

2-WIRE PROGRAMMABLE TRANSMITTER

PRetrans type 5131



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2-Wire Programmable Transmitter

No. 5131V104-IN (0923)
From ser. no. 040112001



SIGNALS THE BEST



UK / Europe Office
Tel: +44 (0)845 9000 601
Fax: +44 (0)845 9000 602
info@omniinstruments.co.uk
www.omniinstruments.co.uk

Australia / Asia Pacific Office
Tel +61 (0)282 442 363
Fax +61 (0)294 751 278
info@omniinstruments.com.au
www.omniinstruments.com.au

USA / Canada Office
Tel +1-866-849-3441
Fax +1-866-628-8055
info@omniinstruments.net
www.omniinstruments.net



GENERAL

WARNING!

This module is designed for connection to hazardous electric voltages.

Ignoring this warning can result in severe personal injury or mechanical damage.

To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed and the guidelines followed. The specifications must not be exceeded, and the module must only be applied as described in the following.

Prior to the commissioning of the module, this manual must be examined carefully.

Only qualified personnel (technicians) should install this module. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



**HAZARD-
OUS
VOLTAGE**

WARNING!

Until the module is fixed, do not connect hazardous voltages to the module.

The following operations should only be carried out on a disconnected module and under ESD safe conditions:

Dismantlement of the module for setting of dipswitches and jumpers.

General mounting, connection and disconnection of wires.

Troubleshooting the module.



Repair of the module and replacement of circuit breakers must be done by PR electronics A/S only.



**INSTAL-
LATION**

WARNING!

SYSTEM 5000 must be mounted on DIN rail according to DIN 46277.

The communication connector of SYSTEM 5000 is connected to the input terminals on which dangerous voltages can occur, and it must only be connected to the programming unit Loop Link by way of the enclosed cable.

SYMBOL IDENTIFICATION



Triangle with an exclamation mark: Warning / demand. Potentially lethal situations.



The CE mark proves the compliance of the module with the essential requirements of the directives.



The double insulation symbol shows that the module is protected by double or reinforced insulation.



Ex modules have been approved for use in connection with installations in explosive areas.

SAFETY INSTRUCTIONS

DEFINITIONS:

Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.

Technicians are qualified persons educated or trained to mount, operate, and also troubleshoot technically correct and in accordance with safety regulations.

Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

RECEIPT AND UNPACKING:

Unpack the module without damaging it and make sure that the manual always follows the module and is always available. The packing should always follow the module until this has been permanently mounted.

Check at the receipt of the module whether the type corresponds to the one ordered.

ENVIRONMENT:

Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.

All modules fall under Installation Category II, Pollution Degree 1, and Insulation Class II.

MOUNTING:

Only technicians who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these should connect the module.

Should there be any doubt as to the correct handling of the module, please contact your local distributor or, alternatively,

**PR electronics A/S, Lerbakken 10, DK-8410 Rønde, Denmark,
tel: +45 86 37 26 77.**

Mounting and connection of the module should comply with national legislation for mounting of electric materials, i.a. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in the block diagram and side label.

The following apply to fixed hazardous voltages-connected modules:

The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the module. The power switch should be marked with a label telling it will switch off the voltage to the module.

Production year can be taken from the first 2 digits of the serial number.

CALIBRATION AND ADJUSTMENT:

During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

NORMAL OPERATION:

Operators are only allowed to adjust and operate modules that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the module is easily accessible.

CLEANING:

When disconnected, the module may be cleaned with a cloth moistened with distilled water.

LIABILITY:

To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

EC DECLARATION OF CONFORMITY

As manufacturer

PR electronics A/S
Lerbakken 10
DK-8410 Rønde

hereby declares that the following product:

Type: 5131
Name: 2-wire programmable transmitter

is in conformity with the following directives and standards:

The EMC Directive 2004/108/EC and later amendments
EN 61326-1 : 2006

For specification of the acceptable EMC performance level, refer to the electrical specifications for the module.

