

# UNIVERSAL TRANSMITTER



- Programmable from standard PC
- Galvanic separation, optional Ex
- Trip amplifiers as option
- For DIN rail mounting
- Universal voltage supply
- Detachable terminals



## General:

The PRetrans transmitter is configured to the present application by means of a PC using the installation program PReset 5000 with associated optical link for communication between transmitter and a DOS-based PC.

Opto Link 5901 is a configuration kit containing an optical link, a PC cable, and the program PReset 5000 for programming of units 5111 and 5511.

The transmitter is configured from factory according to specifications or the user can do the configuration himself by means of the PReset 5000 program.

The transmitter input can be programmed as a TC, an RTD and a resistance input and a unipolar or bipolar mV, mA and voltage input. The output can be a unipolar / bipolar current or voltage signal.

By way of the relay option it is possible to insert limit values and achieve digital on/off signals in connection with temperature sensors or current / voltage signals.

Furthermore, it is possible to insert special linearisation algorithms e.g. in connection with measurement of non-linear signals.

## Input types:

**Thermocouple input:** (TC) with 15 bit bipolar resolution for standard thermocouples in the temperature ranges acc. to the IEC 584, the DIN 43710 or ASTM E988-90 standards. The CJC function is implemented with a Pt100 sensor in the terminal (option - type no. 5912), external Pt100 sensor or fixed CJC (thermostat box).  
Sensor error detection available.

**RTD input** in ranges with 16 bit resolution for Pt100, Ni100 in temperature ranges acc. to the IEC 751/ DIN 43760 standards. Set-up of main type is possible in multipla (e.g. Pt50 and Ni1000).  
Automatic cable compensation by 3- or 4-wire sensor connection. By 2-wire sensor connection it is possible to compensate cable resistance with a calibration button directly from the front cover.  
Sensor error detection available.

**Resistance input** in ranges with 16 bit resolution for re-sistance measurement. Max. range 5 k $\Omega$ . Cable compensation by 3- or 4-wire connection. 0% and 100% process calibration is possible with the calibration button directly from the front cover.  
Cable breakage detection available.

**Current input** in ranges with a 15 bit bipolar resolution for DC current signals. 0% and 100% process calibration is possible with the calibration button directly from the front cover.  
Cable breakage detection available on 4...20 mA signals.

**Voltage input** in ranges with a 15 bit bipolar resolution for DC voltage signals, 3-wire potentiometer, load cells, pressure transducers, etc. 0% and 100% process calibration is possible with the calibration button directly from the front cover.

## Auxiliary supplies:

(Selected by internal DIP-switches).

**Loop supply** 16 VDC/20 mA for supply of 2-wire transmitter.

**Reference voltage** 2.5 VDC, 15 mA as reference for 3-wire potentiometers e.g. as a position indicator from analogue valves etc.

**Excitation voltage** 8 VDC, 25 mA for supply of load cells, pressure transducers, etc.

## Outputs:

(Selected by internal DIP-switches).

**Current output** with 13 bit bipolar resolution programmable in the range  $\pm 20$  mA. Maximum offset is 75% of max. output value.

**Voltage output** with 13 bit bipolar resolution in the ranges  $\pm 1$  VDC and  $\pm 10$  VDC. Max. load 20 mA.  
Maximum offset is 75% of max. output value.

**Relay output** (relay 1 and 2) is selected as a make or break function. The relays can be used as trip amplifier or / and sensor error alarm for a TC, an RTD, a resistance input and current input.

## Status indication:

A green LED in the enclosure front indicates by flashing light that the transmitter is operating correctly.

By activation of the calibration button behind the front cover the green LED lights constantly.

A yellow LED is ON for each active output relay.

## Special version - 5111Hz50:

5111Hz50 is a special version of the Universal Transmitter PRetrans 5111 with a modified input range. This modification enables the 5111Hz50 to handle extreme suppression of 50 Hz hum. The DC value of the superimposed measurement signal is transmitted to the output as e.g. a 4...20 mA current signal.

**Electrical specifications:****Specifications range:**

-20°C to +60°C

**Common specifications:**

Supply voltage.....	21.6...253 VAC or 19.2...300 VDC
Frequency.....	50...60 Hz
Internal consumption.....	2.5 W
Max. consumption.....	3 W
Fuse.....	400 mA SB / 250 VAC
Isolation, test / operation.....	3.75 kVAC / 250 VAC
Communications interface.....	Opto Link 5901
Signal / noise ratio.....	Min. 60 dB
Signal dynamics, input.....	23 bit
Signal dynamics, output.....	16 bit
Response time (programmable)	
min. ....	Updating time x 2.5
max. ....	250 s
Calibration temperature.....	20...28°C
Temperature coefficient.....	< ±0.01% of span/°C
Linearity error.....	< 0.1% of span
Effect of supply voltage change.....	< 0.001% of span/%V

