor current..... Nom. 0.2 mA
 Effect of sensor cable resistance
 (3- / 4-wire)..... < 0.002 Ω / Ω
 Sensor error detection..... Yes

Electrical specifications, mA / V / mV input:

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

Current input:

Measurement range 0...100 mA
 Min. measurement range (span)..... 4 mA
 Input resistance:
 Supplied unit Nom. 10 Ω + PTC 10 Ω
 Non-supplied unit..... RSHUNT = ∞, VDROPO < 6 V

Voltage input:

Measurement range 0...250 VDC
 Min. measurement range (span)..... 5 mVDC
 Input resistance ≤ 2.5 VDC..... Nom. 10 MΩ
 > 2.5 VDC..... Nom. 5 MΩ

Electrical specifications - OUTPUT:

Current output:

Signal range (span)..... 0...20 mA
 Min. signal range (span) 10 mA
 Max. offset..... 50% of selec. max. value
 Load (max.)..... 20 mA / 600 Ω / 12 VDC
 Load stability ≤ 0.01% of span / 100 Ω
 Current limit..... ≤ 28 mA

Voltage output:

Signal range (span)..... 0...10 VDC
 Min. signal range (span) 500 mV
 Max. offset..... 50% of selec. max. value
 Load (min.)..... 500 kΩ


2-wire 4...20 mA output:

Signal range 4...20 mA
 Load stability ≤ 0.01% of span / 100 Ω
 Load resistance ≤ (V_{supply}-3.5) / 0.023 A [Ω]
 Max. external 2-wire supply 29 VDC
 Effect of external 2-wire supply
 voltage change..... < 0.005% of span / V

Sensor error detection:

Programmable..... 0...23 mA
 NAMUR NE43 Upscale..... 23 mA
 NAMUR NE43 Downscale..... 3.5 mA
 No function..... Not defined

EEx / I.S. approval:

DEMKO 99ATEX124571  II (1) GD
 [EEx ia] IIC
 Applicable for zone..... 0, 1, 2, 20, 21 or 22

Ex / I.S. data for 5114B, all types:

Terminal 31, 32, and 33
 U_m : 250 V

Ex / I.S. data for 5114B1 (channel 1 for 5114B3):

Terminal 41, 42, 44 to 43 (51, 52, 54 to 53)
 U_o : 7.5 VDC
 I_o : 6.0 mADC
 P_o : 11.25 mW
 L_o : 200 mH
 C_o : 6.0 µF

Ex / I.S. data for 5114 B2 (channel 2 for 5114B3):

Terminal 44 to 41 (54 to 51)
 U_o : 28.0 VDC
 I_o : 87 mADC
 P_o : 0.62 W
 L_o : 4.2 mH
 C_o : 0.08 µF
 Terminal 42, 43 to 41 (52, 53 to 51)
 U_o : 7.5 VDC
 I_o : 6.0 mADC
 P_o : 11.25 mW
 L_o : 200 mH
 C_o : 6.0 µF

Marine approval:

Det Norske Veritas, Ships & Offshore. Stand. for Certific. No.2.4

GOST R approval:

VNIIM & VNIIFTRI, Cert. no. www.prelectronics.com

Observed authority requirements: Standard:

EMC 2004/108/EC EN 61326-1
 LVD 2006/95/EC EN 61010-1
 PELV/SELV IEC 364-4-41
 and EN 60742
 ATEX 94/9/EC EN 50014, EN 50020 and
 EN 50281-1-1

Of span = Of the presently selected range

Configuration index for the 5114 programmable transmitter:
(Use this as a checklist when ordering configured units)

TEMPERATURE INPUT TC / RTD / Linear resistance / mV				CURRENT / VOLTAGE INPUT mA / voltage	
RTD type: Pt100 (DIN/IEC) Ni100	Thermocouple type: Type B : Pt30%Rh-Pt6%Rh Type E : NiCr-CuNi Type J : Fe-CuNi Type K : NiCr-Ni Type L : Fe-CuNi Type N : NiCrSi-NiSi Type R : Pt13%Rh-Pt Type S : Pt10%Rh-Pt Type T : Cu-CuNi Type U : Cu-CuNi Type W3 : W3%Re/W25%Re Type W5 : W5%Re/W26%Re Type LR : Fe-CuNi	Linear resistance range: (30 Ω ≤ range ≤ 5000 Ω)	mV range: 5 mV ≤ range ≤ 150 mV	mA range input: 4 mA ≤ range ≤ 100 mA	Voltage input range: 50 mV ≤ range ≤ 250 VDC
Specify range °C: ____	Specify range °C : ____	Specify range Ω: ____	Specify range mV: ____	Specify range mA: ____	Specify range mV/V: ____

