



SIGNAL CONDITIONERS

Temperature Transmitters, Alarm Units, Indicators,
Signal Isolators, Configuration kits



INOR

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Specialists in industrial temperature measurement

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Optimal products and solutions for all industries

INOR is always a fair and reliable partner to its customers, business partners and employees. We provide our customers with optimal products and solutions which always meet or exceed their expectations in terms of quality, performance capability, service and design. Our customers are registered in diverse branches of industry such as chemicals, petrochemicals, water, wastewater, food & beverages, pharmaceuticals, oil and gas, power plants, steel, pulp and paper etc.

Acknowledged high quality

INOR is ISO 9001 certified and has a long history of quality assurance work. We actively put the customer first and make a dedicated effort to give the customer extra value when purchasing our products. INOR's products are acknowledged to be of the highest quality, which is why we offer a 5-year warranty. Our standards and optimal manufacturing process help to create products with excellent stability, accuracy and EMC properties.

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INOR environmental objectives are to prevent and reduce harmful effects on the environment, people and property caused by our processes, and to use natural resources in a sustainable manner. INOR continuously strive to improve its environmental performance, for instance by reducing our waste discharges, using green electricity while at the same time reducing the total use of electricity, reduce the use of hazardous substances in our production and replace paper documents with electronic documents. INOR has a high environmental focus on both our and our customers processes and has been ISO 14001 certified since 2002.

Highlights

- Complete product portfolio in signal conditioning
- More than 85 years of experience
- Always the highest product quality
- Global network to provide products, solutions and services
- 5 year warranty



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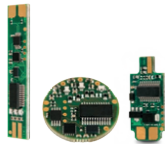
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TEMPERATURE TRANSMITTERS

This section will describe the following basic facts about temperature transmitters:

1. What is a temperature transmitter?
2. Why using temperature transmitters?
3. Why using isolated transmitters?
4. Where to mount the transmitters?
5. 2-, 3- and 4-wire transmitter

1. What is a temperature transmitter?

A temperature transmitter is generally recognized as a device, which on the input side is connected to some sort of temperature sensor and on the output side generates a signal that is amplified and modified in different ways. Normally the output signal is directly proportional to the measured temperature within a defined measurement range. Many additional features can be added depending on the type of transmitter being used.

The features of the temperature transmitters are often described by using different terms with respect to technology, mounting method, functions etc.

The following is a short summary of the terms used.

Technology

Digital transmitters

This transmitter type is mainly based on a microprocessor. They are often called intelligent transmitters, because they normally offer many extra features, which are not possible to realize in analog transmitters.

Read more about these features in the transmitters product descriptions.

Mounting method

In-head transmitters

In-head transmitters are designed for mounting in the connection heads of temperature sensors. All Inor's in-head transmitters fit into DIN B heads or larger. Special care has to be devoted to the ruggedness because of the harsh conditions that sometimes exist. It is important that associated screws are used when mounting.

DIN rail transmitters

Din rail transmitters are designed to be snapped onto a DIN rail. The Inor transmitters fit on a 35 mm DIN-rail according to EN/IEC 60715.

Input type

RTD transmitters

RTD transmitters are used only for RTD sensors (Pt100, Pt1000, Ni100 etc.). Normally they can handle only one RTD type. Most of Inor's transmitters can handle more than one type of RTD, and are either fix-ranged or adjustable. They all have a temperature linear output.

Thermocouple (T/C) transmitters

A T/C transmitter measures a mV-signal from the T/C and compensates for the temperature of the cold junction. The cold junction compensation (CJC) is normally made by measuring the terminal temperature. Alternatively some transmitters can be adjusted to compensate for an external fixed cold junction temperature.

Universal transmitters

Universal transmitters are normally of the intelligent (microprocessor based) type. They are programmable for different input types and ranges and have an accurate temperature linearization. Inor has a wide range of universal transmitters with input types such as RTDs, T/Cs, resistance, voltage and current. For details, see the product descriptions.

Output type

Analog output

The output signal is a current 4-20 mA, some transmitters are also available with 0-20 mA or 0-10 V output. The signal is normally proportional to the measured value within a defined measurement range (temperature linear).

Digital output

The measured value (temperature) is presented as a binary coded message. So called Fieldbus transmitters use this technique. The Fieldbus transmitters on the market today use different standards for the communication thus creating

some problems when integrating them with other instrumentation.

Examples of standards available are: Profibus, Interbus, Foundation Fieldbus, LonWorks and CAN-bus.

Analog and digital output

The HART transmitters (see description under the IPAQ 520 / IPAQ 530 transmitters) have an analog output with a superimposed digital signal on the same wires. Typically the analog signal is used for normal measurements and the digital signal only for temporary measurements because of the low communication speed. The digital signal is mainly used for configuration and status information.

Output / power supply connection

(See also under part 2-, 3- and 4-wire transmitters)

2-wire transmitters:

Totally two leads are used in common for power supply and output signal.

3-wire transmitters:

Totally three leads are used for power supply and output signal. One lead is common.

4-wire transmitters:

Totally four leads are used, two for the power supply and two for the output signal.

Isolation

Non-isolated transmitters

These transmitters have leading connections between for instance input and output circuits. They should be used with care.

Isolated transmitters

Isolated transmitters have no leading connections between circuits that are isolated from each other. The isolation effectively eliminates the risk for circulating currents and facilitates the connection of transmitters to control systems with grounded inputs.

Read more under "Why using isolated transmitters?"

2. Why using temperature transmitters?

The following part gives some important reasons for using temperature transmitters in temperature measurements.

To convert the low-level sensor output to an amplified signal.

The amplified signal is much less sensitive to electrical disturbances. This is particularly important if the sensor is located far away from the receiving instrumentation. Long cables and low signal levels increase the risk for significant disturbances in the measurement.

To convert the nonlinear sensor output to a temperature linear standard signal.

Typical standard signals are 4-20 mA, 0-10 V. Other standard signals are 0-20 mA, 0-5 V, 1-5 V, 2-10 V.

Thanks to the standard signals, which are proportional to the temperatures, it is possible to use standard instruments for indication, recording etc. and standard input modules in PLCs or DCSs. This greatly simplifies the plant engineering.

To reduce the costs for cables and other instrumentation.

If field mounted transmitters are used, the cable costs can be reduced. Only two leads are required, if a 2-wire transmitter is used, compared to three or four for RTDs.

Standard signal cables can be used instead of more expensive compensation or extension cables for T/Cs.

Normally all the connected instrumentation is less expensive if using standard input signals like for instance 4-20 mA.

To improve the safety of the temperature measurement.

The safety can be improved by letting the transmitter supervise the sensor leads. The Sensor Break Protection will indicate broken sensor leads and force the output to a user defined level.

To improve the accuracy of the temperature measurement.

The accuracy can be improved by letting the transmitter compensate for sensor errors (Sensor Error Correction) or errors in connected instrumentation (System Error Correction).

See section ConSoft - INOR Configuration Software

Measuring errors due to reduced isolation in the sensor or between the sensor leads can be avoided with the SmartSense function. This function is a standard feature in most of the Inor intelligent transmitters. See the description of SmartSense later in this section.

To improve the functionality of the temperature measurement.

Useful functions can be included together with the measurement, especially when using the intelligent IPAQ transmitters.

Some examples are:

Dampening function to reduce instabilities of the measuring value.

Loop calibration output. The transmitter generates an accurate output signal that is used to calibrate or check other instruments in the measurement loop.

On-screen real time presentation of measured values (in °C or °F) and output signal. The presentation can be in numerals, as bar graphs or as a line recorder.

3. Why using isolated transmitters?

Fig. 1

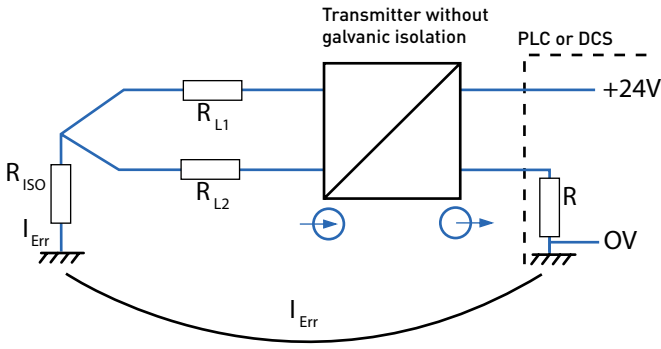
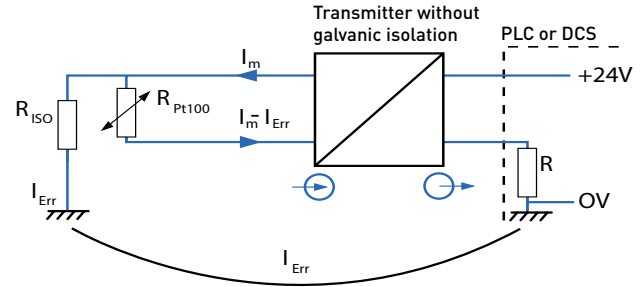


Fig. 2



Measurements with thermocouples

Figure 1 shows a typical situation, when using T/Cs connected to a PLC or DCS over a non-isolated transmitter.

The isolation to ground R_{ISO} is sometimes rather low, e.g. at high temperatures and/or small dimensions of the T/C.

An undesired "ground current" I_{Err} of variable magnitude, depending on the actual situation, will arise. The ground current will flow through the T/C and cause voltage drops over the resistances R_{L1} and R_{L2} in the T/C leads. These voltage drops will interact with the EMF generated by the T/C and can cause significant measuring errors.

It is sometimes hard to foresee and calculate these errors, but it is not unusual that they can reach 5-10 % of the measuring range.

If the transmitter is galvanically isolated between the input and output circuit, the ground loop will be cut off, and the ground current will be stopped. No errors will arise due to a low isolation between T/C and ground.

Measurements with RTDs

Figure 2 shows an RTD sensor connected to a PLC or DCS over a non-isolated transmitter.

The isolation to ground R_{ISO} is normally very high in a "healthy" RTD, typically 50 to 500 M Ω . However, under certain conditions it happens that the internal isolation of an RTD can be significantly reduced. Reasons might be wear or damage causing moisture to penetrate into the RTD.

Depending of the value of R_{ISO} a certain portion I_{Err} of the measuring current I_m will pass through the ground and not through the RTD sensor. This will cause a measuring error.

If the transmitter is galvanically isolated between the input and output circuit, the ground loop will be cut off, and the ground current will be stopped. No errors will arise due to a low isolation between RTD and ground.

Conclusion

To be sure about a good measuring result, use isolated transmitters!

4. Where to mount the transmitters?

In an industrial plant, where there are normally long distances between the measuring points and the receiving instrumentation, some important aspects regarding the location of the transmitters can be mentioned.

There are basically three different locations for the mounting of the temperature transmitters:

- In-head mounting - inside the connection head of the temperature sensors.
- Field mounting – close to the temperature sensors.
- Central mounting - in the vicinity of the control room.

In-head mounting

The transmitters are mounted directly inside the connection head and are normally replacing the terminal block. All Inor's In-head transmitters fit in a DIN B head or larger. They are designed and tested for the harsh conditions that In-head transmitters will often meet.

This way of mounting normally offers the biggest advantages. It is however necessary to be aware of the environmental influence (mainly the temperature) on the measurement accuracy.

Advantages

- Maximum safety in the signal transmission. The amplified signal, e.g. 4-20 mA, is very insensitive to electrical disturbances being induced along the transmission cable.
- Cost savings for the transmission cables. Only two leads are required if a 2-wire transmitter is used.
- Cost savings for installation. No extra connection points because of the transmitter.
- Cost and space savings. No extra housings or cubicles are needed.
- Field instruments, e.g. loop powered indicators, can easily be installed in the 4-20 mA loop.

Disadvantages

- The ambient temperatures can be outside the allowed limits for the transmitters.
- The ambient temperature influence on the measuring accuracy has to be considered. If the temperatures are expected to deviate strongly from normal room temperature, and if the highest possible accuracy is required, we recommend using Inor's high-per-

formance transmitter IPAQ 520 because of their extreme temperature stability.

- Extreme vibrations might cause malfunction of the transmitters.
- The location of the temperature sensor can give maintenance problems.

Field mounting

The transmitters are either mounted directly beside the temperature sensors or in the vicinity of the sensors. Often more than one transmitter is mounted in the same field box.

This method is more expensive than In-head mounting, but otherwise a good alternative offering most of the advantages of In-head mounting without the disadvantages mentioned above.

