



Two-wire smart to DIN rail converter isolated, programmable, with HART 7 protocol and NFC technology

PRUDUCT MANUAL



APPLICATION

- To convert a resistance or thermoelectric sensor signal to a unified output signal 4 to 20 mA or 20 to 4 mA
- For installation on 35 mm DIN rail according to EN 60715 / DIN 50022
- For explosive conditions in areas Zone 2, Zone 1 and Zone 0 pursuant to EN 60079-10 in case of using the converter R530X

DESCRIPTION

On the front side there are terminals for connection sensor or two sensors, power supply / evaluation and a connector for PC connection (configuration units). The converter is powered from an external source and is equipped with polarity protection and EMC circuits. The converter is resistant to sensor interruption and short circuit. The converter is equipped with galvanic isolation, sensor error correction and the whole system, adjustable output function at sensor interruption and short-circuits. The converter is set up using a PC connection via USB, using the ConSoft software, via HART communicator or on a portable device with NFC and Bluetooth. All HW and SW required to set up the converter is included in the supplied ICON configuration set (separately supplied), no power required for programming.

TECHNICKÉ ÚDAJE

Intrinsically safe version pursuant to EN 60079-0 and EN 60079-11 (version R530X):

Ex II 1G Ex ia IIC T6...T4 Ga

Intrinsically safe circuit parameters:

Output (terminals 21 and 22): Input (terminals 1 to 4):

- | | |
|--------------------|---------------------|
| $U_i \leq 30$ V DC | $U_o \leq 6,6$ V DC |
| $I_i \leq 100$ mA | $I_o \leq 11,7$ mA |
| $P_i \leq 900$ mW | $P_o \leq 19,1$ mW |
| $L_i: 20$ μ H | $L_o: 400$ mH |
| $C_i: 23,1$ nF | $C_o: 24$ μ F |

Zero point: anywhere in the limited range

Galvanic isolation: 1500 V AC/ 1 min

Ingress protection EN 60529: IP 20 / IP 20

Weight: approx 0,07 kg

Terminals type: screw, wire cross section 1,5 mm²

Communication interface: mini USB connector, NFC and Bluetooth

Sensor current Pt100: ≤ 300 μ A

Input impedance T/C: >10 M Ω

Maximum wire resistance:

- Measuring resistance
 - o 2- wire Loop resistance compensation 0 to 100 Ω
 - o 3 and 4-wire 50 Ω / wire
- Thermocouple
 - o 10 k Ω (loop including thermocouple)

OPERATION CONDITIONS

Ambient temperature:

- | | |
|-------|------------------------------|
| R530 | -40 to +85 $^{\circ}$ C |
| R530X | -40 to +60 $^{\circ}$ C (T6) |
| | -40 to +75 $^{\circ}$ C (T5) |
| | -40 to +85 $^{\circ}$ C (T4) |

Relative ambient humidity:

5 to 98 % without condensation

Vibrations pursuant to EN 60068-2-6: up to 10G

Converter power supply:

- | | |
|-------|---|
| R530 | from source SELV, (i.e.. INAP 16 or INAP 901) |
| R530X | from intrinsically safe source Ex ia |

Type of power supply:

- | | |
|-------|------------------|
| R530 | DC 8,5 V to 36 V |
| R530X | DC 8,5 V to 30 V |

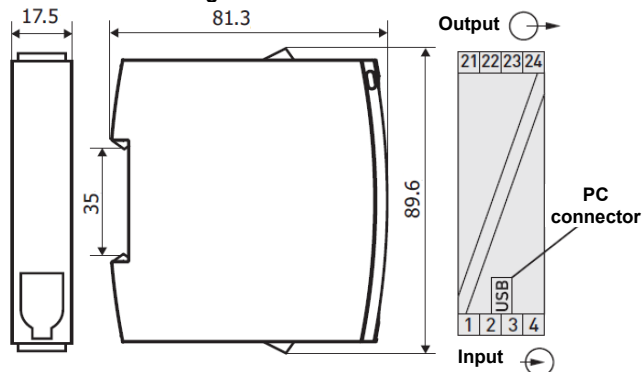
Electromagnetic compatibility EMC:

Emissions and resistance comply with the standard EN 61326-1 criterion A and EN 61326-3-1

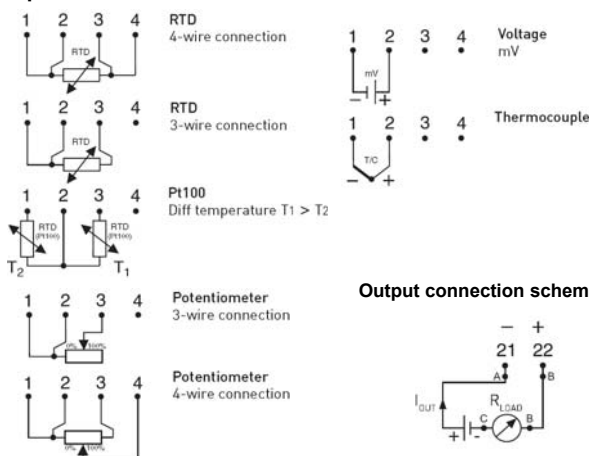
Stabilization time: 15 minutes



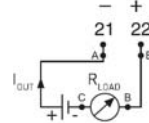
Dimensional drawing and location of terminals



Input connection scheme



Output connection scheme:



Load resistance of current output signal:

$$R_{zc \max} = \frac{U_n - 8,5}{0,022} [\Omega, V] \quad R_{zc} = R_z + R_v [\Omega]$$

where $R_{zc \max}$... the maximum total load resistance R_{zc}
 U_n ... the supply voltage of the power supply
 R_v ... the wire resistance in the power loop
 R_z ... the load resistance

Load characteristics

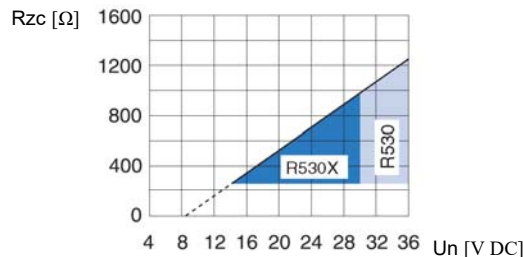


Table 1 - Accuracy:

Setting probe	Measuring range [°C]	Min. span [°C]	Accuracy		Temperature influence [Dev. from ref temp. 20°C]	
			[°C]	[%] of span		
RTD	Pt 100	-200...+850	10	±0,08	±0,08	±0,01% of span per °C
	Pt X *)	only to 4 kΩ				±0,01% of span per °C
	Ni 100	-60...+250		±0,1	±0,1	±0,01% of span per °C
	Ni 120	-60...+250				±0,01% of span per °C
	Ni 1000	-50...+180				±0,01% of span per °C
	Cu 10	-50...+200	83	±1,5	±0,2	±0,02% of span per °C
T/C **)	B	+400...+1800	700	±1	±0,1	±0,01% of span per °C
	C	0...+2315	200			
	D	0...+2315	200			
	E	-270...+1000	50	±0,5	±0,1	
	J	-210...+1000	50			
	K	-270...+1300	50			
	N	-100...+1300	100			
	N	-270...-100	100	±1	-	±0,1% of span per °C
	R	-50...-1750	300	±1	±0,1	±0,01% of span per °C
	S	-50...+1750	300			
	T	-270...+400	50	±0,5	±0,1	

*) 10 ≤ X ≤ 1000

**) Cold Junction Compensation error is not included. ≤ 0,5°C within ambient temperature range.

METROLOGICAL DATA

INPUT SIGNAL:

- v 2, 3 or 4-wire connection, α = 0,00385 [K-1]
Pt100 (α=0.00385 [K-1], EN 60751)
PtX 10 ≤ X ≤ 1000 (α=0.00385 [K-1]) The upper range depends on the X value, max. input temperature corresponding to 4000 Ω
Ni100 (DIN 43760)
Ni120 (Edison Curve No. 7)
Ni1000 (DIN 43760)
Cu10 (Edison Copper Windings No. 15)
- resistance 0...10000Ω
- potentiometer 100...10000Ω
- thermocouple
B, E, J, K, N, R, S, T (IEC 60584)
C,D (ASTM E 988)
- voltage -10...1000mV