RTD connection: 2-wire, no compens. 2-wire, fixed line res. 3-wire compensation 4-wire compensation Specify connection: ____	CJC: Internal CJC (Pt100): External CJC (Pt100): External CJC (Ni100): Fixed external CJC: (Specify °C): ____	Resistance connection: 2-wire, no compensation: 2-wire, fixed line resistance 3-wire compensation: 4-wire compensation: Specify connection: ____	mA: Loop supply: > 17.1 V Specify Yes / No: ____	Voltage: Vref.: 2.5 VDC (e.g. potentiometer input as voltage divider) Specify Yes / No: ____
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Linearisation
No linearisation:
Customer linearisation (specify):

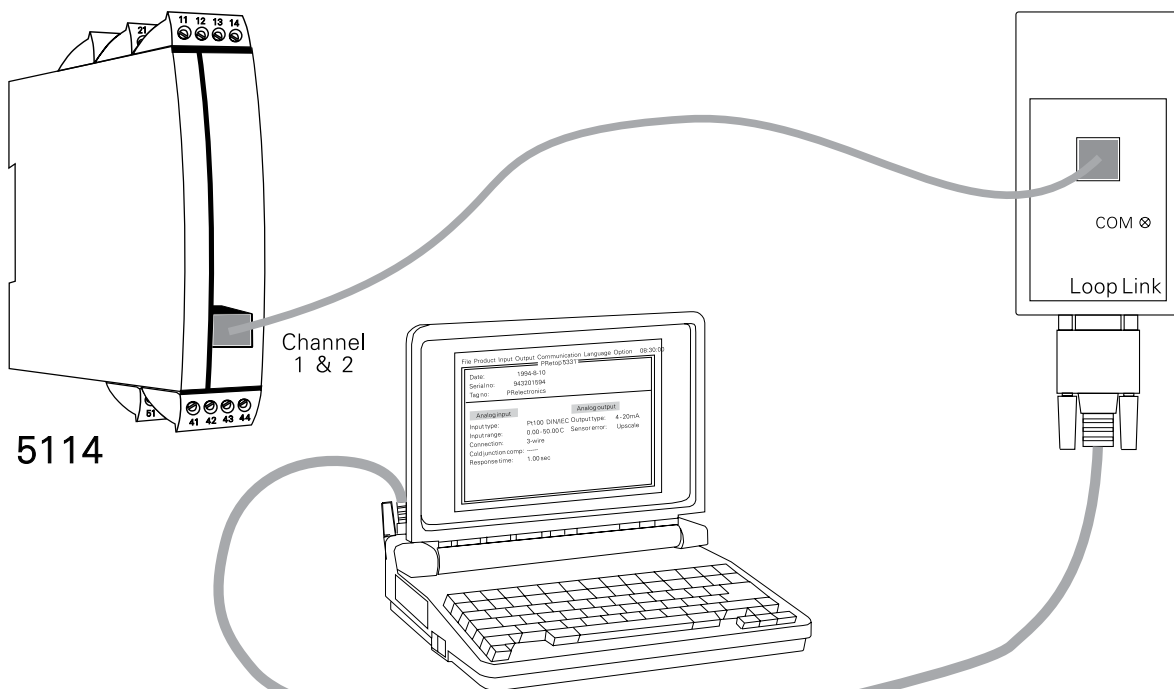
Response time:
250/400 ms ≤ response time ≤ 60 s
(min. response time depending on input type)

OUTPUT

Voltage output: 800 mV ≤ range ≤ 10 VDC Output voltage 0% (specify): ____ Output voltage 100% (specify): ____ Voltage limit value (max. 11.5 V)	Active current output: 10 mA ≤ range ≤ 20 mA Output current 0% (specify): ____ Output current 100% (specify): ____ Current limit value (max. 23 mA)	Passive current output (2-wire output): Range 4...20 mA Current limit value fixed: typ. 23 mA
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Sensor error:

Selected value	Output to max.
NAMUR NE43 Upscale	Output to min.
NAMUR NE43 Downscale	No sensor error



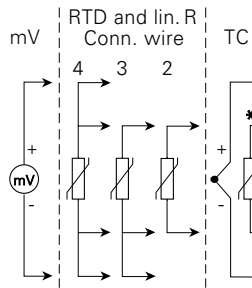
Order : 5114

Type	Version	Input	Channels
5114	Standard : A	RTD / TC / R / mA / V / mV : -	Single : A
	ATEX Ex : B	RTD / TC / mV / R : 1 mA / V / mV : 2 Channel 1, RTD / TC / mV / R : 3 Channel 2, mA / V / mV	Double : B

Note! For TC inputs with internal CJC, remember to order the CJC connectors type 5910 / 5910 Ex (ch. 1) and 5913 / 5913 Ex (ch.2).

