

PROGRAMMABLE TRANSMITTER

ATEX   

- 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 > 18 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, and 2. • 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 Windows® 95/98/-NT-based PC and PR electronics A/S' communications interface Loop Link 5905.

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 according to the norms IEC 584, DIN 43710 and ASTM E988-90.

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 terminal 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 connexion. At a 2-wire connexion 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 > 18 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 a 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 Windows® 95/98/-NT-based PC and PR electronics A/S' communications interface Loop Link 5905. 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 RS232. 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:

Specification range:

(@: -20°C to +60°C)

Common specifications:

Supply voltage universal 24...230 VAC ±10%
 50...60 Hz
 24...250 VDC ±20%
 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 5905
 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 to 60 s
 mA / V / mV input 250 ms to 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	≤ ±2°C	≤ ±0.2°C/°C

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

Auxiliary supplies:
 Reference voltage 2.5 VDC ±0.5% / 15 mA
 Loop supply..... 28...18 VDC₂ / 0...20 mA
 Max. wire size..... 1 x 2.5 mm²
 Screw terminal torsion 0.5 Nm
 Relative humidity < 95% RH (non-cond.)
 Dimensions (HxVxD)..... 109 x 23.5 x 130 mm
 DIN rail type..... DIN 46277
 Tightness (enclosure / terminals)..... IP50 / IP20
 Weight 225 g

Electrical specifications, temperature input:

TC input:

Type	Min. temperature	Max. temperature	Min. span	Norm
B	+400°C	+1820°C	200°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
N	-180°C	+1300°C	100°C	IEC584
R	-50°C	+1760°C	200°C	IEC584
S	-50°C	+1760°C	200°C	IEC584
T	-200°C	+400°C	50°C	IEC584
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

Max. offset..... 50% of selec. max. value
 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
 Max. offset..... 50% of selec. max. value
 Input resistance..... Nom. 10 MΩ

RTD and linear resistance input:

Type	Min. value	Max. value	Min. span	Norm
Pt100	-200°C	+850°C	25°C	IEC 751
Ni100	-60°C	+250°C	25°C	DIN 43760
Lin.R	0 Ω	5000 Ω	30 Ω	-----

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

Current input:

Measurement range 0...100 mA
 Min. measurement range (span)..... 4 mA
 Max. offset..... 50% of selec. max. value
 Input resistance:
 Supplied unit Nom. 10 Ω + PTC 10 Ω
 Non-supplied unit..... RSHUNT = ∞, VDROPP < 6 V

Voltage input:

Measurement range 0...250 VDC
 Min. measurement range (span)..... 5 mVDC
 Max. offset..... 50% of selec. max. value
 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..... ≤ (Vcc-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

Ex data for 5114 B1 (channel 1 for 5114B3):

Terminal 41, 42, 44 to 43 (51, 52, 54 to 53)
 U_m 250 V
 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 data for 5114 B2 (channel 2 for 5114B3):

Terminal 44 to 41 (54 to 51)
 U_m 250 V
 U_o 28.0 VDC
 I_o 87.0 mADC
 P_o ≤ 0.62 W
 L_o < 4.2 mH
 C_o < 80 nF

Terminal 42, 43 to 41 (52, 53 to 51)

U_m 250 V
 U_o 7.5 VDC
 I_o 6.0 mADC
 P_o ≤ 11.25 mW
 L_o < 200 mH
 C_o < 6.0 µF

EEx approval CENELEC:

..... [EEx ia] IIC
 Applicable in..... Zone 0, 1, or 2
 ATEX.....  II (1) G

Observed authority requirements: Standard:

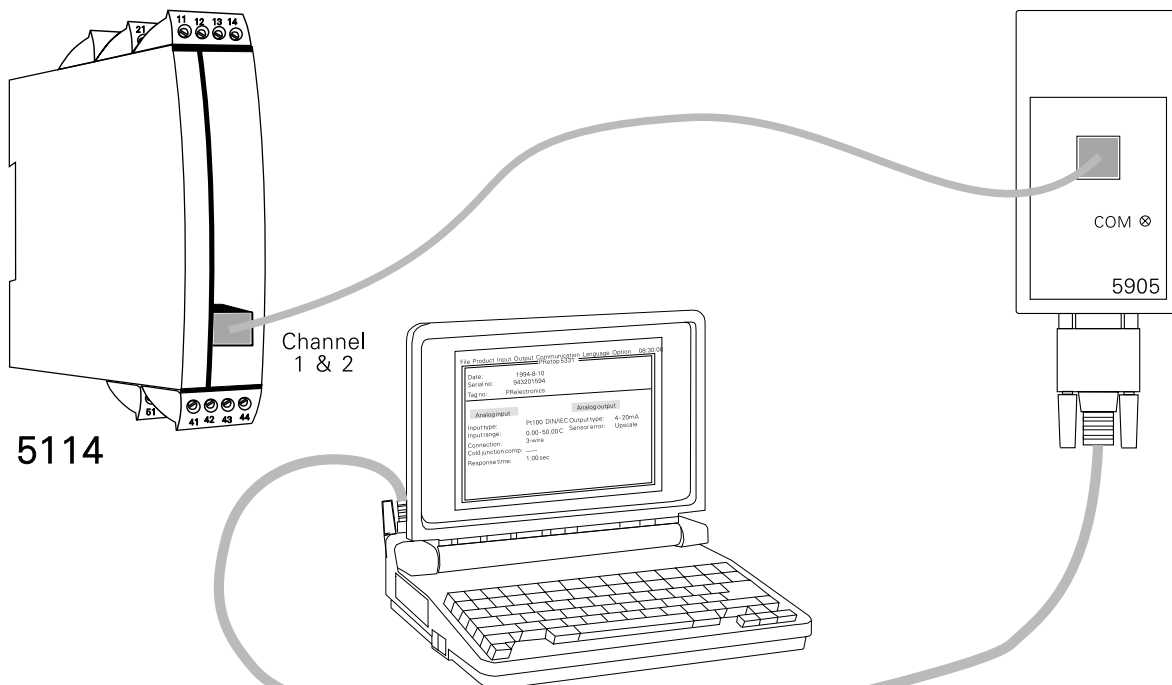
EMC 89/336/EEC, Emission EN 50 081-1, EN 50 081-2
 Immunity EN 50 082-2, EN 50 082-1
 LVD 73/23/EEC..... EN 61 010-1
 PELV/SELV IEC 364-4-41
 and EN 60 742
 ATEX 94/9/EC..... EN 50 014 and EN 50 020

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 Specify range °C: ____	Thermocouple type: Pt30%Rh-Pt16%Rh: type B NiCr-CuNi : type E Fe-CuNi : type J NiCr-Ni : type K Fe-CuNi : type L NiCrSi-NiSi : type N Pt13%Rh-Pt : type R Pt10%Rh-Pt : type S Cu-CuNi : type T Cu-CuNi : type U W3%Re/W25%Re : type W3 W5%Re/W26%Re : type W5 Specify range °C : ____	Linear resistance range: (30 Ω ≤ range ≤ 5000 Ω) Specify range Ω: ____	mV range: 5 mV ≤ range ≤ 150 mV Specify range mV: ____	mA range input: 4 mA ≤ range ≤ 100 mA Specify range mA: ____	Voltage input range: 50 mV ≤ range ≤ 250 VDC Specify range mV/V: ____	
RTD-connection: 2-wire, no compens. 2-wire, fixed line res.. 3-wire compensation 4-wire compensation Specify connexion: ____	CJC: Internal CJC (Pt100): External CJC (Pt100): External CJC (Ni100): Fixed external CJC: (Specify °C): ____	Resistance connexion: 2-wire, no compensation: 2-wire, fixed line resistance 3-wire compensation: 4-wire compensation: Specify connexion: ____	mA: Loop supply: > 18 V Specify Yes / No: ____			Voltage: Vref.: 2.5 VDC (e.g. potentiometer input as voltage divider) Specify Yes / No: ____
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		
Sensor error: Selected value NAMUR NE43 Upscale NAMUR NE43 Downscale Output to max. Output to min. No sensor error						

5114 connexion to Loop Link:



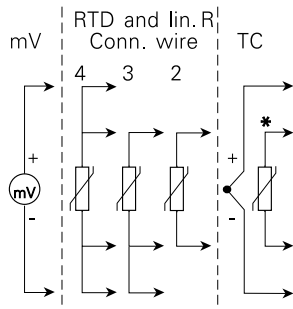
Order : 5114

Type	Version	Input	Channels
5114	Standard : A	RTD / TC / R / mA / V / mV : -	Single : A
	[EEEx ia] IIC : B	RTD / TC / mV / R : 1	Double : B
		mA / V / mV : 2	
		Channel 1, RTD / TC / mV / R	
		Channel 2, mA / V / mV : 3	

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

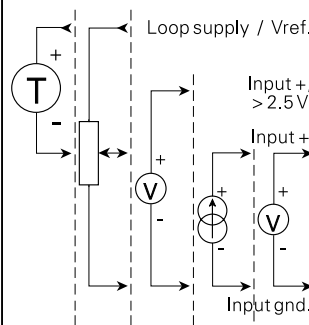
Block diagram:

Channel 1 shown as a temperature input:



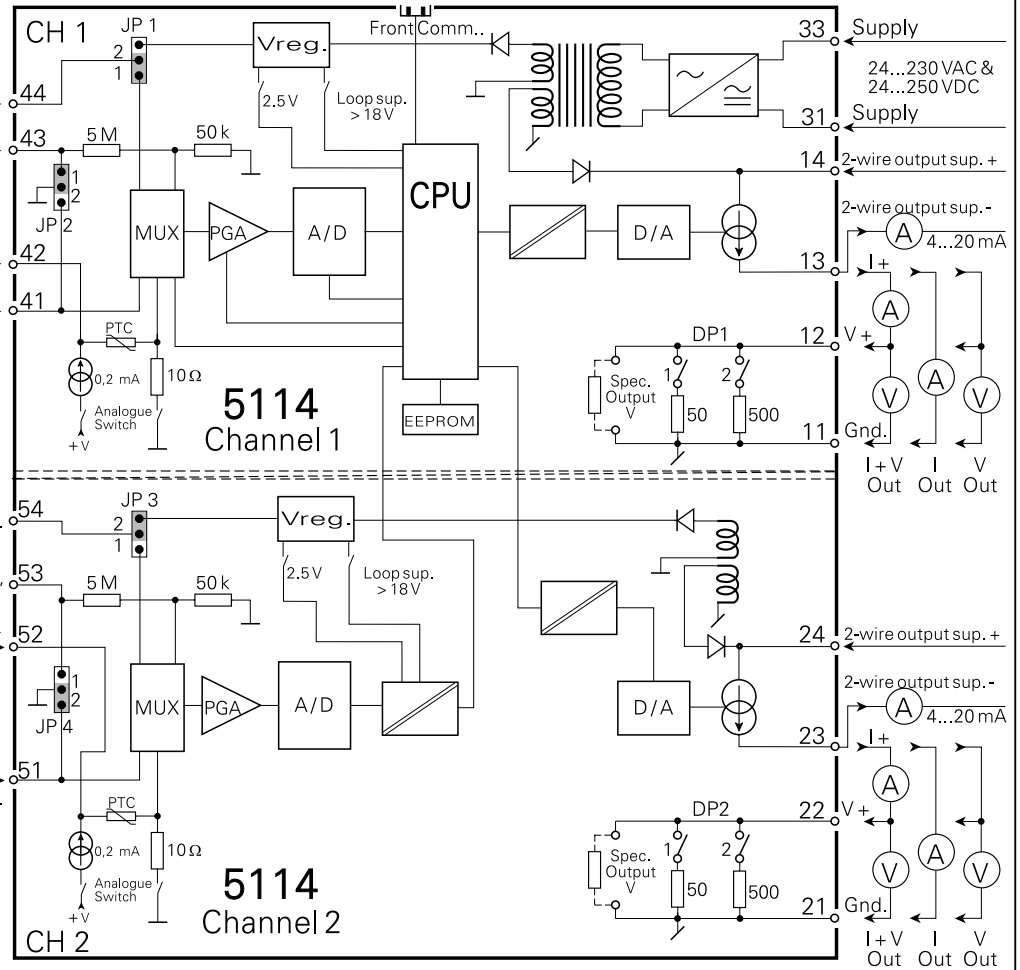
!! If channel 2, use terminal no. 54...51

Channel 2 shown as a current/voltage input:



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

* Accessories: 5910 CJC-terminal CH1, 5913 CJC-terminal CH2.



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