OUTPUT SIGNAL:

4 to 20 mA, 20 to 4mA, temperature, resistance or voltage linear, customized linearization possible

Sensors break and short-circuit sensor (adjustable):

≤ 3,6 mA or >21 mA

Supply voltage influence:

<±0.005 % of span per 1 V

Long-term drift:

±0,05°C or ±0,05% of span per 5 year

Adjustable filtering level:

0,17...90 s (default 1,4s) (3-wire RTD)

CERTIFICATION:

Version R530X

- Non-explosiveness II 1G Ex ia IIC T6-T4 Ga, EU-Type Examination Certificate pursuant to the 2014/34/EU, KIWA 17 ATEX 0053 X

Configuration kit ICON-X

- Non-explosiveness II (1)G [Ex ia Ga] IIC EU-Type Examination Certificate pursuant to the 2014/34/EU, KIWA 16 ATEX 0011 X

CONVERTERS ORDERIN NUMBERS

C530	70C5300010
C530X	70C530X010
HART PC modem (UBS)	70MEM00003
PC configuration kit (UBS) ICON-X	70CFGUSX01
Configuration kit ICON-BT	70CFGBT001
Configuration	70CAL00001

PACKING

Converters are delivered in a packing ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations.

STORAGE

The converters may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 pursuant to EN 60721-3-1 (i.e. in places with temperature between - 40 to 60 °C and humidity between 0 to 98%, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand).

CONVERTER INSTALLATION IN CONDITIONS WITH EXPLOSIVE GAS ATMOSPHERE

Only R530X converters can be installed in an explosive gas atmosphere. An intrinsically safe power supply approved for powering intrinsically safe equipment must always be used.

R530X

If an ICON-X certified interface is used, the converter can be connected to a sensor that is located in a **explosive atmosphere**.

R530

The converter must not be installed in explosive atmosphere or connector to sensor in explosive atmosphere or using an ICON-X certified interface.

CONVERTER SETTING

The converter is set up using a PC connection via USB, using the ConSoft software (separately supplied, no power required for programming), via HART communicator, NFC or Bluetooth interface in portable device such as a smartphone.

PC programmable:

- Measuring range are set from PC
- Full accuracy is provided without any need for calibration
- Configuration without external power

High security

The configuration is protected by a password and the date the changes were written.

Runtime counter

The runtime counter function can be used to monitor the elapsed operating time.

Configuration software ConSoft

ConSoft configuration software is a tool for configuring the converter, such as measuring range, sensor fault operation, error correction, TAG, etc.

ConSoft is part of the complete ICON configuration kit, which also includes a USB interface and the necessary cables.

Before configuring the converter R330 or R330X using a PC, follow these steps:

1. Install the ConSoft configuration software and INOR USB communication drivers on your computer.
2. Connect the USB interface to an available USB port on your computer and wait for the USB to install automatically. For detailed installation instructions, see the ConSoft installation guide.

Configuration procedure:

1. Connect the converter to a computer via USB, the "DEV" LED on the USB interface will turn green. Configuration can be done with or without power supply.
2. In ConSoft, click the "Read" button. The software recognizes the connected converter and opens the configuration window.
3. In the "C530 / R530" configuration window, edit the parameters that need to be changed.
4. The selected configuration is downloaded to the converter by clicking on the "Write" button. When the data transfer is complete, the converter starts using the new parameters directly.

Without using a USB configuration modem, the converter requires power to be programmed, for communication, $R_{zc} = \min. 250 \Omega$ and $U_n = \min. 15,5 \text{ V DC}$ (according to load characteristics).