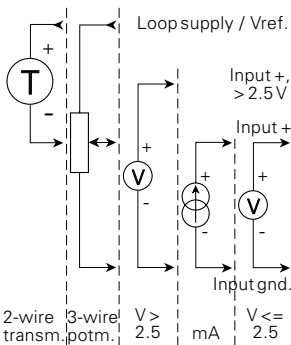
Block diagram:

Channel 1 shown as a temperature input:



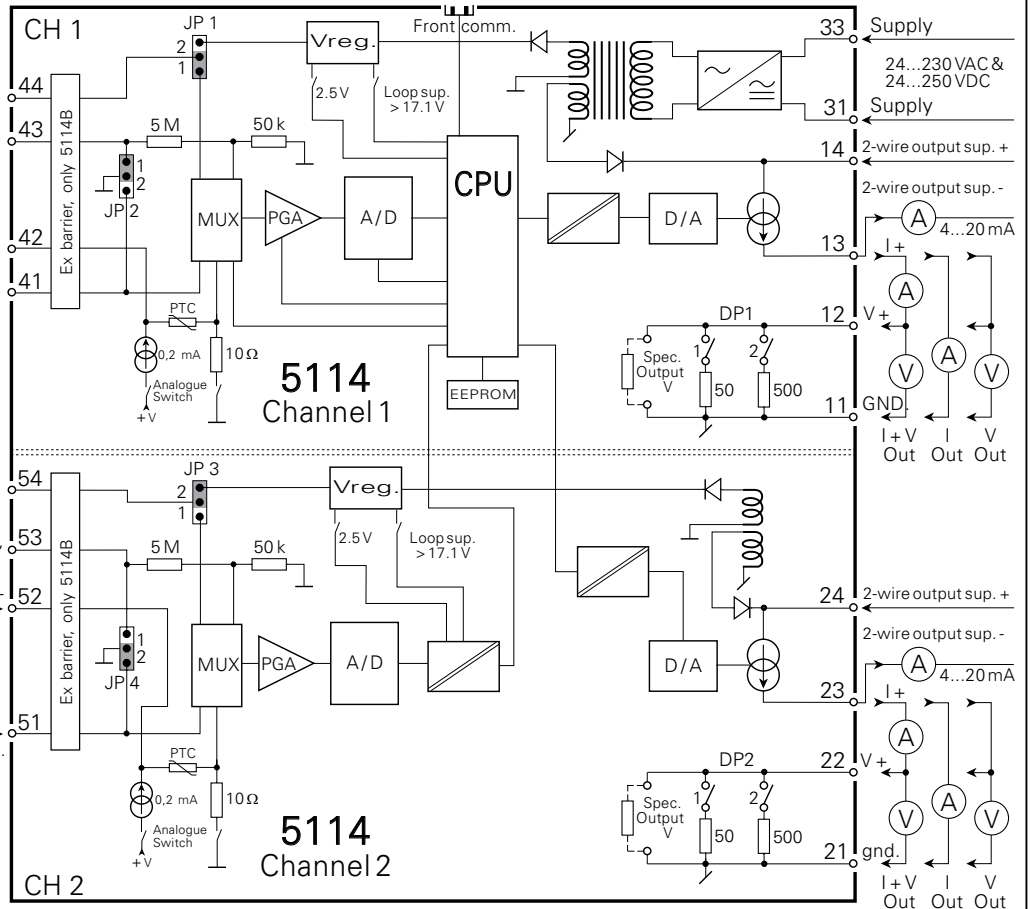
!! If channel 2, use terminal no. 54...51

Channel 2 shown as a current/voltage input:



!! If channel 1, use terminal no. 44...41

* Accessories: 5910 CJC connector CH 1, 5913 CJC connector CH 2.



Selection of input type: (5114A)

Input	JP 1	JP 2	JP 3	JP 4
Temperature channel 1	1	1	-	-
Temperature channel 2	-	-	1	1
Current / voltage channel 1	2	2	-	-
Current / voltage channel 2	-	-	2	2