Advantages

- High safety in the signal transmission. The main part of the signal transmission is made with an amplified signal.
- No extreme temperatures or vibrations exist. This facilitates accurate and safe measurements.
- Cost savings for transmission cables (See above).
- A wider selection of transmitters is available. DIN rail transmitters can also be used.
- Field instruments can often be installed easily (See above).
- Maintenance can normally be carried out without problems.

Disadvantages

- Higher installation costs compared to In-head mounting.
- Costs and space requirements for transmitter boxes or cubicles.

Central mounting

In this case, the transmitters are placed in the vicinity of the control room or in another central part of the plant. They are often mounted inside cubicles, and/or closed rooms. The ambient conditions are normally very good and stable.

This method offers the most convenient conditions for maintenance and the best possible environment for the transmitters. There are on the other hand some disadvantages that should be considered.

Advantages

- Convenient conditions for installation, commissioning and maintenance.

- Minimum risk for environmental influences (e.g. temperature influence).

Disadvantages

- Reduced safety in the signal transmission. The low-level sensor signal is rather sensitive to electrical disturbances being induced along the transmission cable.
- Relatively high costs for cabling. T/C measurements require compensation or extension cables all the way to the transmitters. RTD measurements with high accuracy should be done in 4-wire connection to get rid of the lead resistance influence (See section Transmitter Connections).
- Costs and space requirements for cubicles or frames.
- Rather complicated and expensive to connect field instruments, e.g. indicators.

5. 2-, 3- and 4-wire transmitter

This part describes three transmitter groups with respect to output and power supply connections:

2-wire transmitters: Totally two leads are used in common for power supply and output signal.

3-wire transmitters: Totally three leads are used for power supply and output signal. One lead is common.

4-wire transmitters: Totally four leads are used, two for the power supply and two for the output signal.

Fig. 3 2-wire transmitter

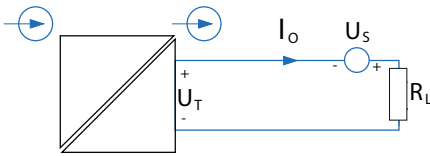


Fig. 4 3-wire transmitter

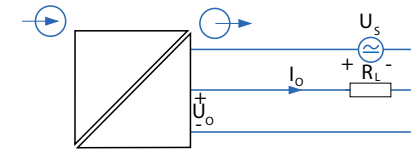
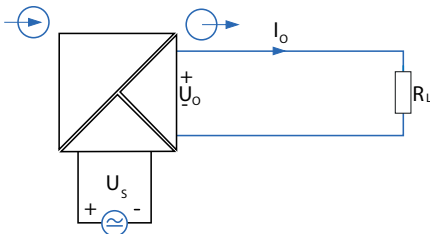


Fig. 5 4-wire transmitter



2-wire transmitters

This is the most frequently used transmitter type today, especially for field mounted transmitters and transmitters in hazardous locations.

Fig. 3 shows the principal diagram

The power supply U_s and the output signal I_o are using the same pair of leads.

The power supply is a DC voltage, which is allowed to vary according to the transmitter specifications, e.g. 8 to 36 VDC for IPAQ C330.

The output signal is standardized to 4-20 mA, but intermediate and reversed values occur too.

The maximum load $R_{L\max}$ is depending on the supply voltage and the minimum voltage over the transmitter U_T and is specified separately for all 2-wire transmitters in a Load Diagram. For calculation of the maximum load, the formula can be used:

$$R_{L\max} = \frac{U_s - U_T}{I_{\max}}$$

Advantages of 2-wire transmitters:

- Reduced cable and installation costs with only two leads.
- Reduced dimensions, heat losses and costs since a mains transformer is not needed.
- Direct connection to PLC or DCS using active inputs (using the system's internal transmitter supply).
- Allow for big variations in the supply voltage.
- Simple and cost effective Intrinsically Safe installations in hazardous locations.
- Well-established technique makes the 2-wire transmitters compatible with other instrumentation.

Disadvantages of 2-wire transmitters:

- Output signal limited to 4-20 mA (or intermediate values).
- Because of the low power supplied to the 2-wire transmitters (can be as low as 25 mW), power consuming functions (alarm relays etc.) can not be included.
- Since the power supply is galvanically connected to the output signal, special caution is necessary when using power supplies that are grounded and/or common for a number of transmitters.

3-wire transmitters

This transmitter type is rarely used for industrial applications, probably because it is a mixture of the 2- and 4-wire technique, not offering the full advantages of any of them. For the time being, Inor is not manufacturing 3-wire transmitters.

Fig. 4 shows the principal diagram.

The 3-wire transmitter has one power supply circuit and one output circuit. Because these circuits have one point in common, it is enough to use only three leads between transmitter and power supply / load.

The supply voltage U_s is typically 12-36

VDC, but other voltages such as 24 VAC can be found.

The output signal I_o or U_o can be a DC current or DC voltage, e.g. 0/4-20 mA, 0/1-5 V or 0/2-10 V.

The minimum and maximum load R_L depend on supply voltage and type of output.

Advantages of 3-wire transmitters:

- Reduced cable costs compared to 4-wire transmitters.
- Accept AC and DC supply voltage.
- Big variety of output signals.

Disadvantages of 3-wire transmitters:

- Since the power supply is galvanically connected to the output signal, special caution is necessary when using power supplies that are grounded and/or common for a number of transmitters.
- 3-wire transmitters are normally not designed for Intrinsically Safe installations.

4-wire transmitters

The 4-wire transmitters are used, when it is preferred to have the output and power supply isolated from each other, or when the transmitter functions (e.g. relays, lighted display etc.) require more power than what is available for 2-wire transmitters.

Fig. 5 shows the principal diagram.

In the 4-wire transmitters, the power supply U_s and the output signal I_o or U_o are separated and normally isolated from each other.

The supply voltage can vary from 12 VDC to 230 VAC.

The output signal I_o or U_o can be a DC current or DC voltage, e.g. 0/4-20 mA, 0/1-5 V or 0/2-10 V.

The minimum and maximum load R_L depend on supply voltage and type of output.

Advantages of 4-wire transmitters:

- Accept DC and AC (up to 230 V) supply voltage.
- Since the power supply is galvanically isolated from the output signal, there are no problems using power supplies that are grounded and/or common for a number of transmitters.
- Can handle more power consuming functions like relays, displays, sensor excitations etc.

Disadvantages of 4-wire transmitters:

- Higher cable and installation costs when field mounted (compared to 2-wire transmitters).
- Increased dimensions, heat losses and costs due to built-in mains transformer (compared to 2-wire transmitters).
- Normally have to be mounted outside the hazardous locations.

2-, 3- and 4-wire connection for RTD sensors

This part describes three connection types used for RTD:

2-wire connection: Two leads connect sensor and transmitter.

3-wire connection: Three leads connect sensor and transmitter.

4-wire connection: Four leads connect sensor and transmitter.

Fig. 6 2-wire connection

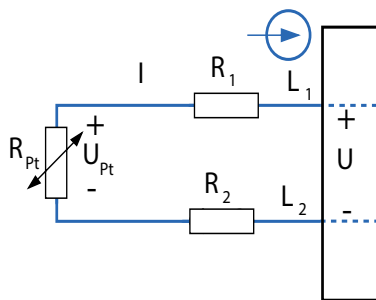
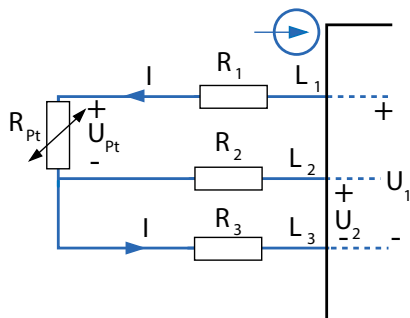


Fig. 7 3-wire connection



In the following part, the pros and cons of the different connection types are explained.

Things to observe and the effects of wrong connections are also mentioned.

The examples below are given for RTD's (e.g. Pt100 sensors), but in principle they apply to all resistance sensors.

The grouping is based on the transmitter design or configuration and not on the number of leads actually used between sensor and transmitter.

2-wire connection

This connection is seldom used in industrial measurements, because of the accuracy problems involved.

Fig. 6 shows the input wiring.

The transmitter sends out a constant measuring current I , which generates a voltage U measured by the transmitter.

The voltage is $U = I \cdot (R_{Pt} + R_1 + R_2)$.

The correct value would be the voltage over the sensor resistance R_{Pt} only, i.e. $U_{Pt} = I \cdot R_{Pt}$. Thus the lead resistances R_1 and R_2 create a measuring error.

As a rule of thumb, the error due to the lead resistance ($R_1 + R_2$) is approximately 2.6 °C (4.7 °F) per ohm for a Pt100 sensor and 10 times less for a Pt1000 sensor.

If the lead resistance is known, the transmitter can be manually adjusted to compensate for the lead resistance.

Since this is a fixed compensation, changes in the lead resistance, due to temperature variations, will not be taken care of.

Advantages of 2-wire connection:

- Reduced cable costs (depends on distance).

Disadvantages of 2-wire connection:

- Considerable measuring errors can occur without compensation for lead resistance.
- Time-consuming compensation for lead resistance.
- Errors due to variation in the cable temperature can never be eliminated.

3-wire connection

The 3-wire connection is today the dominating technique for connection of RTD sensors, especially in industrial use. The reason is the combination of automatic compensation for the lead resistance and reasonable cable costs.

Fig. 7 shows the input wiring.

In principal, most transmitters for 3-wire connection work in the same way. A constant measuring current I is sent through lead L_1 , the sensor element and lead L_2 , generating a voltage U_1 , which is $U_1 = I \cdot (R_{Pt} + R_1 + R_2)$.

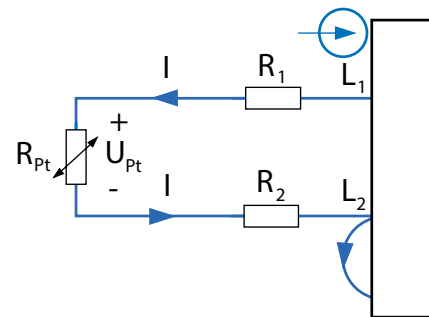
To get rid of the influence of R_1 and R_2 , an extra lead L_3 is connected to one side of the sensor element. No current is flowing in this lead because of a very high input impedance, so the voltage U_2 is $U_2 = I \cdot R_2$. Assuming that the lead resistances are identical, $R_1 = R_2 = R_L$, and letting the transmitter calculate a voltage U , which is $U = U_1 - 2 \cdot U_2$, the result will be:

$$U = I \cdot R_{Pt} + 2 \cdot I \cdot R_L - 2 \cdot I \cdot R_L \text{ or: } U = I \cdot R_{Pt} = U_{Pt}$$

Table 1

	Resistance difference, Rdiff	
	0,1 ohm	1,0 ohm
Pt 100	0,26°C/0,47°F	2,6°C/4,7°F
Pt 1000	0,03°C/0,05°F	0,26°C/0,47°F

Fig. 8 "Unclean" connection



Thus we have an expression, which vary directly with the sensor resistance and without influence of the lead resistances.

Note:

It is very important that lead L_1 and L_2 have equal resistance. To avoid the risk of mixing up the leads, always keep all 3 lead resistances as equal as possible.

For practical reasons, all transmitters have an upper limit for the lead resistances of typically 15-25 ohm per lead (see Specifications).

Table 1 shows examples of the errors in a 3-wire connection for Pt100 and Pt1000 caused by a difference in resistances, Rdiff, between L_1 and L_2 .

Examples of “unclean” connections

For different reasons, the user might connect sensors with only two leads or with four leads to transmitters for 3-wire connection.

Two sensor leads together with transmitter for 3-wire connection

A typical connection can be as shown in fig. 8.

It is important to note that, even if all three terminals of the transmitter are used, the automatic compensation for lead resistance is not working.

The error due to the lead resistance is the same as described above for 2-wire connection, i.e. approximately 2.6 °C (4.7 °F) per ohm total lead resistance (R_1+R_2). Manual (fixed) compensation can normally be performed.