**Auxiliary voltages:**

Loop supply.....	16 VDC / 20 mA
Reference voltage.....	2.5 VDC ±0.5% / 15 mA
Excitation supply.....	8.0 VDC ±0.5% / 25 mA
EMC immunity influence.....	< ±0.5%
Wire square (max.).....	1 x 2.5 mm <sup>2</sup> stranded wire
Screw terminal torsion.....	0.5 Nm
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.....	250 g

**Electrical specifications - input:**

Max. offset..... 75% of selec. max. value

**TC input:**

Type	Min. temperature	Max. temperature	Min. span	Norm
B	+400°C	+1820°C	200°C	IEC584
E	-200°C	+1000°C	50°C	IEC584
J	-210°C	+1200°C	50°C	IEC584
K	-180°C	+1372°C	50°C	IEC584
L	-200°C	+900°C	50°C	DIN43710
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	50°C	DIN43710
W3	0°C	+2300°C	200°C	ASTM E988-90
W5	0°C	+2300°C	200°C	ASTM E988-90

Sensor error current..... Nom. 5 µA

Updating time (int./ext.CJC/diff.)..... 250 ms

**Basic accuracy:**

Type E,J,K,L,N,T,U..... &lt; ±0.5°C

Type B,R,S,W3,W5..... &lt; ±2°C

Cold junction compensation (CJC) ... &lt; ±0.5°C

**Temperature coefficient**

Type E,J,K,L,N,T,U

span < 500°C..... ±0.05°C/°C<sub>amb.</sub>span > 500°C..... ±0.01% of span/°C<sub>amb.</sub>Type B,R,S,W3,W5..... 0.2°C/°C<sub>amb.</sub>

Sensor error detection..... Yes

**RTD input:**

RTD type	Min. temperature	Max. temperature	Min. span
Pt	-200°C	+850°C	25°C
Ni	-60°C	+250°C	25°C

Cable resistance per wire (max.)..... 50 Ω

Sensor current..... Nom. 0.4 mA

**Updating time:**

2 and 4-wire..... 100 ms

3-wire and diff..... 250 ms

Basic accuracy..... ±0.2°C

**Temperature coefficient**span < 100°C..... ±0.01°C/°C<sub>amb.</sub>span > 100°C..... ±0.01% of span/°C<sub>amb.</sub>**Effect of sensor cable resistance**

3- / 4-wire..... &lt; 0.002 Ω/Ω

Sensor error detection..... Yes

**Linear resistance input:**

Measurement range..... 0...5 kΩ

Min. measurement range (span)

2- / 4-wire..... 10 Ω

3-wire and difference..... 50 Ω

Max. cable resistance per wire..... 50 Ω

Sensor current..... Nom. 0.4 mA

Updating time (2- / 4-wire)..... 100 ms

Updating time (3-wire / diff.)..... 250 ms

Effect of sensor cable resistance

3- / 4-wire..... &lt; 0.002 Ω/Ω

Sensor error detection..... Yes

**Voltage input:**

Measurement range..... -250...+250 VDC

Min. measurement range (span)..... 20 mV

Input resistance (Vin ≤ 2.4 V)..... Nom. 10 MΩ

(Vin &gt; 2.4 V)..... Nom. 5 MΩ

Updating time (without linearisation)..... 50 ms

Updating time (with linearisation)..... 100 ms

**Bridge input:**

Measurement range..... -70...+70 mV

Min. measurement range (span)..... 5 mV

Input resistance..... Typ. 500 kΩ

Updating time (without linearisation)..... 200 ms

Updating time (with linearisation)..... 250 ms

**Current input:**

Measurement range..... -100...+100 mA

Min. measurement range (span)..... 2 mA

Input resistance..... Nom. 10 Ω + PTC 10 Ω

Updating time (without linearisation)..... 50 ms

Updating time (with linearisation)..... 100 ms

Cable breakage detection (4...20 mA)..... Yes

**Electrical specifications - output:**

Max. offset..... 75% of selec. max. value

**Current output:**

Signal range..... -20...+20 mA

Min. signal range (span)..... 5 mA

Load (max.)..... 20 mA / 600 Ω / 12 VDC

Load stability..... &lt; ±0.01% of span/100 Ω

Current limit..... 23.5 mA

**Voltage output:**

Signal range..... -10...+10 VDC

Min. signal range (span)..... 0.25 VDC

Load (max.)..... 10 VDC / 20 mA

Current limit..... 40 mA

Voltage limit..... 11.5 VDC

**Relay output:**

Max. voltage..... 250 VRMS

Max. current..... 2 A / AC

Max. AC power..... 500 VA

Max. AC power Ex version 5111B..... 100 VA

Max. load at 24 VDC..... 1 A

**Sensor / cable error indication:**

Analogue output upscale..... Max. value +10%

Analogue output downscale..... Min. value -10%

Analogue output..... Hold

Relay output..... ON/OFF/Hold

**Ex / I.S. data for 5111B, all types:**

Terminal 31, 32; 11, 12; 21, 22 and 23, 24:

U<sub>m</sub>..... : 250 V**2-wire supply (terminal 54 to 52) and****3-wire potentiometer (terminal 54, 43 to 42):**U<sub>o</sub>..... : 28 VDCI<sub>o</sub>..... : 93 mADCP<sub>o</sub>..... : 650 mWL<sub>o</sub>..... : 4.7 mHC<sub>o</sub>..... : 80 nF**Load cell (terminal 54, 53, 51, 44, 43 and 41 to 42):**U<sub>o</sub>..... : 28 VDCI<sub>o</sub>..... : 110 mADCP<sub>o</sub>..... : 650 mWL<sub>o</sub>..... : 4.2 mHC<sub>o</sub>..... : 80 nF**V, mA, TC, RTD (terminal 53, 52, 51, 44, 43 and 41 to 42):**U<sub>o</sub>..... : 7.5 VDCI<sub>o</sub>..... : 23 mADCP<sub>o</sub>..... : 45 mWL<sub>o</sub>..... : 160 mHC<sub>o</sub>..... : 11 µF**EEx / I.S. approval:**DEMKO 01ATEX130321.....  II (1) GD

[EEx ia] IIC

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

**Observed authority requirements: Standard:**

EMC 2004/108/EC

Emission and immunity..... EN 61326

LVD 73/23/EEC..... EN 61010-1

PELV/SELV..... IEC364-4-41

and EN 60 742

ATEX 94/9/EEC..... EN 50014, EN 50020 and

EN 50 281-1-1

**Of span** = Of the presently selected range

**Options index for the 5111 Universal Transmitter:**  
(Use this as a checklist when ordering configured units)

<b>INPUT</b>				
<b>RTD type:</b> Pt100 (DIN/IEC) Pt n (100 x n) (e.g. 10 = Pt1000) Ni100 Ni n (100 x n) (e.g. 5 = Ni500)  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> (10 Ω ≤ range ≤ 5000 Ω)  Specify range Ω: ___	<b>Voltage range*:</b> 20 mV ≤ range ≤ ±250 VDC  * Voltage range includes bridge input for load cells (min. range ±5 mV and 3-wire potentiometer input).  Specify range VDC: ___	<b>mA input range:</b> 2 mA ≤ range ≤ ±100 mA  Specify range mA: ___

<b>Linearisation:</b> Standard linearisation RTD, TC:	<b>Linearisation:</b> No linearisation: Customer linearisation (specify):
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<b>RTD options:</b> 2-wire, fixed line resistance: 2-wire, external calibration: 3-wire compensation: 4-wire compensation: Differential input:	<b>TC options:</b> Internal CJC (Pt100): External CJC (Pt100): Fixed external CJC: (specify °C) Differential input	<b>Resistance options:</b> 2-wire, fixed line resistance: 2-wire, external calibration: 3-wire compensation: 4-wire compensation: Differential input	<b>Voltage options:</b> V <sub>ref</sub> : 2.5 VDC (e.g. potentiometer input as voltage divider).  V <sub>excitation</sub> : 8 VDC (e.g. bridge input from load cells).	<b>mA options:</b> Loop supply: 16 VDC
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<b>Process calibration:</b> 0% calibration 0% and 100% calibration No process calibration
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<b>OUTPUT</b>	
<b>Voltage output:</b> 0.25 VDC ≤ range ≤ ±1 VDC 2.5 VDC ≤ range ≤ ±10 VDC Output voltage 0% (specify): ___ Output voltage 100% (specify): ___ Voltage limit value (max. ±11.5 VDC)	<b>mA output:</b> 5 mA ≤ range ≤ ±20 mA Output current 0% (specify): ___ Output current 100% (specify): ___ Current limit value (max. ±23.5 mA)

<b>Response time:</b> 125 ms * ≤ response time ≤ 250 s *(min. response time depending on input type)
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<b>Relay 1 &amp; 2 options:</b> % of output span Units of analogue input Units of analogue output Relay delay
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<b>Relay action:</b>		
Increase Decrease	Sensor error	Off

<b>Relay sensor error action:</b>
High Low Hold None

<b>Relay contact function:</b>
Contact N.O. Contact N.C.

Order: 5111

Type	Version	Output option
5111	Standard : A	Analogue output only : 1
	ATEX Ex : B	Analogue output + 2 relays : 2

**Note!** For TC inputs with internal CJC, remember to order the CJC connectors type 5912 or 5912EEx.

Order: 5111Hz50

Special version of the 5111. Input signal -2.4...+2.4 VDC.

**Block diagram:**