The Low Voltage Directive 73/23/EEC and later amendments
EN 61010-1 : 2001

The ATEX directive 94/9/EC and later amendments
EN 50014 : 1997 E incl. A1+A2, EN 50020 : 2002 E
and EN 50281-1-1 : 1998 incl. A1
ATEX certificate: DEMKO 99ATEX124572 (5131B)

No changes are required to enable compliance with the replacement standards:
EN 60079-0 : 2006 and EN 60079-11 : 2007

Notified body:

UL International Demko A/S (0539)
Lyskaer 8
P.O. Box 514
2730 Herlev
Denmark



Kim Rasmussen
 Manufacturer's signature

Rønde, 12 June 2009

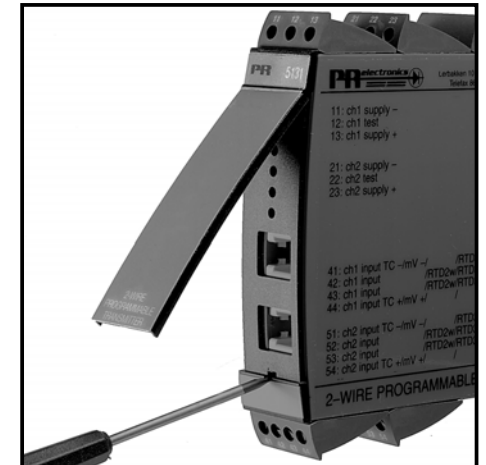
HOW TO DISMANTLE SYSTEM 5000

First, remember to demount the connectors with hazardous voltages. By lifting the bottom lock, the module is detached from the DIN rail as shown in picture 1. Then, by lifting the upper lock and pulling the front plate simultaneously the PCB is removed as shown in picture 2.

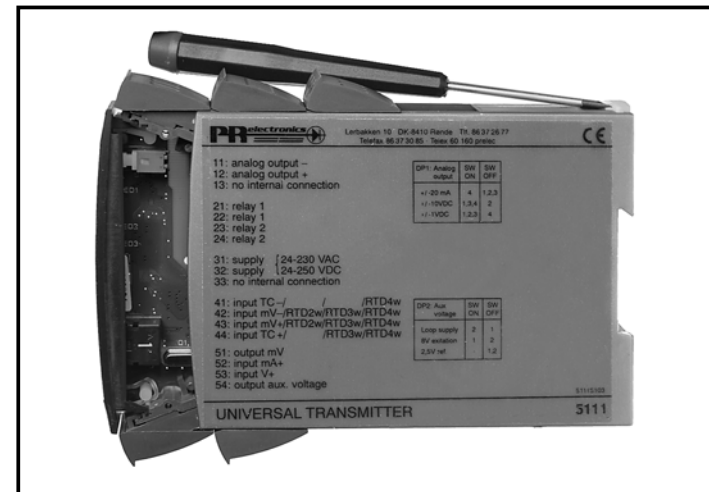
Switches and jumpers can now be adjusted. By opening the front, the programming connector is accessible as shown in picture 3.



Picture 1: Separation from DIN rail.



Picture 3: Access to programming connector.



Picture 2: Removal of PCB.

2-WIRE PROGRAMMABLE TRANSMITTER 5131

- Input for RTD, TC, mV, linear resistance, mA, and V
- 3.75 kVAC galvanic isolation
- 4...20 mA loop output
- 1- and 2-channel versions
- ATEX Ex version
- DIN rail mounting

Application:

Electronic temperature measurement with resistance sensor or thermocouple sensor. • Ex barrier for temperature sensors, potentiometers and current / voltage signals. • Conversion of current signals from supplied transmitters to 2-wire 4...20 mA signals. • 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 a jumper 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 - jumper 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 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 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 - jumper 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.

Output:

Standard loop 4...20 mA current output. 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 1375 Ω .

Sensor error detection:

The output can be set up at a RTD, thermocouple and linear resistance input to go to max., to min., entered value, NAMUR NE43 Upscale or Downscale at sensor error detection.

Configuration:

The transmitter is configured to the present task by way of a 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 5131 can be delivered configured according to customer specifications: input type, measurement range, sensor error detection, and output signal.