Fig. 9 “Unclean” connection

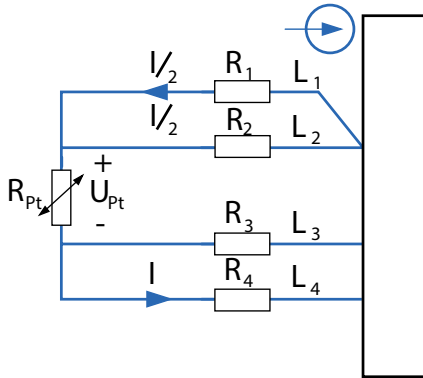


Fig. 10 4-wire connection

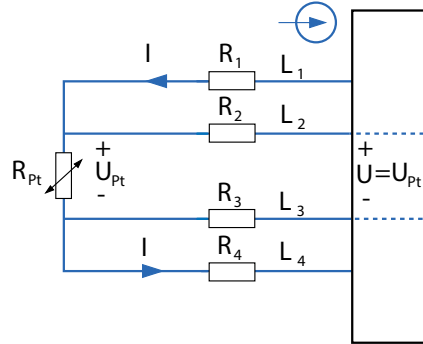


Fig. 11 “Unclean” connection

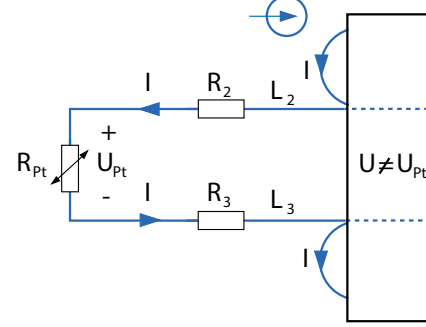
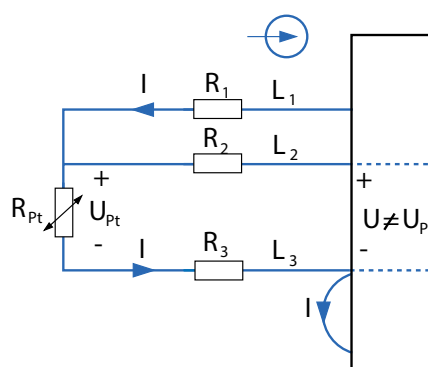


Fig. 12 “Unclean” connection



Four sensor leads together with transmitter for 3-wire connection

Sometimes the four sensor leads are connected as shown in fig. 9.

Because the three lead resistances, as seen from the transmitter, are not equal, the automatic compensation for lead resistance is not working properly. The measuring error depends on the difference in lead resistance, as described above.

Solution: Use only three of the sensor leads.

Conclusion

With two leads to the sensor, the 3-wire connection will neither improve the accuracy nor make it worse compared to the 2-wire connection.

With four leads to the sensor, the 3-wire connection will not compensate the lead resistance properly.

Advantages of 3-wire connection:

- Automatic compensation for the resistance in the leads connecting sensor and transmitter.
- Reduced cable costs compared to 4-wire connection.

Disadvantages of 3-wire connection:

- An unbalance in the resistance of the three sensor leads might cause consi-

derable measuring errors.

- Poor connections, i.e. corroded or loose terminals, can cause measuring errors due to extra and unequal resistances.

4-wire connection

The 4-wire connection of RTD sensors is used when the highest accuracy is required, e.g. in research laboratories and for critical industrial measurements. With the 4-wire connection, the influence of the lead resistances is fully eliminated. Even resistances due to poor connections will have no influence.

Fig. 10 shows the input wiring.

A constant measuring current I is sent through lead L_1 , the sensor element and lead L_4 , generating a voltage U_{Pt} over the sensor element, which is $U_{Pt}=I \cdot R_{Pt}$. This voltage is measured by connecting two leads, L_2 and L_3 , from the sensor to a high impedance input of the transmitter. Practically no current is flowing in L_2 and L_3 , so there is only a negligible voltage drop over these leads, and the transmitter will directly measure the voltage:

$$U = I \cdot R_{Pt} = U_{Pt}$$

the sensor resistance and that was reached without any reservations for the lead resistances.

For practical reasons, all transmitters have an upper limit for the lead resistance of typically 15-25 ohm per lead (see Specifications).

Examples of “unclean” connections

For different reasons, the user might connect sensors with only two leads or with three leads to transmitters for 4-wire connection.

Two sensor leads together with transmitter for 4-wire connection

A typical connection can be as shown in fig. 11.

Please note that, even if all four terminals of the transmitter are used, the lead resistances R_2 and R_3 will directly create a measuring error.

The voltage seen from the transmitter is

$$U = I \cdot (R_{Pt} + R_2 + R_3) \neq U_{Pt}$$

The error due to the lead resistance is the same as described above for 2-wire connection, i.e. approximately 2.6 °C (4.7 °F) per ohm total lead resistance (R_2+R_3). Manual (fixed) compensation can normally be performed.

Three sensor leads together with transmitter for 4-wire connection

A typical connection can be as shown in fig. 12.

Even if all four terminals of the transmitter are used, in this example the lead resistance R_3 will directly create a measuring error.

The voltage seen from the transmitter is

$$U = I \cdot (R_{pt} + R_3) \neq U_{pt}$$

The error due to the lead resistance is approximately 1.3 °C (2.3 °F) per ohm of the resistance in each lead (R_1 , R_2 or R_3). Manual (fixed) compensation can normally be performed.

Conclusion

With two leads to the sensor, the 4-wire connection will neither improve the accuracy nor make it worse compared to the 2-wire connection.

With three leads to the sensor, the 4-wire connection will make the accuracy worse compared to the 3-wire connection.

Advantages of 4-wire connection:

- High accuracy because the resistances in the leads connecting sensor and transmitter have no influence.
- Poor connections, i.e. corroded or loose terminals, will not influence the accuracy in most cases.

Disadvantages of 4-wire connection:

- Increased cable costs compared to 2-wire and 3-wire connection

SMARTSENSE – SENSOR ISOLATION MONITORING

This section describes how the isolation influences the measurements with RTDs and Thermocouples - independent of manufacturer - and how to get an early warning regarding errors due to low isolation.

Fig. 1

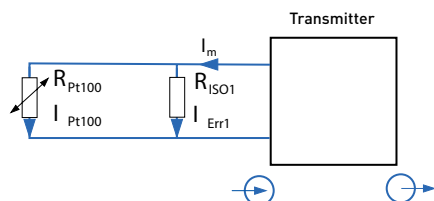


Fig. 2

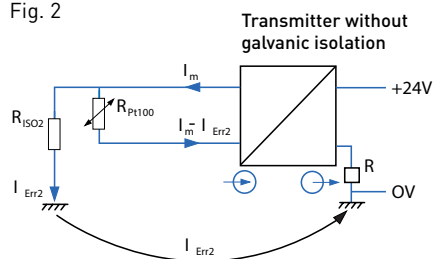
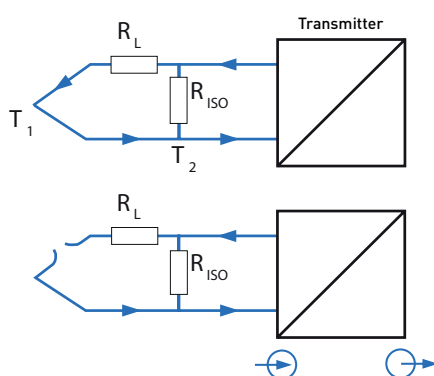


Fig. 3



The structures of Pt100 and thermocouple thermometers have properties, which can lead to erroneous measurements. This is independent of brand and type. One of these often neglected sources of error is the isolation in the thermometer, which, if too low, can give a serious degradation of the measurement. Heat, vibration, physical or chemical influence or radioactive influence can lower the isolation. This section will give an explanation to the necessity of keeping an eye on the isolation resistance and how to make this.

The effect of low isolation

Pt100

The Pt100 element is a low-resistance sensor, and a too low isolation resistance will influence the measurement. Figure 1 shows the electrical schematic for a Pt100 sensor in 2-wire connection with a temperature transmitter. The isolation resistance between the sensor leads is symbolized by R_{ISO1} .

See Figure 1.

The measuring current I_m shall go through the Pt100 element, but a negligible fraction I_{Err1} is normally passing through the high isolation resistance R_{ISO1} . When the isolation is lowered, a greater fraction of the current will pass through the isolation resistance. As a result of this, the measured voltage over the combined resistance of Pt100 and isolation resistance will be lower than if the isolation resistance was sufficiently high. This will give a too low measured temperature value, and this is not dependent on whether the transmitter is isolated or not.

If the transmitter is without galvanic isolation between input and output, a low isolation resistance between sensor and earth R_{ISO2} can carry a significant part I_{Err2} of the measuring current. This so called "ground current" will also cause a too low indicated temperature. With an isolated transmitter, this will not happen, because the isolation will cut off the loop, where the ground current is flowing.

See Figure 2.

Thermocouples

Low isolation in thermocouple sensors will give other errors. The EMF from a thermocouple is not particularly sensitive for low isolation. The problem is rather that a low isolation will give a new measuring point in the location of the low isolation. If this location is near the real measuring point, the error will be negligible.

Figure 3 shows a thermocouple connected to a temperature transmitter. If the low isolation R_{ISO} is in a location where the temperature T_2 differs from the temperature in the measuring point T_1 , there is a possibility of a significant error. The measured temperature will correspond to an intermediate value of T_1 and T_2 .

Low isolation in thermocouple sensors can also make the sensor break detection to fail, because the monitoring current can still pass through R_{ISO} .

See Figure 3.

Isolation monitoring with SmartSense

The transmitters in the IPAQ 520 family can monitor the isolation resistance of the sensor and the sensor leads. This function, named SmartSense, is available for Pt100 and thermocouple sensors. To accomplish the monitoring, the sensor must be furnished with an extra conductor. Under certain circumstances there is a possibility of using the cable shield. See Sensor solution below.

When the isolation resistance is too low, the IPAQ 520 transmitter's output signal will go to a pre-programmed value.

Pt100

For Pt100 the detection limit for "low isolation" is adjustable between 50 k Ω and 500 k Ω . The error due to the isolation value R_{ISO} has to be added to other measurement errors. By 400 $^{\circ}\text{C}/752$ $^{\circ}\text{F}$ the added error is 0.4 $^{\circ}\text{C}/0.7$ $^{\circ}\text{F}$ for

500 k Ω and 3.1 $^{\circ}\text{C}/5.6$ $^{\circ}\text{F}$ for 50 k Ω isolation.

See Figure 4.

Thermocouples

For thermocouples the detection limit for "low isolation" is adjustable between 20 k Ω and 200 k Ω . The added error depends on the relation between the lead resistance R_L and the isolation resistance R_{ISO} . The error is also dependent on the temperature difference between the measuring point and the location of the low isolation. Under the following circumstances: measuring temperature 1000 °C/1832 °F, ambient temperature 25 °C/77 °F and R_L 50 Ω there will be an error of 1% if the isolation resistance is 5 k Ω . This equals 10 °C. It is assumed that the low isolation is in the ambient temperature area.

Sensor solution

The SmartSense function in the IPAQ 520 transmitters is applicable for Pt100 in 3-wire connection and thermocouples. For a correct usage of the SmartSense, the sensor must have an extra conductor. This conductor will have a separate terminal and go through the sensor all the way to the sensor element.

See Figure 5.

Mineral isolated Pt100 sensors and thermocouples will use an unconnected conductor.

N.B. Due to the normally low isolation in mineral isolated thermocouples at high temperatures, it is not useful to monitor the high temperature end, above ~600 °C/1100 °F depending on application. Instead, it is important to monitor connections and cables from the sensor to the transmitter. It is not recommended to use the sheath of the sensor or a cable shield as the monitoring conductor. One task of the sheath is to keep interference outside the measurements. Connecting the sheath to the SmartSense terminal can lead to erroneous measurements. This is also applicable to the shield of cable sensors.

See Figure 6.

Conclusion: Full control over sensor and connection

Too low isolation resistance in temperature sensors can give erroneous measurements independent of brand and type. SmartSense gives the possibility of substituting Pt100 (3-wire connected) and thermocouple sensors with a low isolation resistance in time. SmartSense does not only monitor the sensor but also the conductors from the sensor ter-

minals to the transmitter terminals. This gives a full control on the condition of the measuring chain from measuring point to transmitter.

