

# 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 > 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 5905A.

## 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 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** > 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 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 Windows® 95/98/-NT-based PC and PR electronics A/S' communications interface Loop Link 5905A. 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:

### Specifications range:

-20°C til +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 5905A
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...100%), 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 <sub>tc</sub>
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
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.....	28...18 VDC / 0...20 mA
Max. wire size.....	1 x 2.5 mm <sup>2</sup> multicore cable
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
Tightness (enclosure / terminals).....	IP50 / IP20
Weight .....	225 g

### Electrical specifications, temperature input:

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

Type	Min. value	Max. value	Min. span	Norm
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

### TC input:

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

Type	Min. value	Max. value	Min. span	Norm
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	-----

### RTD and linear resistance input:

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 = ∞, VDROD < 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 <sub>supply</sub> -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 5114B, all types:

Terminal 31, 32, and 33	
U <sub>m</sub> .....	: 250 V

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


Terminal 41, 42, 44 to 43 (51, 52, 54 to 53)	
U <sub>0</sub> .....	: 7.5 VDC
I <sub>0</sub> .....	: 6.0 mADC
P <sub>0</sub> .....	: 11.25 mW
L <sub>0</sub> .....	: 200 mH
C <sub>0</sub> .....	: 6.0 µF

#### Ex data for 5114 B2 (channel 2 for 5114B3):

Terminal 44 to 41 (54 to 51)	
U <sub>0</sub> .....	: 28.0 VDC
I <sub>0</sub> .....	: 87 mADC
P <sub>0</sub> .....	: 0.62 W
L <sub>0</sub> .....	: 4.2 mH
C <sub>0</sub> .....	: 0.08 µF

Terminal 42, 43 to 41 (52, 53 to 51)	
U <sub>0</sub> .....	: 7.5 VDC
I <sub>0</sub> .....	: 6.0 mADC
P <sub>0</sub> .....	: 11.25 mW
L <sub>0</sub> .....	: 200 mH
C <sub>0</sub> .....	: 6.0 µF

#### Ex / I.S. approval:

DEMKO 99. ATEX 124571 .....	 II (1) G D
	[EEEx ia] IIC

Applicable for zone..... 0, 1, 2, 20, 21 or 22

#### Marine approval:

Det Norske Veritas Rules for Ships ... Certificat. Notes No.2.4

#### Observed authority requirements: Standard:

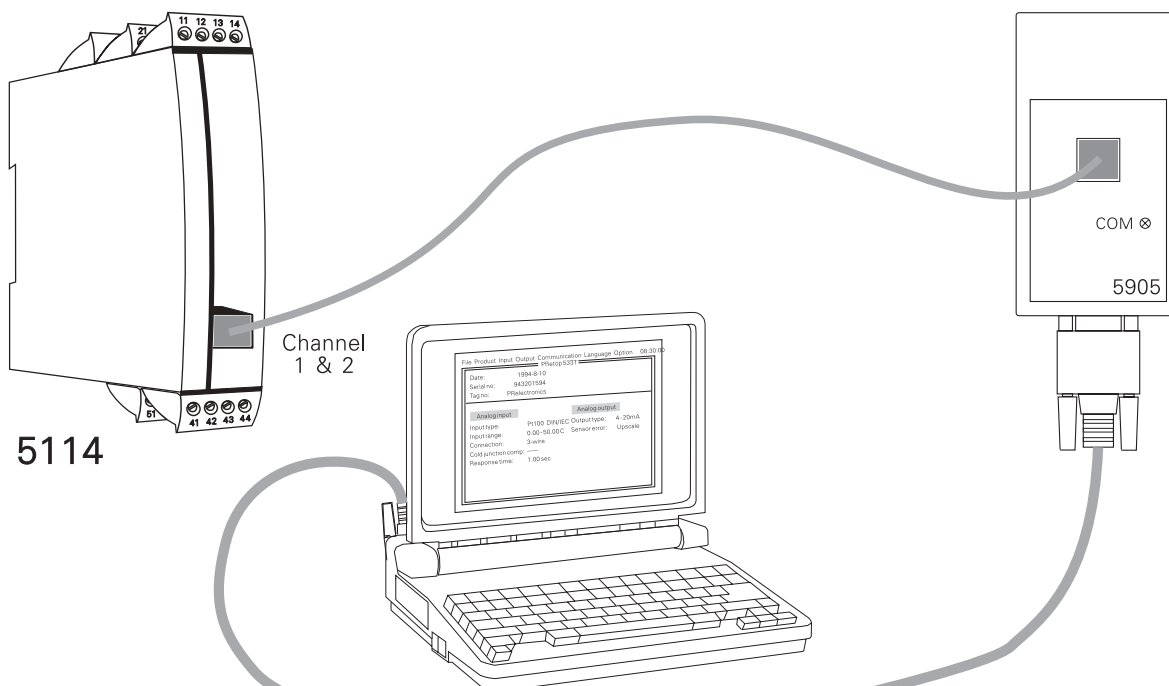
EMC 89/336/EEC, Emission .....	EN 50 081-1, EN 50 081-2
Immunity .....	EN 50 082-2, EN 50 082-1
Emission and immunity .....	EN 61 326
LVD 73/23/EEC .....	EN 61 010-1
PELV/SELV.....	IEC 364-4-41
	and EN 60 742
ATEX 94/9/EC.....	EN 50 014, EN 50 020 and EN 50 281-1-1