ELECTRICAL SPECIFICATIONS:

Specifications range:

-20°C to +60°C

Common specifications:

Supply voltage 7.5...35 VDC
 Fuse..... 50 mA SB / 250 VAC
 Consumption during programming 3...8 mA
 Isolation voltage, test / operation 3.75 kVAC / 250 VAC
 Communications interface Loop Link
 Signal / noise ratio Min. 60 dB (0...100 kHz)
 Signal dynamics, input..... 22 bit
 Signal dynamics, output 16 bit
 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
 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
Improved EMC immunity: NAMUR NE 21, A criterion burst	< ±1% of span

Effect of supply voltage change < 0.005% of span / VDC
 Wire square (max.) 1 x 2.5 mm² stranded wire
 Screw terminal torque 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 195 g

Electrical specifications, temperature input:

TC input:

Type	Min. temperature	Max. temperature	Min. span	Standard
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
LR	-200°C	+800°C	50°C	GOST 3044-84

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	Standard
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 = ∞, VDROPO < 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:

Signal range (span) 4...20 mA
 Min. signal range (span) 10 mA
 Max. offset 50% of selec. max. value
 Load resistance ≤ (Vsupply-7.5) / 0.023 A [Ω]
 Load stability ≤ 0.01% of span / 100 Ω
 Current limit ≤ 28 mA

Sensor error detection:

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

EEx / I.S. approval (5131B):

DEMKO 99ATEX124572  II (1) GD
 [EEx ia] IIC
 Applicable for Zone 0, 1, 2, 20, 21 or 22

Ex / I.S. data:

U_m : 250 V
 U_o : 8.0 VDC
 I_o : 10 mA DC
 P_o : 20 mW
 L_o : 200 mH
 C_o : 1.0 µF

GOST R approval:

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

Observed authority requirements:

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

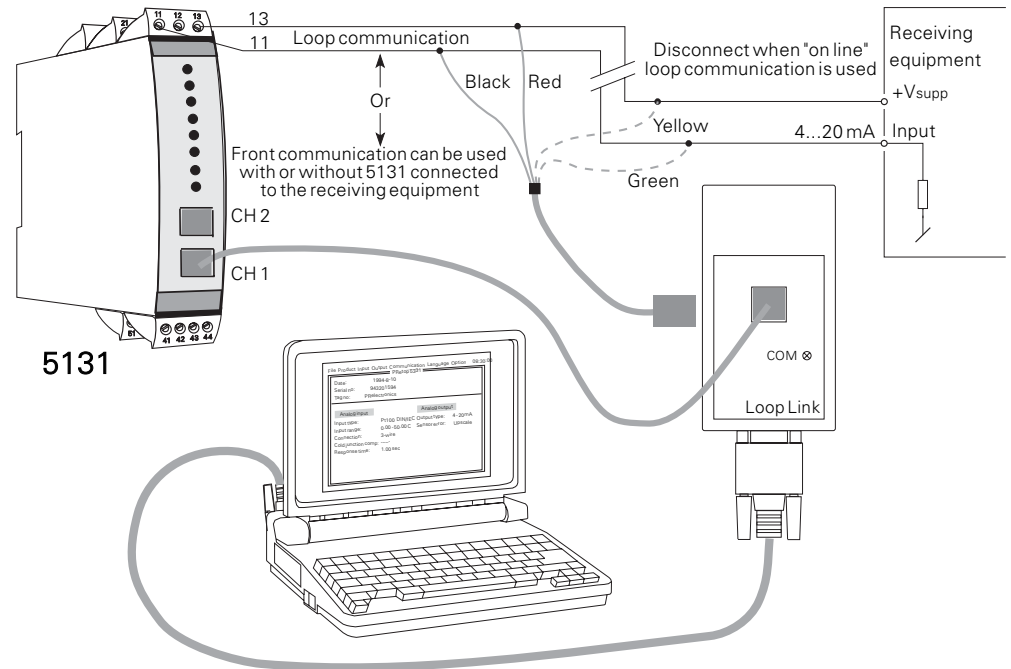
Of span = Of the presently selected range

ORDER:

Type	Version	Input	Channels
5131	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 CJC connectors type 5910 / 5910EEEx (ch. 1) and 5913 / 5913EEEx (ch. 2).