Causes of low isolation:

- Contamination
- Physical influence (wear, jamming)
- Chemical influence (corrosion)
- Vibration
- Radioactive radiation
- Humidity

Examples of errors Pt100 by 400°C

Isolation R_{ISO}	Error
500 k Ω	0,4°C
100 k Ω	1,6°C
50 k Ω	3,1°C
10 k Ω	15°C

Thermocouple type K by 1000°C $R_L=50 \Omega$, $T_{AMB}=25^\circ\text{C}$

Isolation R_{ISO}	Error
50 k Ω	1°C
20 k Ω	3°C
5 k Ω	10°C

Fig. 4

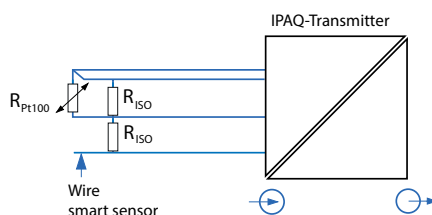
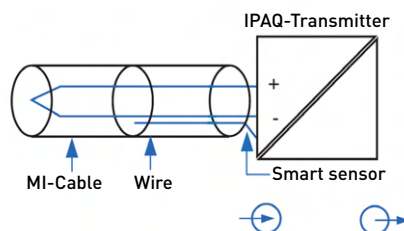


Fig. 5



Fig. 6



Transmitter selection list

	BASIC			
	APAQ C130 ^{TC} APAQ R130 ^{TC}	APAQ C130 ^{RTD} APAQ R130 ^{RTD}	IPAQ C202	IPAQ C310 ^{RTD}
				
Page	20/28	21/29	22	23
Type				
In-head transmitter	✓	✓	✓	✓
Rail transmitter	✓	✓	–	–
Output / Power Supply connection	2-wire transmitter	2-wire transmitter	2-wire transmitter	2-wire transmitter
Available Certificates				
Ex Certification / Intrinsically safe	–	–	ATEX, IECEx	–
Functional safety	–	–	–	–
Input				
Resistance thermometer (RTD)	–	2-, 3- or 4-wire	3-wire	2-, 3- or 4-wire
Thermocouples (T/C)	B, E, J, K, N, R, S, T	–	–	–
Other input types	–	–	–	Ω
Input / Channel				
Single sensor input	✓	✓	✓	✓
Dual sensor inputs	–	–	–	–
Output				
4-20 mA (2-wire loop)	✓	✓	✓	✓
Freely in ranges 0-20 mA / 0-10 V	–	–	–	–
HART® Communication	–	–	–	–
Accuracy				
Typical Accuracy	See Data Sheet	±0.15%	±0.1%	±0.1%
Electrical Separation				
Galvanic Isolation (test voltage)	–	–	–	1500 VAC
Power Supply				
24 VDC (2-wire Loop Power Supply)	✓	✓	✓	✓
24 VDC (Separate Power Supply)	–	–	–	–
Configuration				
PC (via ConSoft + ICON-X)	–	–	✓	✓
PC (via INOR-Set)	–	–	–	–
HART® (via HART® protocol)	–	–	–	–
NFC (via app INOR Connect)	✓	✓	–	✓
Bluetooth® (via app INOR Connect + ICON-BT)	–	–	–	✓
DIP-Switch	–	–	–	–

	UNIVERSAL			SMART	
	MinIPAQ C230 MinIPAQ R230	IPAQ C330 IPAQ R330	IPAQ R460	IPAQ C530 IPAQ R530	IPAQ C520 IPAQ R520
					
Page	24/30	25/31	34	26/32	27/33
Type					
In-head transmitter	✓	✓	–	✓	✓
Rail transmitter	✓	✓	✓	✓	✓
Output / Power Supply connection	2-wire transmitter	2-wire transmitter	4-wire transmitter	2-wire transmitter	2-wire transmitter
Available Certificates					
Ex Certification / Intrinsically safe	–	ATEX, IECEx, cFMus	–	ATEX, IECEx, cFMus	ATEX, IECEx
Functional safety	–	–	–	–	SIL 2
Input					
Resistance thermometer (RTD)	2- 3- or 4-wire	2-, 3- or 4-wire	2-, 3- or 4-wire	2-, 3- or 4-wire	2-, 3- or 4-wire
Thermocouples (T/C)	B,C,D,E,J,K,N,R,S,T	B,C,D,E,J,K,N,R,S,T	B,C,E,J,K,L,N,R,S,T,U	B,C,D,E,J,K,N,R,S,T	B,C,D,E,J,K,N,R,S,T
Other input types	mV, Ω	mA ¹⁾ , mV, Ω	mV, Ω , KTY	mV, Ω	mV, Ω
Input / Channel					
Single sensor input	✓	✓	✓	✓	✓
Dual sensor inputs	–	–	–	–	✓
Output					
4-20 mA (2-wire loop)	✓	✓	–	✓	✓
Freely in ranges 0-20 mA / 0-10 V	–	–	✓	–	–
HART® Communication	–	–	–	✓	✓
Accuracy					
Typical Accuracy	±0.15%	±0.08%	±0.1%	±0.08%	±0.05%
Electrical Separation					
Galvanic Isolation (test voltage)	–	1500 VAC	3000 VAC	1500 VAC	1500 VAC
Power Supply					
24 VDC (2-wire Loop Power Supply)	✓	✓	–	✓	✓
24 VDC (Separate Power Supply)	–	–	✓	–	–
Configuration					
PC (via ConSoft + ICON-X)	✓	✓	–	✓	✓
PC (via INOR-Set)	–	–	✓	–	–
HART® (via HART® protocol)	–	–	–	✓	✓
NFC (via app INOR Connect)	✓	✓	–	✓	–
Bluetooth® (via app INOR Connect + ICON-BT)	✓	✓	–	✓	–
DIP-Switch	–	–	✓	–	–

¹⁾ mA-input is possible only on IPAQ R330 and together with adapter P/N 70ADA00051

Basic Programmable 2-wire Transmitter for Thermocouple



The APAQ C130^{TC} is a modern transmitter with high reliability and great performance. External influences such as ambient temperature, vibration, moisture and EMC interference have minimal influence on the measurement result, thanks to the robust design.

- Type: Digital
- Input: TC
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

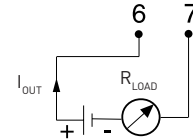
Specifications:

Input	
TC type B - Pt30Rh-Pt6Rh (IEC 60584)	0...+1820 °C / +32...+3308 °F
TC type E - NiCr-CuNi (IEC 60584)	-270...+1000 °C / -454...+1832 °F
TC type J - Fe-CuNi (IEC 60584)	-210...+1200 °C / -346...+2192 °F
TC type K - NiCr-NiAl (IEC 60584)	-270...+1300 °C / -454...+2372 °F
TC type N - NiCrSi-NiSi (IEC 60584)	-270...+1300 °C / -454...+2372 °F
TC type R - Pt13Rh-Pt (IEC 60584)	-50...+1750 °C / -58...+3182 °F
TC type S - Pt10Rh-Pt (IEC 60584)	-50...+1750 °C / -58...+3182 °F
TC type T - Cu-CuNi (IEC 60584)	-270...+400 °C / -454...+752 °F
Adjustments	
Minimum span	
TC type B	700 °C / 1260 °F
TC type R, S,	300 °C / 540 °F
TC type E, J, K, T	50 °C / 90 °F
TC type N	100 °C / 180 °F
Zero adjustments	Any value within range limits
Output	4-20 mA, temperature linear
Sensor failure indication	Upscale (≥21.0 mA) or downscale (≤3.6 mA)
NAMUR compliance	Current limitations and failure currents acc. to NAMUR NE 43
Response time	0.4 to 26 s, adjustable filtering level
Ambient temperature	
Storage and operation	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	None
Power supply	6 to 32 VDC
Typical accuracy	Max. of [CJC not included]
TC type R, S, T	±2.0 °C or ±0.2 % of span / ±3.6 °F or ±0.2 % of span
TC type B (<100 °C / <212 °F)	not specified
TC type B (100 °C...400 °C / 212 °F...752 °F)	± 10 °C / ± 18 °F
TC type B (>400 °C / >752 °F)	±2.0 °C or ±0.2 % of span / ±3.6 °F or ±0.2 % of span
TC type E, J, K	±1 °C or ±0.2 % of span / ±1.8 °F or ±0.2 % of span
TC type N [-100...+1300 °C]	±1 °C or ±0.2 % of span / ±1.8 °F or ±0.2 % of span
TC type N [-270...-100 °C]	±2.0 °C / ±3.6 °F
Mounting	DIN B head or larger, DIN-rail (with adapter)
Vibration	Acc. to IEC 60068-2-6, test Fc, 10...2000 Hz, 10 g
EMC	EN 61326-1 and EN 61326-2-3
Configuration	App Inor Connect via NFC

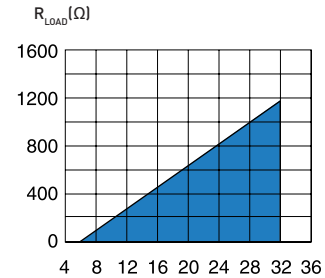
Input connections



Output connections



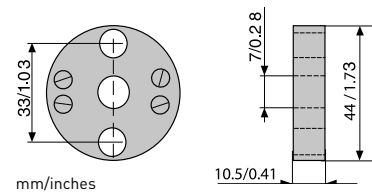
Output load diagram



Supply voltage U [V DC]

$$R_{LOAD} = (U - 6) / 0.022$$

Dimensions



Ordering information

APAQ C130 ^{TC}	70C1300211
Head mounting kit	70ADA00017
DIN-rail Adapter + Screw (10 pcs)	70ADA00027

APAQ C130^{RTD}

Basic Programmable 2-wire Transmitter for Pt100 and Pt1000



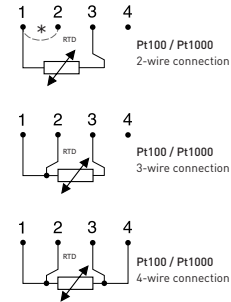
The APAQ C130^{RTD} is a modern transmitter with high reliability and great performance. External influences such as ambient temperature, vibration, moisture and EMC interference have minimal influence on the measurement result, thanks to the robust design.

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

Specifications:

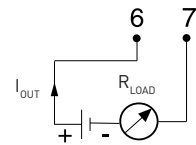
Input	2-, 3-, 4-wire connection Pt100 (IEC 60751, $\alpha=0.00385$) -200... +850 °C / -328...+1562 °F Pt1000 (IEC 60751, $\alpha=0.00385$) -200... +850 °C / -328...+1562 °F
Adjustments	
Minimum span	20 °C / 36 °F
Zero adjustments	Any value within range limits
Output	4-20 mA temperature linear
Sensor failure indication	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA)
NAMUR compliance	Current limitations and failure currents acc. to NAMUR NE 43
Response time	0.4 to 26 s, adjustable filtering level
Ambient temperature	
Storage and operation	-40...+85 °C / -40...+185 °F
Galvanic isolation	None
Power supply	6 to 32 VDC
Typical accuracy	Max. of ± 0.15 K or ± 0.15 % of span
Mounting	DIN B head or larger, DIN-rail (with adapter)
Vibration	IEC 60068-2-6, 10 g
EMC	EN 61326-1 and EN 61326-2-3
Configuration	App INOR Connect via NFC

Input connections

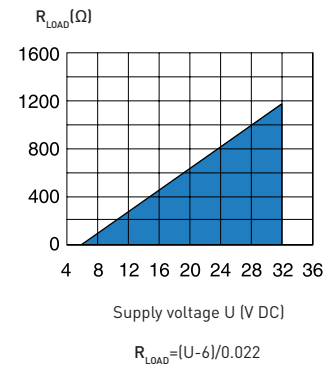


* Short terminals 1 and 2 on the transmitter

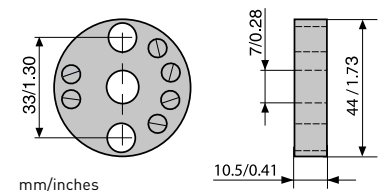
Output connections



Output load diagram



Dimensions



Ordering information

APAQ C130 ^{RTD}	70C1300011
Head mounting kit	70ADA00017
DIN-rail Adapter + Screw (10 pcs)	70ADA00027

IPAQ C202

Basic Programmable 2-wire Transmitter for Pt100



The IPAQ C202 is a digital, easy-to-use 2-wire temperature transmitter for measurement with a Pt100 resistance sensor. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions. IPAQ C202 combines competitive cost with easy and user friendly functionality and reliable accuracy during the lifetime.

