



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

PRUDUCT MANUAL



IPAQ C530/ C530X

APPLICATION

- To convert a resistance or thermoelectric sensor signal to a unified output signal 4 to 20 mA or 20 to 4 mA with digital signal (HART 7 protocol)
- For installation in the B-type temperature sensors head to DIN 43729 or bigger or in the box (INPAL 400)
- For explosive conditions in areas Zone 2, Zone 1 and Zone 0 pursuant to EN 60079-10 in case of using the converter C530X

DESCRIPTION

On the top of converter 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.

TECHNICAL DATA

Intrinsically safe version pursuant to EN 60079-0 and EN 60079-11 (version C530X):

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

Intrinsically safe circuit parameters:

Output (terminals 6 and 7):	Input (terminals 1 to 5):
$U_i: \leq 30 \text{ V DC}$	$U_o: \leq 6,5 \text{ V DC}$
$I_i: \leq 100 \text{ mA}$	$I_o: \leq 11,7 \text{ mA}$
$P_i: \leq 900 \text{ mW}$	$P_o: \leq 19,1 \text{ mW}$
$L_i: 20 \mu\text{H}$	$L_o: 400 \text{ mH}$
$C_i: 23,1 \text{ nF}$	$C_o: 24 \mu\text{F}$

- Zero point:** anywhere in the limited range
- Galvanic isolation:** 1500 V AC/ 1 min
- Ingress protection EN 60529:** IP 65 / IP 00
- Weight:** approx. 0,035 kg
- Terminals type:** screw, wire cross section 1,5 mm²
- Communication interface:** mini USB connector, NFC and Bluetooth
- Sensor current Pt100:** $\leq 300 \mu\text{A}$
- Input impedance T/C:** $>10 \text{ M}\Omega$
- Maximum wire resistance:**
 - Measuring resistance
 - o 2-wire Loop resistance compensation 0 to 100Ω
 - o 3 and 4-wire 50 Ω / wire
 - Thermocouple
 - o 5 kΩ (loop including thermocouple)

OPERATION CONDITIONS

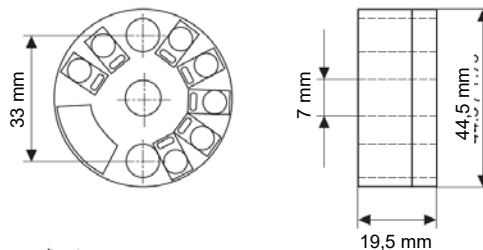
- Ambient temperature:**
 - C530 -40 to +85 °C
 - C530X -40 to +60 °C (T6)
 - 40 to +75 °C (T5)
 - 40 to +85 °C (T4)
- Relative ambient humidity:** 5 to 98 % without condensation
- Vibrations** pursuant to EN 60068-2-6: up to 10G

- Converter power supply:**
 - C530 from source SELV, (i.e.. INAP 16 or INAP 901)
 - C530X from intrinsically safe source Ex ia
- Type of power supply:**
 - C530 DC 8,5 V to 36 V
 - C530X DC 8,5 V to 30 V

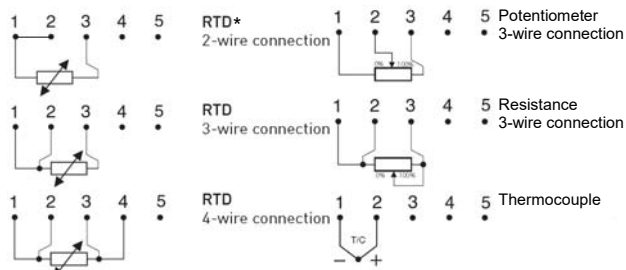
- Electromagnetic compatibility EMC:** Emissions and resistance comply with the standard EN 61326-1 criterion A and EN 61326-3-1
- Stabilization time:** 15 minutes



Dimensional drawing



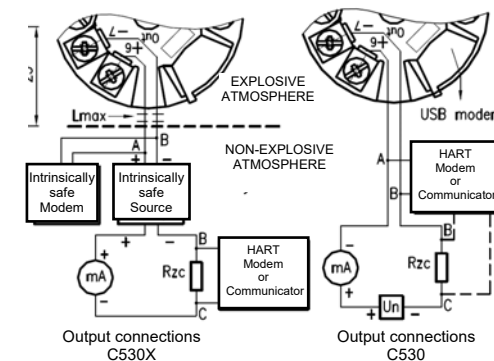
Input connection scheme



Output connection scheme:



* For 2-wire connection, terminals 1 and 2 must be connected



A-B and B-C are possible connection for HART modem or Communicator, max cable length Lmax see Table 2

Load resistance of current output signal:

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

- where $R_{zc \text{ max}}$... the maximum total load resistance
- 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

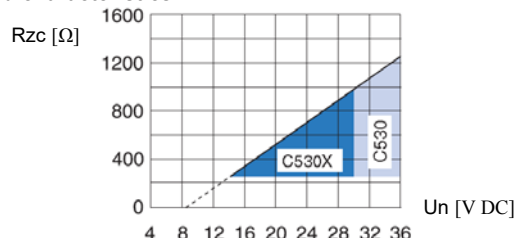


Table 1 - Accuracy:

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 C530X

- 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
ICON-BT Bluetooth kit	70CFGBT001
Rail mounting kit	70ADA00015
Head mounting kit	70ADA00017
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 C530X converters can be installed in an explosive gas atmosphere. An intrinsically safe power supply approved for powering intrinsically safe equipment must always be used.

C530X

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

C530

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 R530 or R530X 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, $R_{zc} = \text{min. } 250 \text{ } \square$ and $U_n = \text{min. } 15,5 \text{ V DC}$ (according to load characteristics).

Maximum cable length calculation:

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

- 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

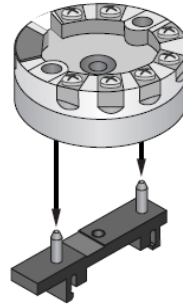


4. Start INOR Connect on your device.
5. You can now manage the converter via the app and choose from four options at the main screen.



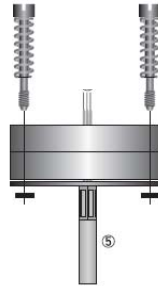
6. When selecting *Read Configuration* or *Monitoring*, the app will scan for available devices and show them in a list. Click on the device you want to connect to. The name of your ICON-BT is the same as the serial number, which can be found on the product label.

DIN RAIL ADAPTER



The adapter enables mounting of the converter on a rail according to EN 60715 (DIN rail TS 35)

CONNECTION HEAD INSTALLATION KIT



The connection head installation kit does not belong to the standard scope of delivery of the converter, you have to order it separately. Set includes 2x M4 screws, springs and lock washer.

More information at www.inor.com

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