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	
<b>RTD type:</b> Pt100 (DIN/IEC) NI100  Specify range °C: ____	<b>Thermocouple type:</b> Pt30%Rh-Pt6%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 : ____	<b>Linear resistance range:</b> (30 Ω ≤ range ≤ 5000 Ω)  Specify range Ω: ____	<b>mV range:</b> 5 mV ≤ range ≤ 150 mV  Specify range mV: ____	<b>mA range input:</b> 4 mA ≤ range ≤ 100 mA  Specify range mA: ____	<b>Voltage input range:</b> 50 mV ≤ range ≤ 250 VDC  Specify range mV/V: ____
<b>RTD connection:</b> 2-wire, no compens. 2-wire, fixed line res. 3-wire compensation 4-wire compensation Specify connection: ____	<b>CJC:</b> Internal CJC (Pt100): External CJC (Pt100): External CJC (Ni100): Fixed external CJC: (Specify °C): ____	<b>Resistance connection:</b> 2-wire, no compensation: 2-wire, fixed line resistance 3-wire compensation: 4-wire compensation: Specify connection: ____	<b>mA:</b> Loop supply: > 18 V  Specify Yes / No: ____		
			<b>Voltage:</b> Vref.: 2.5 VDC (e.g. potentiometer input as voltage divider)  Specify Yes / No: ____		
<b>Linearisation</b> No linearisation: Customer linearisation (specify):					
<b>Response time:</b> 250/400 ms ≤ response time ≤ 60 s (min. response time depending on input type)					
<b>OUTPUT</b>					
<b>Voltage output:</b> 800 mV ≤ range ≤ 10 VDC Output voltage 0% (specify): ____ Output voltage 100% (specify): ____ Voltage limit value (max. 11.5 V)		<b>Active current output:</b> 10 mA ≤ range ≤ 20 mA Output current 0% (specify): ____ Output current 100% (specify): ____ Current limit value (max. 23 mA)		<b>Passive current output (2-wire output):</b> Range 4...20 mA  Current limit value fixed: typ. 23 mA	
<b>Sensor error:</b> <div style="display: flex; justify-content: space-between;"> <div>           Selected value            NAMUR NE43 Upscale            NAMUR NE43 Downscale         </div> <div>           Output to max.            Output to min.            No sensor error         </div> </div>					