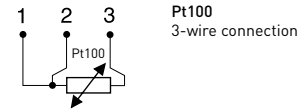
- Robust terminals with test connections
- Input: Pt100 in 3-wire connection
- PC configurable measuring ranges without need for calibration
- Temperature linear output
- Very short response time
- Excellent EMC immunity
- Configuration without external power
- Easy-to-use Windows configuration software
- USB communication
- Withstands vibrations up to 10 g
- Runtime counter
- Only 19.5 mm / 0.72 inch high

Specifications:

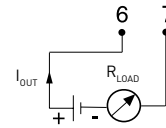
Input Pt100		3-wire connection
Pt100 ($\alpha=0.00385$) ¹⁾		-200 to +850 °C / -328 to +1562 °F
Sensor failure		Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments		
Zero adjustment		Any value within range limits
Minimum span		20 °C / 36 °F
Sensor error compensation		$\pm 10\%$ of span for span < 100°C/180°F otherwise $\pm 10^\circ\text{C}/\pm 18^\circ\text{F}$
Output		4...20 mA, temperature linear
Adjustable filtering level		0.13 to 54 s, (default 0.9 s)
Response time		< 50 ms
Environment conditions		
Ambient temperature		-40 to +85 °C / -40 to +185 °F
Humidity		0...98% RH (non-condensing)
Vibrations		Acc. to IEC 60068-2-6, test Fc, 10...2000 Hz, 10 g
EMC		Directive: 2014/30/EU Harmonized standards: EN 61326-1, EN 61326-2-3
Galvanic isolation		No
Power supply	Standard version	6.0...32.0 VDC
	Ex version	8.0...30.0 VDC
Intrinsic safety		
IPAQ C202X	ATEX:	II 1G Ex ia IIC T6...T4 Ga
	IECEx:	Ex ia IIC T6...T4 Ga
Accuracy		Max of $\pm 0.1\text{K}$ or $\pm 0.1\%$ of span
Long-term stability		$\pm 0.1\%$ of span per year
Mounting		DIN B head or larger, DIN-rail (with adapter)
Weight		32 g / 0.07 lb
Protection, housing / terminals		IP 65 / IP 00

¹⁾ IEC 60751

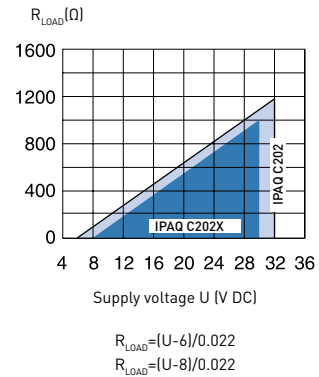
Input connections



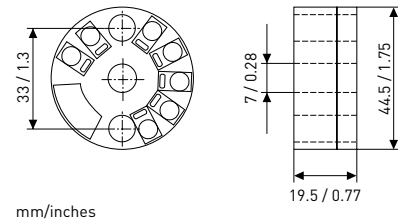
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ C202	70C2020010
IPAQ C202X (ATEX, IECEx)	70C202X010
ICON-X, PC configuration kit	70CFGUSX01
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015

IPAQ C310^{RTD}

Programmable 2-wire transmitter for RTD and Resistance inputs



The IPAQ C310^{RTD} transmitter is a isolated temperature transmitter for measurement with a RTD sensor. It is compatible with Pt10 ... Pt1000 sensors with additional Ni100, Ni120, Ni1000 and resistance input. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions.

IPAQ C310^{RTD} supports communication via NFC (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

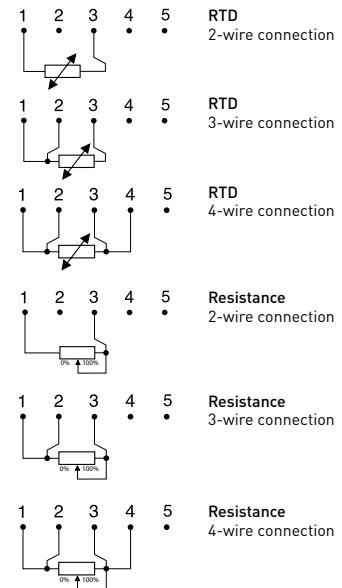
- High accuracy and long term stability
- Galvanic isolation
- Accepts RTD and Ω
- Sensor error and system (sensor+transmitter) error correction for highest total accuracy
- Low temperature drift
- Configuration via PC, NFC or Bluetooth® without external power
- Runtime counter - hour counter for elapsed operational time
- Rugged design tested for 10 g vibrations
- High security - Password protection and date of changes logged

Specifications:

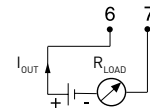
Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 ≤ X ≤ 1000 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Pt100 ($\alpha = 0.003916$) ²⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ³⁾ , Ni120 ⁴⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ³⁾	-50 to +180 °C / -58 to +356 °F
Input Resistance	0 to 10 000 Ω
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
RTD	10 °C / 18 °F
Resistance	10 Ω
Output	4-20 mA / 20-4 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	1500 VAC, 1 min
Power supply	8.0...36.0 VDC
Typical accuracy	Max. of ± 0.1 °C or ± 0.1 % of span
Mounting	DIN B head or larger, DIN-rail (with adapter)

¹⁾ IEC 60751, ²⁾ JIS C 1604, ³⁾ DIN 43760, ⁴⁾ Edison Curve No. 7

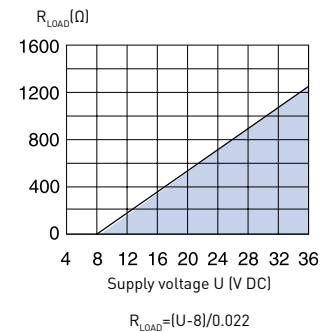
Input connections



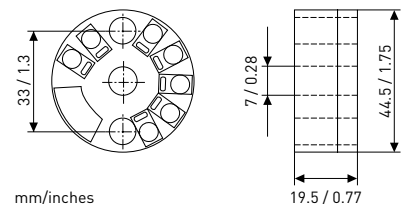
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ C310 ^{RTD}	70C3100011
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015

MinIPAQ C230

Universal Programmable 2-wire transmitter



MinIPAQ C230 is a universal, programmable non-isolated, temperature transmitter with additional voltage and resistance input. Its robust design and high quality gives good performance and accuracy also under harsh conditions.

MinIPAQ C230 supports communication via NFC (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

- Accepts RTD, T/C, mV and Ω
- Sensor error and system (sensor/transmitter) error correction for highest total accuracy
- Configuration via PC, NFC or Bluetooth® without external power
- Runtime counter - hour counter for elapsed operational time
- Rugged design tested for 10 g vibrations
- High security - Password protection and date of changes logged

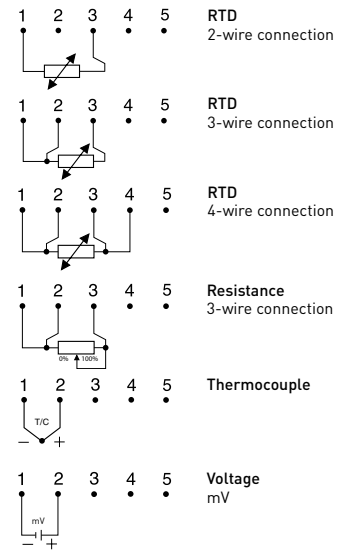
Specifications:

Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 $\leq X \leq 1000$ ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ²⁾ , Ni120 ³⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ²⁾	-50 to +180 °C / -58 to +356 °F
Input Resistance	0 to 4000 Ω (2-wire connection 0 to 2000 Ω)
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
RTD	10 °C / 18 °F
Resistance	10 Ω
T/C, mV	2 mV
Output	4-20 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	No
Power supply	8.0...36.0 VDC
Typical accuracy, (RTD)	Max. of ± 0.15 K or ± 0.15 % of span
Mounting	DIN B head or larger, DIN-rail (with adapter)

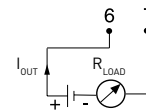
¹⁾ IEC 60751, ²⁾ DIN 43760, ³⁾ Edison Curve No. 7

Input connections

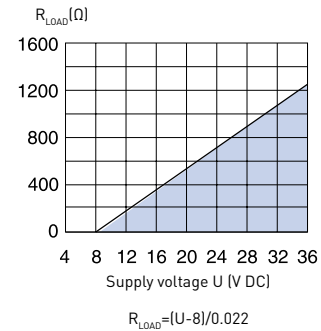
See data sheet for more alternatives



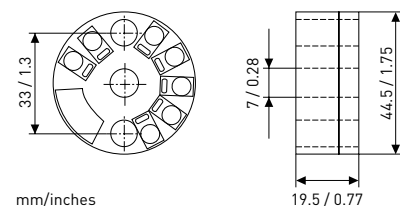
Output connections



Output load diagram



Dimensions



Ordering information

MinIPAQ C230	70C2300011
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015

IPAQ C330

Universal Programmable 2-wire transmitter



IPAQ C330 is a universal, isolated, temperature transmitter with additional voltage and resistance input. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions.

IPAQ C330 supports communication via NFC® (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

- High accuracy and long term stability
- 50-point Customized Linearization and Callendar-Van Dusen
- Accepts RTD, T/C, mV and Ω
- Sensor error and system (sensor/transmitter) error correction for highest total accuracy
- Low temperature drift
- Configuration via USB or NFC without external power
- Runtime counter - hour counter for elapsed operational time
- Rugged design tested for 10 g vibrations
- High security - Password protection and date of changes logged

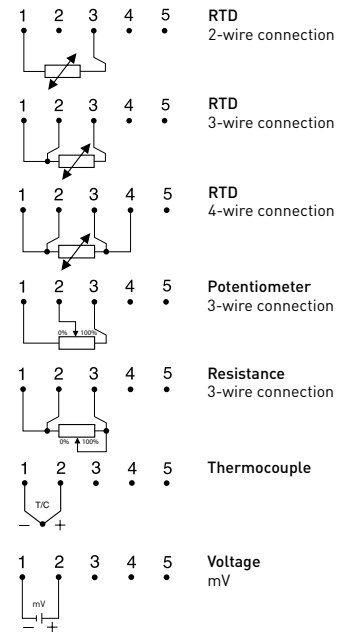
Specifications:

Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 $\leq X \leq 1000$ ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Pt100 ($\alpha = 0.003916$) ²⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ³⁾ , Ni120 ⁴⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ³⁾	-50 to +180 °C / -58 to +356 °F
Cu10 ⁵⁾	-50 to +200 °C / -58 to +392 °F
Input Resistance / potentiometer	0 to 10000 Ω / 100 to 10000 Ω
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
Pt100, Pt1000, Ni100, Ni1000	10 °C / 18 °F
Resistance / potentiometer	10 Ω / 10 %
T/C, mV	2 mV
Output	4-20 mA / 20-4 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	1500 VAC, 1 min
Power supply	IPAQ C330 8.0...36.0 VDC
	IPAQ C330X 8.0...30.0 VDC
Intrinsic safety	
IPAQ C330X ATEX:	II 1 G Ex ia IIC T6...T4 Ga
IPAQ C330X IECEx:	Ex ia IIC T6...T4 Ga
IPAQ C330X FM US:	IS CL I Div 1 GP A-D, T6...T4 ⁶⁾
IPAQ C330X FM CA:	CL I Zn 0 AEx/Ex ia IIC T6...T4 Ga ⁶⁾
Typical accuracy	$\pm 0.08^\circ\text{C}$ or $\pm 0.08\%$ of span
Mounting	DIN B head or larger, DIN-rail (with adapter)

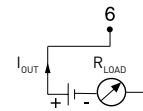
¹⁾ IEC 60751, ²⁾ JIS C 1604, ³⁾ DIN 43760, ⁴⁾ Edison No. 7, ⁵⁾ Edison No. 15, ⁶⁾ T6...T4 are depending on effect

Input connections

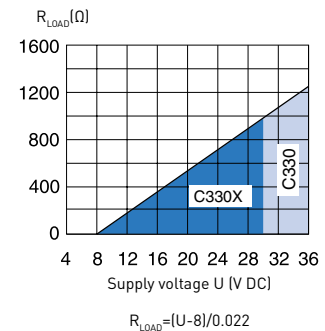
See data sheet for more alternatives



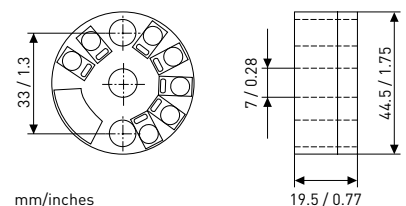
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ C330	70C3300012
IPAQ C330X (ATEX, IECEx)	70C330X012
IPAQ C330X (cFmus, ATEX, IECEx)	70C330F012
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001
Head mounting kit	70ADA00017
Rail mounting kit	70ADA00015

IPAQ C530

Smart HART-compatible 2-wire Transmitter



IPAQ C530 is a modern, HART® temperature transmitter developed to meet the highest standards of accuracy and reliability. A universal transmitter compatible with RTD, thermocouples, voltage and potentiometer sensors. It is fully compatible with HART® 7 and offers extended diagnostic information, for example device error, sensor and wiring conditions. IPAQ C530 supports communication via NFC (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