Maximum cable length calculation:

$$L_{\max} = \frac{65 \times 10^6}{R_{zc} \times C} [\Omega, \mu\text{F}/\text{m}, \text{m}] \quad R_{zc} = R_z + R_v [\Omega]$$

- L – cable length
- R_{zc} – total load resistance
- R_v - wire resistance in the power loop
- R_z - load resistance
- C – cable capacity

Table 1 - Maximum cable length for typical cable values 1 mm²

Cable insulation	PVC	PE	XLPE
Maximum cable length [m]	600	1100	2000

OPTIONAL ACCESSORIES

Ex CONFIGURATION KIT ICON-X



The kit includes a USB storage medium with ConSoft configuration software and drivers, an ICON-X USB interface and the necessary cables (USB cable for connecting PC to USB and cable for connecting USB to converter). The set is placed in a plastic case.

All software, USB drivers and installation guides can also be downloaded from the website www.inor.com.

USB ICON-X is a portable device to be connected between the converter and the computer used to configure the converter. It is enclosed in a non-metallic housing with three built-in status LEDs. The device has a computer connector and a converter connector.

When connecting the ICON-X configuration interface to the converter, the converter and interface must not be placed in an explosive atmosphere.

Non-explosiveness version pursuant to EN 60079-0 and EN 60079-11:

Ex II (1)G [Ex ia Ga] IIC

Intrinsically safe circuit parameters:

Mini USB connector to converter

U_o : 9,4 V DC

I_o : 96 mA

P_o : 0,68 W

Connector USB to PC

U_m : 250 V AC/DC

PC to USB Interface

USB cable type A to type B

USB Interface to converter

Changeable adapter cables

Power supply

PC's USB port,

5 V DC, max. 74 mA

Operation temperature

0 to 50 °C

Storage temperature

-20 to 70 °C

Humidity (non-condensing)

0 to 90% RH

Galvanic isolation

1500 V AC

System requirements

32- or 64bit edition of Windows, Windows XP (SP2 +) /Vista /Windows 7/ 8/ 8.1/ 10

Free hard disk space

185 MB

PC Port

1x USB 1.1 or higher port type A

Electromagnetic compatibility EMC:

pursuant to EN 61326-1 and EN 61326-2-3

There are three LED indicators on the USB Interface: "USB", "PC" and "DEV". They are indicator to make the understanding of the communication between PC and converter easier. Their functions are described below:

- LED "USB" indicates data transfer. It lights during data transfer, otherwise it is off.
- "PC" LED indicates a connection between the Configuration program and PC. Green only when reading or writing to the converter.
- "DEV" LED indicates the connection status of the converter. If it is green, the connected converter is detected by the USB Interface. Flashing green indicates that the USB Interface is waiting for a new converter from the same product group, e.g. change to a new device. If it is red, no converter is detected by the USB Interface and any sort converter can be connected to the USB Interface.

ICON-BT KIT

ICON –BT is an Interface for wireless communication between portable devices (e.g. smartphone) and INOR temperature converter.

The smartphone app – INOR Connect, makes it possible to read, write, save and share settings directly in the field

The configuration procedure use the NFC function in combination with a smartphone with built-in NFC support to perform all settings of the converter. The converter does not need any power or other external connection, just to be close to the smartphone. The app makes it possible to read, write, save and share settings directly in the field.

The logging function give the possibility to log events directly in the field without any other equipment beside the smartphone. The logged data can be stored or shared by the mobile network. It make it also very simple to read an display the actual measuring value in the converter.

The app does also give direct access to the converter documentation and calibration data through an internet connection.

ICON –BT kit includes USB cable for connecting the interface to the converter, two AAA batteries and user instruction

Ambient temperature: -20 to +50°C

Establish communication via ICON_BT interface:

Before configuring the converter open the sliding list at the back of the ICON-BT, insert batteries into the interface. Make sure that the + and – ends are in the correct position.

1. Download the app INOR Connect from App Store or Google Play Store an install it on your device.
2. Set Bluetooth communication to ON in your portable device (e.g. smartphone)
3. Connect the ICON-BT to converter using the supplied cable



More information at www.inor.com

4. Start INOR Connect on your device.
5. You can now manage the converter via the app and choose from four options at the main screen.



6. When selecting *Read Configuration* or *Monitoring*, the app will scan for available devices and show them in a list.
Click on the device you want to connect to. The name of your ICON-BT is the same as the serial number, which can be found on the product label.

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