**5114 connection to Loop Link:**



Order : 5114

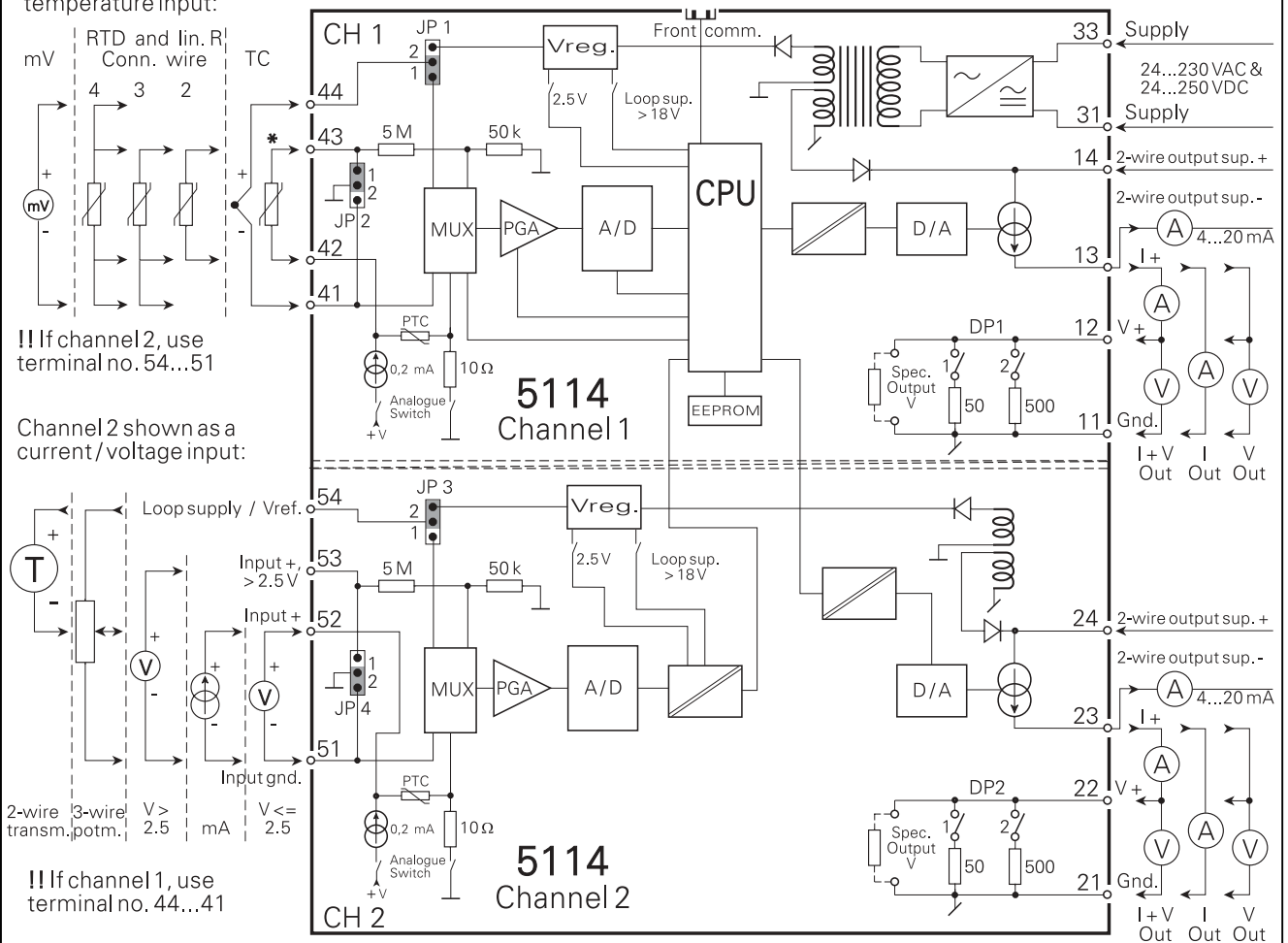
Type	Version	Input	Channels
5114	Standard : A	RTD / TC / R / mA / V / mV : —	Single : A
	ATEX Ex : B	RTD / TC / mV / R : 1	Double : B
		mA / V / mV : 2	
		Channel 1, RTD / TC / mV / R	
		Channel 2, mA / V / mV : 3	

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

### Block diagram:

Channel 1 shown as a temperature input:

\* 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