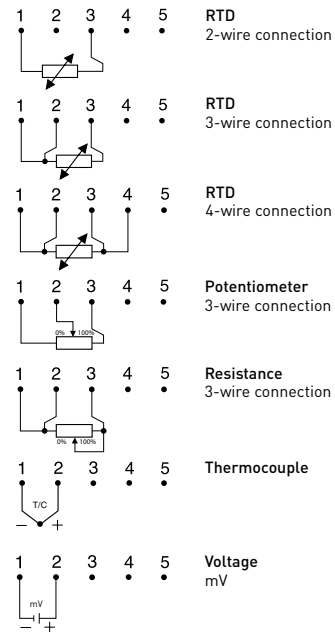
- High accuracy and long term stability
- Accepts RTD, T/C, mV and ohm
- Sensor error and system (sensor/transmitter) error correction
- 50-point Customized Linearization and Callendar-Van Dusen
- Rugged design tested for 10 g vibrations
- Configuration via USB, without external power
- Runtime counter - hour counter for elapsed operational time
- Communicates with HART Communicator or PC via HART modem
- Integrated in Emerson AMS and Siemens PDM systems

Specifications:

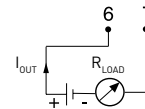
Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 ≤ X ≤ 1000 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Pt100 ($\alpha = 0.003916$) ²⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ³⁾ , Ni120 ⁴⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ³⁾	-50 to +180 °C / -58 to +356 °F
Cu10 ⁵⁾	-50 to +200 °C / -58 to +392 °F
Input Resistance / potentiometer	0 to 10000 Ω / 100 to 10000 Ω
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
Pt100, Pt1000, Ni100, Ni1000	10 °C / 18 °F
Resistance / potentiometer	10 Ω / 10 %
T/C, mV	2 mV
Output	4-20 mA / 20-4 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	1500 VAC, 1 min
Power supply	IPAQ C530: 8.5...36.0 VDC
	IPAQ C530X: 8.5...30.0 VDC
Intrinsic safety	
IPAQ C530X ATEX:	II 1G Ex ia IIC T6...T4 Ga
IPAQ C530X IECEx:	Ex ia IIC T6...T4 Ga
IPAQ C530X FM US:	IS CL I Div 1 GP A-D, T6...T4 ⁶⁾
IPAQ C530X FM CA:	CL I Zn 0 AEx/Ex ia IIC T6...T4 Ga ⁶⁾
Typical accuracy	±0.08 °C or ±0.08 % of span
Mounting	DIN B head or larger, DIN-rail (with adapter)

¹⁾ IEC 60751, ²⁾ JIS C 1604, ³⁾ DIN 43760, ⁴⁾ Edison No. 7, ⁵⁾ Edison No. 15, ⁶⁾ T6...T4 are depending on effect

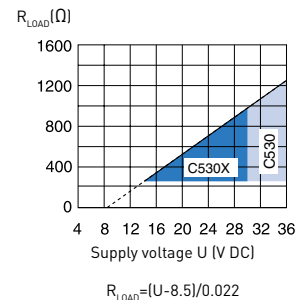
Input connections



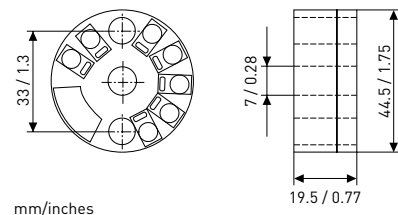
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ C530	70C5300010
IPAQ C530X (ATEX, IECEx)	70C530X010
IPAQ C530X (cFmus, ATEX, IECEx)	70C530F010
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001

IPAQ C520

Smart HART-compatible Dual-input 2-wire Transmitter



The IPAQ C520 transmitters are universal, isolated, dual-input temperature transmitters with additional voltage and resistance input. C520X/C520XS are Intrinsically Safe versions for use in Ex-Zone 0, 1 and 2. The transmitters are compatible with the HART 6 protocol. Typical characteristics are the high accuracy, stability and reliability combined with a robust housing.

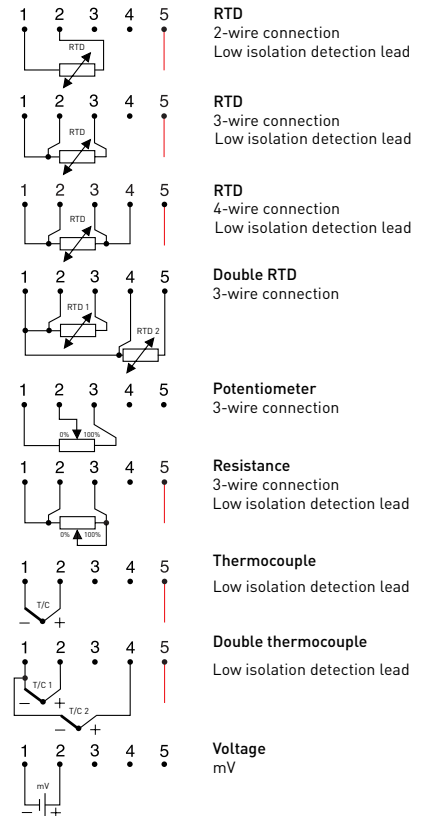
- Universal, dual-input for RTD and T/C
- SIL 2 compatible according to IEC 61508-2
- 5 year guaranteed stability
- Withstands 10 g vibrations
- Complies with NAMUR NE 21, NE 43, NE 53, NE 89 and NE 107
- EMC immunity according to Criteria A
- Sensor Backup
- Sensor Drift Monitoring
- Sensor Isolation Monitoring
- Sensor matching
- 50 point customized linearization
- Integrated in Emerson AMS and Siemens PDM systems

Specifications:

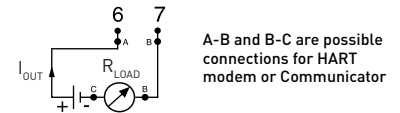
Input RTD		
Pt100	(IEC 60751, $\alpha=0.00385$)	-200 to +850 °C
PtX [10 ≤ X ≤ 1000]	(IEC 60751, $\alpha=0.00385$)	Corresp. to max. 4 000 Ω
Pt100	(JIS C 1604, $\alpha=0.003916$)	-200 to +850 °C
Ni100	(DIN 43760)	-60 to +250 °C
Ni120	(Edison Curve No. 7)	-60 to +250 °C
Ni1000	(DIN 43760)	-50 to +180 °C
Cu10	(Edison Cu Windings No. 15)	-50 to +200 °C
Input connections	One sensor	2-, 3- and 4-wire connection
	Two sensors	2- and 3-wire connection
Input Thermocouple	T/C types	B, C, D, E, J, K, N, R, S, T
Input Resistance	Potentiometer	100 to 4000 Ω, 2-, 3- and 4-wire connection
Input Voltage		-10 to +1000 mV
Double inputs for RTD and Thermocouple		
Measure mode		T1 or T2 or difference, average, min, max of T1 and T2
Sensor Redundancy		Automatic switchover to undamaged sensor
Sensor Drift Monitoring		Adjustable maximum temp. difference T1-T2
Output		
Output signal	Temperature linear	4-20 mA, 20-4 mA or customized
NAMUR compliance	Measure and fail currents	NAMUR, NE 43
Galvanic isolation		1500 VAC, 1 min
Ex-classifications	C520X/C520XS	ATEX: II 1G Ex ia IIC T6...T4 Ga
		IECEx: Ex ia IIC T6...T4 Ga
Power supply	C520/C520S	10...36.0 VDC, Standard power supply
	C520X/C520XS	10...30.0 VDC, I.S. power supply
Ambient temperature	Storage/operation	-40 to +85 °C
Accuracy	RTD (Pt and Ni sensors)	Max. of ±0.1 °C or ±0.05 % of span
	Thermocouple	Typical ±0.05 % of span
	Resistance/voltage	See data sheet
Long-term stability		Max. drift: ±0.05 % of span / 5 years
Mounting		DIN B head or larger, DIN-rail (with adapter)

Input connections

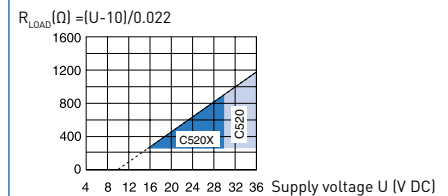
See data sheet for more alternatives



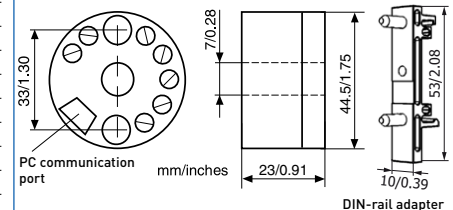
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ C520	70C5200010
IPAQ C520S, SIL 2 compatible	70C5200510
IPAQ C520 (ATEX, IECEx)	70C520X010
IPAQ C520XS, SIL 2 compatible (ATEX, IECEx)	70C520XS10
ICON-X, PC configuration kit	70CFGUSX01
Head mounting kit	70ADA00017



Basic Programmable 2-wire Transmitter for Thermocouple



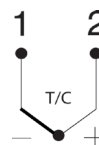
The APAQ R130^{TC} is a modern transmitter with high reliability and great performance. External influences such as ambient temperature, vibration, moisture and EMC interference have minimal influence on the measurement result, thanks to the robust design.

- Type: Digital
- Input: TC
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

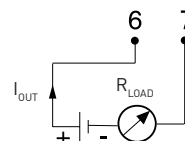
Specifications:

Input	
TC type B - Pt30Rh-Pt6Rh (IEC 60584)	0...+1820 °C / +32...+3308 °F
TC type E - NiCr-CuNi (IEC 60584)	-270...+1000 °C / -454...+1832 °F
TC type J - Fe-CuNi (IEC 60584)	-210...+1200 °C / -346...+2192 °F
TC type K - NiCr-NiAl (IEC 60584)	-270...+1300 °C / -454...+2372 °F
TC type N - NiCrSi-NiSi (IEC 60584)	-270...+1300 °C / -454...+2372 °F
TC type R - Pt13Rh-Pt (IEC 60584)	-50...+1750 °C / -58...+3182 °F
TC type S - Pt10Rh-Pt (IEC 60584)	-50...+1750 °C / -58...+3182 °F
TC type T - Cu-CuNi (IEC 60584)	-270...+400 °C / -454...+752 °F
Adjustments	
Minimum span	
TC type B	700 °C / 1260 °F
TC type R, S,	300 °C / 540 °F
TC type E, J, K, T	50 °C / 90 °F
TC type N	100 °C / 180 °F
Zero adjustments	Any value within range limits
Output	
4-20 mA, temperature linear	
Sensor failure indication	
Upscale (≥21.0 mA) or downscale (≤3.6 mA)	
NAMUR compliance	
Current limitations and failure currents acc. to NAMUR NE 43	
Response time	
0.4 to 26 s, adjustable filtering level	
Ambient temperature	
Storage and operation	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	
None	
Power supply	
6 to 32 VDC	
Typical accuracy	
Max. of (CJC not included)	
TC type R, S, T	±2.0 °C or ±0.2 % of span / ±3.6 °F or ±0.2 % of span
TC type B (<100 °C / <212 °F)	not specified
TC type B (100 °C...400 °C / 212 °F...752 °F)	± 10 °C / ± 18 °F
TC type B (>400 °C / >752 °F)	±2.0 °C or ±0.2 % of span / ±3.6 °F or ±0.2 % of span
TC type E, J, K	±1 °C or ±0.2 % of span / ±1.8 °F or ±0.2 % of span
TC type N (-100...+1300 °C)	±1 °C or ±0.2 % of span / ±1.8 °F or ±0.2 % of span
TC type N (-270...-100 °C)	±2.0 °C / ±3.6 °F
Mounting	
35 mm DIN rail acc. to EN 60715	
Vibration	
Acc. to IEC 60068-2-6, test Fc, 10...2000 Hz, 5 g	
EMC	
EN 61326-1 and EN 61326-2-3	
Configuration	
App Inor Connect via NFC	

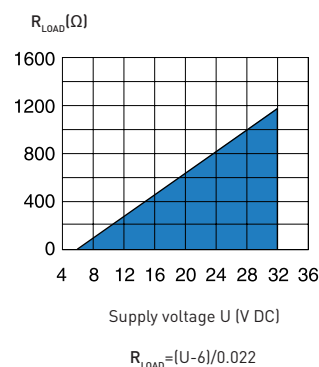
Input connections



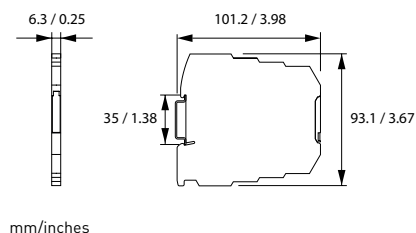
Output connections



Output load diagram



Dimensions



Ordering information

APAQ R130^{TC}

70R1300211



APAQ R130^{RTD}

Basic Programmable 2-wire Transmitter for Pt100 and Pt1000



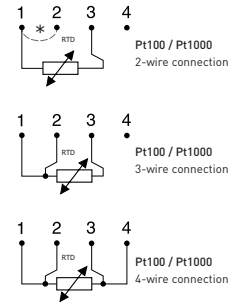
The APAQ R130^{RTD} is a modern transmitter with high reliability and great performance. External influences such as ambient temperature, vibration, moisture and EMC interference have minimal influence on the measurement result, thanks to the robust design.