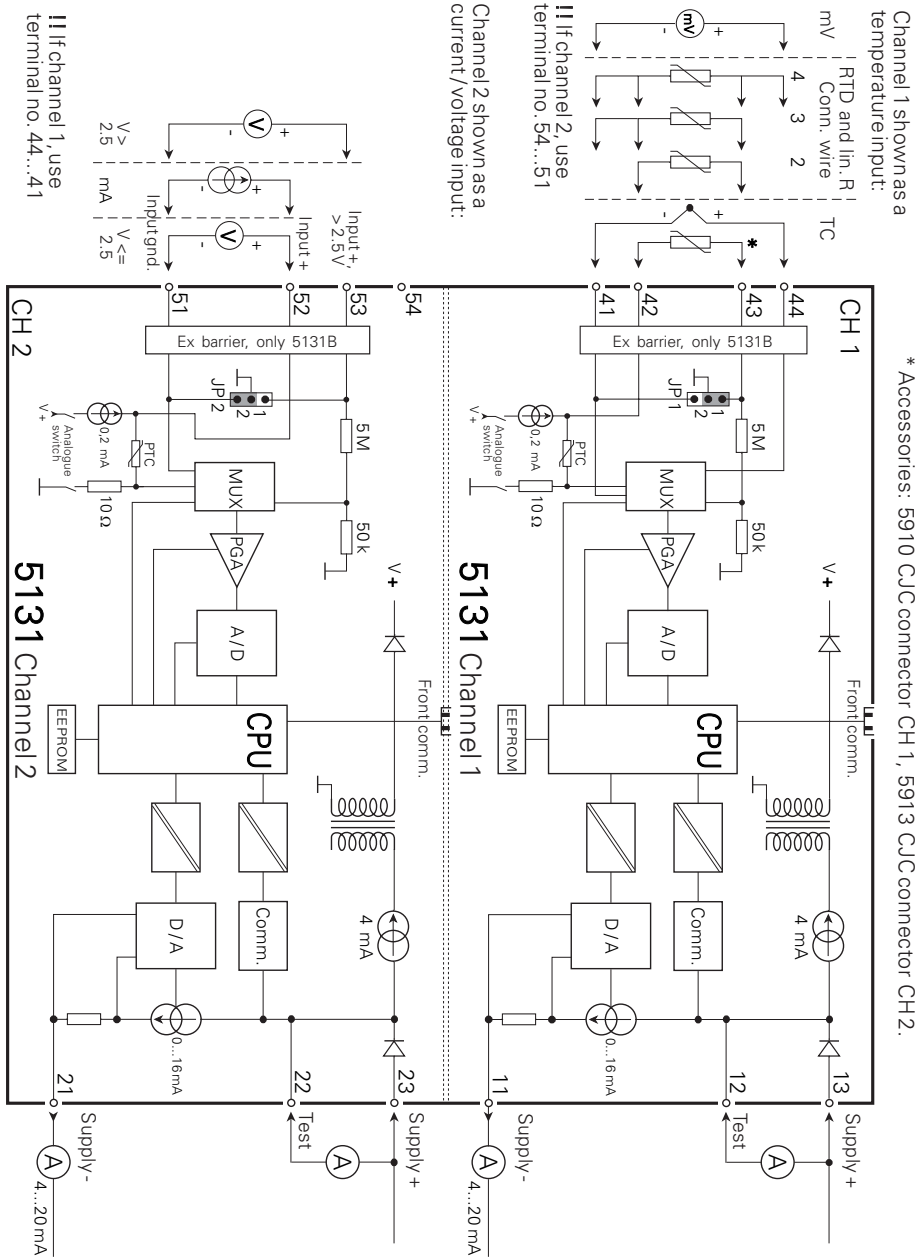
5131 CONNECTION TO LOOP LINK:



SELECTION OF INPUT TYPE: (5131A)

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

BLOCK DIAGRAM:



Displays Programmable displays with a wide selection of inputs and outputs for display of temperature, volume and weight, etc. Feature linearisation, scaling, and difference measurement functions for programming via PReset software.



Ex interfaces Interfaces for analogue and digital signals as well as HART® signals between sensors / I/P converters / frequency signals and control systems in Ex zone 0, 1 & 2 and for some modules in zone 20, 21 & 22.



Isolation Galvanic isolators for analogue and digital signals as well as HART® signals. A wide product range with both loop-powered and universal isolators featuring linearisation, inversion, and scaling of output signals.



Temperature A wide selection of transmitters for DIN form B mounting and DIN rail modules with analogue and digital bus communication ranging from application-specific to universal transmitters.



Universal PC or front programmable modules with universal options for input, output and supply. This range offers a number of advanced features such as process calibration, linearisation and auto-diagnostics.