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

Specifications:

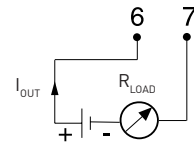
Input	2-, 3-, 4-wire connection Pt100 (IEC 60751, $\alpha=0.00385$) -200... +850 °C / -328...+1562 °F Pt1000 (IEC 60751, $\alpha=0.00385$) -200... +850 °C / -328...+1562 °F
Adjustments	
Minimum span	20 °C / 36 °F
Zero adjustments	Any value within range limits
Output	4-20 mA temperature linear
Sensor failure indication	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA)
NAMUR compliance	Current limitations and failure currents acc. to NAMUR NE 43
Response time	0.4 to 26 s, adjustable filtering level
Ambient temperature	
Storage and operation	-40...+85 °C / -40...+185 °F
Galvanic isolation	None
Power supply	6 to 32 VDC
Typical accuracy	Max. of $\pm 0,15$ K or $\pm 0,15$ % of span
Mounting	35 mm DIN rail acc. to EN 60715
Vibration	IEC 60068-2-6, test Fc, 10...2000 Hz, 5 g
EMC	EN 61326-1 and EN 61326-2-3
Configuration	App INOR Connect via NFC

Input connections

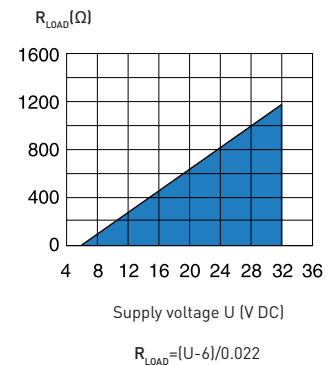


* Short terminals 1 and 2 on the transmitter

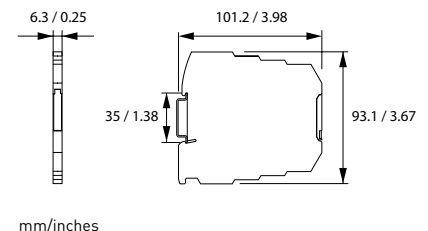
Output connections



Output load diagram



Dimensions



Ordering information

APAQ R130^{RTD}

70R1300011

MinIPAQ R230

Universal Programmable 2-wire transmitter



MinIPAQ R230 is a universal, programmable non-isolated, temperature transmitter with additional voltage and resistance input. Its robust design and high quality gives good performance and accuracy also under harsh conditions.

MinIPAQ R230 supports communication via NFC (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

- Accepts RTD, T/C, mV and Ω
- Sensor error and system (sensor/transmitter) error correction for highest total accuracy
- Configuration via PC, NFC or Bluetooth® without external power
- Runtime counter - hour counter for elapsed operational time
- Rugged design tested for 5 g vibrations
- High security - Password protection and date of changes logged

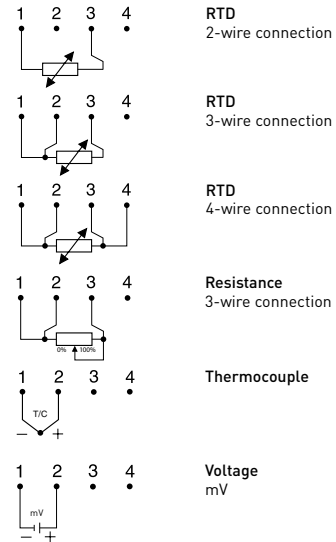
Specifications:

Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 $\leq X \leq 1000$ ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ²⁾ , Ni120 ³⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ²⁾	-50 to +180 °C / -58 to +356 °F
Input Resistance	0 to 4000 Ω
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
RTD	10 °C / 18 °F
T/C, mV	2 mV
Output	4-20 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	No
Power supply	8.0...36.0 VDC
Typical accurac., (RTD)	Max. of ± 0.15 K or ± 0.15 % of span
Mounting	35 mm DIN rail acc. to EN 60715

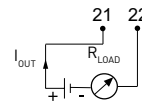
¹⁾ IEC 60751, ²⁾ DIN 43760, ³⁾ Edison Curve No. 7

Input connections

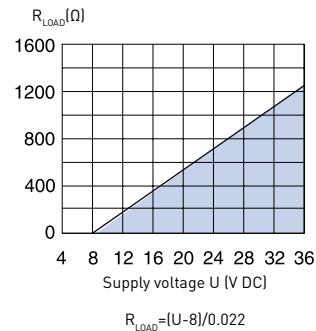
See data sheet for more alternatives



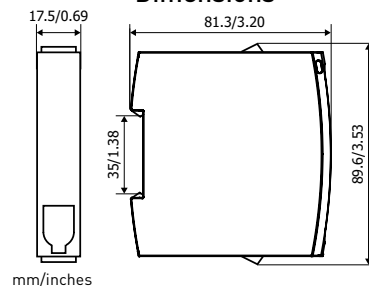
Output connections



Output load diagram



Dimensions



Ordering information

MinIPAQ R230	70R2300011
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001



IPAQ R330

Universal Programmable 2-wire transmitter



IPAQ R330 is a universal, isolated, temperature transmitter with additional voltage and resistance input. Its robust design and high quality gives excellent performance and accuracy also under harsh conditions. IPAQ R330 supports communication via NFC® (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

- High accuracy and long term stability
- 50-point Customized Linearization and Callendar-Van Dusen
- Accepts RTD, T/C, mV and Ω
- Sensor error and system (sensor/transmitter) error correction for highest total accuracy
- Low temperature drift
- Configuration via USB, without external power
- Runtime counter - hour counter for elapsed operational time
- Rugged design tested for 5 g vibrations
- High security - Password protection and date of changes logged
- Accepts mA input signals within -1 to +100 mA when used with Adapter mA
- Acts like a passive isolator (isolation transmitter) with a 2-wire loop-powered 4-20 mA output
- Suitable for direct connection to an active input module of a control system

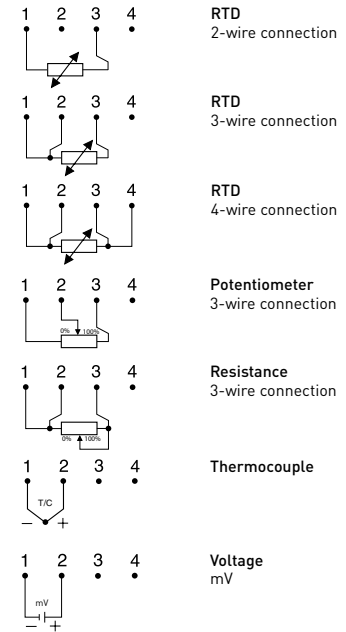
Specifications:

Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX $10 \leq X \leq 1000$ ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Pt100 ($\alpha = 0.003916$) ²⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ³⁾ , Ni120 ⁴⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ³⁾	-50 to +180 °C / -58 to +356 °F
Cu10 ⁵⁾	-50 to +200 °C / -58 to +392 °F
Input Resistance / potentiometer	0 to 10000 Ω / 100 to 10000 Ω
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
Pt100, Pt1000, Ni100, Ni1000	10 °C / 18 °F
Resistance / potentiometer	10 Ω / 10 %
T/C, mV	2 mV
Output	4-20 mA / 20-4 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	1500 VAC, 1 min
Power supply	IPAQ R330 8.0...36.0 VDC
	IPAQ R330X 8.0...30.0 VDC
Intrinsic safety	
IPAQ R330X ATEX:	II 1 G Ex ia IIC T6...T4 Ga
IPAQ R330X IECEx:	Ex ia IIC T6...T4 Ga
IPAQ R330X FM US:	IS CL I Div 1 GP A-D, T6...T4 ⁴⁾
IPAQ R330X FM CA:	CL I Zn 0 AEx/Ex ia IIC T6...T4 Ga ⁴⁾
Typical accuracy	± 0.08 °C or ± 0.08 % of span
Mounting	35 mm DIN rail acc. to EN 60715

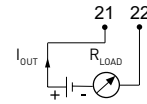
¹⁾ IEC 60751, ²⁾ JIS C 1604, ³⁾ DIN 43760, ⁴⁾ Edison No. 7, ⁵⁾ Edison No. 15, ⁶⁾ T6...T4 are depending on effect

Input connections

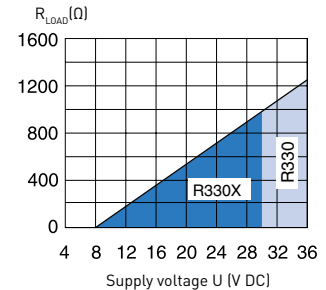
See data sheet for more alternatives



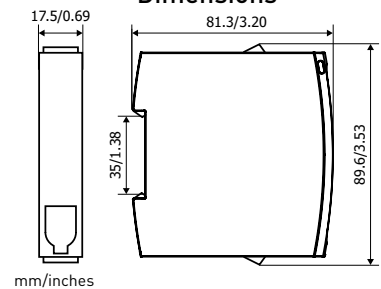
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ R330	70R3300012
IPAQ R330X (ATEX, IECEx)	70R330X012
IPAQ R330X (cFmus, ATEX, IECEx)	70R330F012
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001
Adapter mA, adapter for mA input signal	70ADA00051

IPAQ R530

Smart HART-compatible 2-wire Transmitter



IPAQ R530 is a modern, HART® temperature transmitter developed to meet the highest standards of accuracy and reliability. A universal transmitter compatible with RTD, thermocouples, voltage and potentiometer sensors. It is fully compatible with HART® 7 and offers extended diagnostic information, for example device error, sensor and wiring conditions.

IPAQ R530 supports communication via NFC® (Near-field communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

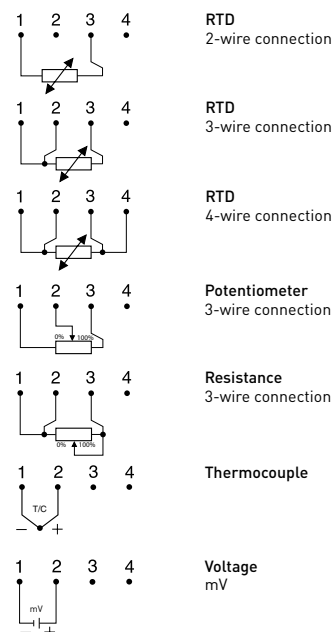
- High accuracy and long term stability
- Accepts RTD, T/C, mV and ohm
- Sensor error correction
- 50-point Customized Linearization and Callendar-Van Dusen
- Low temperature drift
- High security - Password protection and date of changes logged
- Configuration via USB, without external power
- Runtime counter - hour counter for elapsed operational time
- Communicates with HART Communicator or PC via HART modem
- Integrated in Emerson AMS and Siemens PDM systems

Specifications:

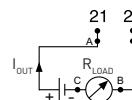
Input RTD	2-, 3-, 4-wire connection
Pt100 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
PtX 10 ≤ X ≤ 1000 ($\alpha = 0.00385$) ¹⁾	-200 to +850 °C / -328 to +1562 °F
Pt100 ($\alpha = 0.003916$) ²⁾	-200 to +850 °C / -328 to +1562 °F
Ni100 ³⁾ , Ni120 ⁴⁾	-60 to +250 °C / -76 to +482 °F
Ni1000 ³⁾	-50 to +180 °C / -58 to +356 °F
Cu10 ⁵⁾	-50 to +200 °C / -58 to +392 °F
Input Resistance / potentiometer	0 to 10000 Ω / 100 to 10000 Ω
Input Thermocouples	Types B, C, D, E, J, K, N, R, S, T
Input mV	-10 to +1000 mV
Sensor failure	Upscale (≥21.0 mA) or downscale (≤3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	
Pt100, Pt1000, Ni100, Ni1000	10 °C / 18 °F
Resistance / potentiometer	10 Ω / 10 %
T/C, mV	2 mV
Output	4-20 mA / 20-4 mA, temperature linear
Operating temperature	-40 to +85 °C / -40 to +185 °F
Galvanic isolation	1500 VAC, 1 min
Power supply	IPAQ R530 8.5...36.0 VDC
	IPAQ R530X 8.5...30.0 VDC
Intrinsic safety	
IPAQ R530X ATEX:	II 1G Ex ia IIC T6...T4 Ga
IPAQ R530X IECEx:	Ex ia IIC T6...T4 Ga
IPAQ R530X FM US:	IS CL I Div 1 GP A-D, T6...T4 ⁴⁾
IPAQ R530X FM CA:	CL I Zn 0 AEx/Ex ia IIC T6...T4 Ga ⁴⁾
Typical accuracy	±0.08°C or ±0.08% of span
Mounting	35 mm DIN rail acc. to EN 60715

¹⁾ IEC 60751, ²⁾ JIS C 1604, ³⁾ DIN 43760, ⁴⁾ Edison No. 7, ⁵⁾ Edison No. 15, ⁶⁾ T6...T4 are depending on effect

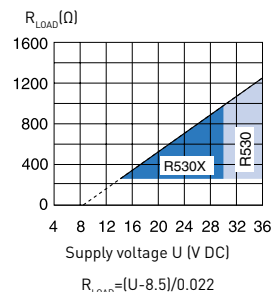
Input connections



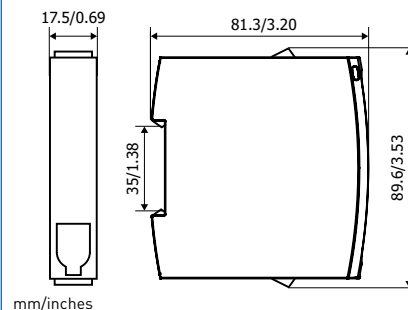
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ R530	70R5300010
IPAQ R530X (ATEX, IECEx)	70R530X010
IPAQ R530X (cFmus, ATEX, IECEx)	70R530F010
ICON-X, PC configuration kit	70CFGUSX01
ICON-BT, Bluetooth® configuration kit	70CFGBT001

IPAQ R520

Smart HART-compatible Dual-input 2-wire Transmitter



The IPAQ R520 transmitters are universal, isolated, dual-input temperature transmitters with additional voltage and resistance input. R520X/R520XS are Intrinsically Safe versions for use in Ex-Zone 1 and 2. The transmitters are compatible with the HART 6 protocol. Typical characteristics are the high accuracy, stability and reliability combined with a robust housing.

- Universal, dual-input for RTD and T/C
- SIL 2 compatible according to IEC 61508-2
- 5 year guaranteed stability
- Withstands vibrations up to 5 g
- Complies with NAMUR NE 21, NE 43, NE 53, NE 89 and NE 107
- EMC immunity according to Criteria A
- Sensor Backup
- Sensor Drift Monitoring
- Sensor Isolation Monitoring
- Sensor Matching
- 50 point customized linearization
- Integrated in Emerson AMS and Siemens PDM systems

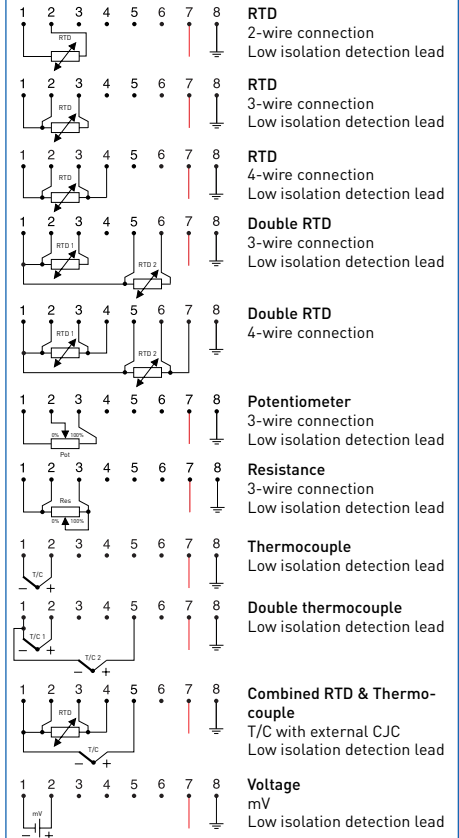
Specifications:

Input RTD		
Pt100	(IEC 60751, $\alpha=0.00385$)	-200 to +850 °C
PtX (10 ≤ X ≤ 1000)	(IEC 60751, $\alpha=0.00385$)	Corresp. to max. 4000 Ω
Pt100	(JIS C 1604, $\alpha=0.003916$)	-200 to +850 °C
Ni100	(DIN 43760)	-60 to +250 °C
Ni120	(Edison Curve No. 7)	-60 to +250 °C
Ni1000	(DIN 43760)	-50 to +180 °C
Cu10	(Edison Cu Windings No. 15)	-50 to +200 °C
Input connections	One sensor	2-, 3- and 4-wire connection
	Two sensors	2-, 3- and 4-wire connection
Input Thermocouple	T/C types	B, C, D, E, J, K, N, R, S, T
Input Resistance	Potentiometer	100 to 4000 Ω, 2-, 3- and 4-wire connection
Input Voltage		-10 to +1000 mV
Double inputs for RTD and Thermocouple		
Measure mode		T1 or T2 or difference, average, min, max of T1 and T2
Sensor Redundancy		Automatic switchover to undamaged sensor
Sensor Drift Monitoring		Adjustable maximum temp. difference T1-T2
Output		
Output signal	Temperature linear	4-20 mA, 20-4 mA or customized
NAMUR compliance	Measure and fail currents	NAMUR, NE 43
Test output		mA meter with impedance ≤10 Ω
Galvanic isolation		1500 VAC, 1 min
Ex-classifications	R520X/R520XS	ATEX: II 2(1)G Ex ia [ia Ga] IIC T6...T4 Gb ¹⁾
		IECEx: Ex ia [ia Ga] IIC T6...T4 Gb ¹⁾
Power supply	R520/R520S	10.0...36.0 VDC, Standard power supply
	R520X/R520XS	10.0...30.0 VDC, I.S. power supply
Ambient temperature	Storage/operation	-20 to +70 °C
Accuracy	RTD (Pt and Ni sensors)	Max. of ±0.1 °C or ±0.05 % of span
	Thermocouple	Typical ±0.05 % of span
	Resistance/voltage	See data sheet
Long-term stability		Max. drift: ±0.05 % of span / 5 years
Mounting		35 mm DIN rail acc. to EN 60715

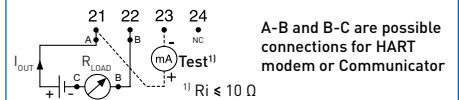
¹⁾ For Tambient, see the manual

Input connections

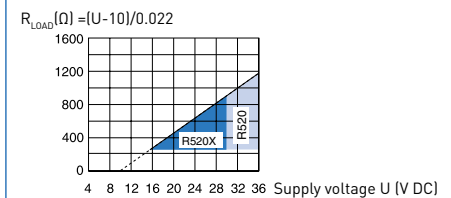
See data sheet for more alternatives



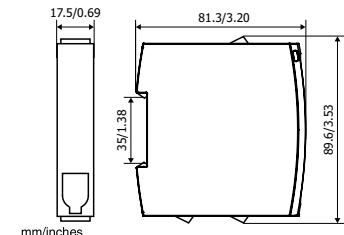
Output connections



Output load diagram



Dimensions



Ordering information

IPAQ R520	70R5200010
IPAQ R520S, SIL 2 compatible	70R5200S10
IPAQ R520X (ATEX, IECEx)	70R520X010
IPAQ R520XS, SIL 2 compatible (ATEX, IECEx)	70R520XS10
ICON-X, PC configuration kit	70CFGUSX01

IPAQ R460

4-wire transmitter for resistance thermometers and thermocouples



IPAQ R460 is a programmable 4-wire (separately powered) transmitter. It converts Pt, Ni, KTY and TC sensor signals as well as potentiometer, resistor and mV signals to isolated standard signals.

IPAQ R460 can be programmed either via the PC-Software INOR-Set or via DIP-switches (limited number of sensors and ranges). Power supply is not necessary during PC configuration. The auxiliary power can be supplied via the connection terminals or via the In-Rail-Bus connector. The status of power supply and sensor connection will be displayed by a LED on the transmitter front.

- Complete programmable via USB-interface or selectable per DIP-switch
- Switchable service functions for easy commissioning
- 3-port isolation
- Protection against measurement errors due to earthing problems and interference voltage carry-over
- Extremely slim design 6.2 mm narrow bayed housing for simple and space-saving top-hat rail mounting
- In-Rail-Bus connector for power supply allows for fast and cost-effective installation
- Safe isolation according to EN 61140 Protection of maintenance personnel and downstream equipment from impermissibly high voltage

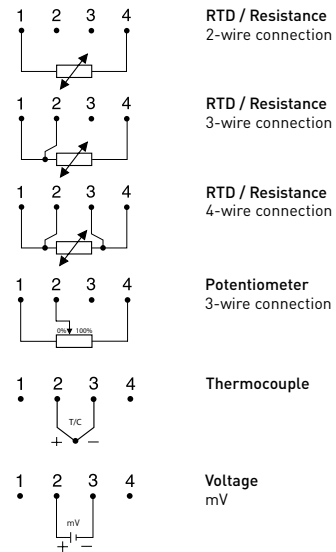
Specifications:

Input RTD and resistance	2-, 3-, 4-wire connection
Pt100, Pt200, Pt500, Pt1000 [a=0.00385] ¹⁾	-200 to +850 °C / -328 to 1562 °F
Ni100 [a=0.006180] ²⁾	-60 to +250 °C / -76 to 482 °F
Ni200, Ni500, Ni1000 [a=0.006180] ²⁾	-50 to 180 °C / -58 to 356 °F
KTY, 29 types	-50 to +150 °C / -58 to 302 °F
Resistance	0 to 5000 Ω
Potentiometer/slidewire (3-terminals)	100 Ω to 50 kΩ
Input Thermocouple	B, C, D, E, J, K, L, N, R, S, T, U
Input Voltage	-100 to +100 mV / -1000 to +1000 mV
Sensor failure	Upscale or downscale action
Adjustments – Zero	Any value within range limits
Adjustments – Minimum spans	
Pt100, Pt200, Pt500, Pt1000	10 K
Ni100, Ni200, Ni500, Ni1000	10 K
KTY types	25 K
Resistance	20 Ω
Potentiometer/slidewire (3-terminals)	10 %
T/C type B, C, D / E, J, K, L, N, R, S, T, U	100 K / 50 K
mV-Input ± 100 mV / ± 1000 mV	5 mV / 50 mV
Output	
Current (rising or falling)	0/4-20 mA, 0/2-10 mA or customized
Voltage (rising or falling)	0/2-10 V, 0/1-5 V or customized
Operating temperature	-25 to +70 °C / -13 to 158 °F
Galvanic isolation (test / working voltage)	3 kV AC, 50 Hz, 1 min / 600 V AC/DC
Power supply	24 V DC, range 9.6 to 31.2 V DC, approx. 0.8 W
Typical measuring error	
Pt / Ni sensors	<0.1 K + 0.05 % meas.val.
T/C	<0.3 K + 0.08 % meas.val. + error of CJC (<1.5 K)
Mounting	DIN-Rail 35 mm according to EN/IEC 60715

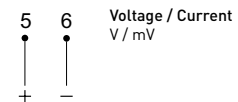
¹⁾ IEC 60751, ²⁾ DIN 43760

Input connections

See data sheet for more alternatives



Output connections



Power supply

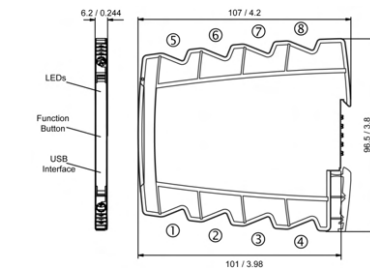
via Terminals



via In-Rail-Bus



Dimensions



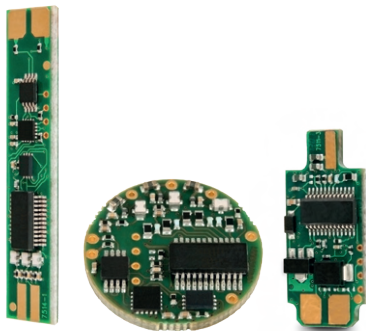
mm/inches

Ordering information

Transmitter	
IPAQ R460	70R4600010
Configuration tools	
INOR-Set, PC USB Converter	70USBIM010
INOR-Set, PC Software	www.inor.com
Accessories	
In-Rail-Bus system	See accessories

OEM202

OEM PCB, Basic Programmable 2-wire Transmitters for RTD



OEM202 are programmable temperature 2-wire transmitters in various OEM PCB-forms for integration into own equipments, such as temperature sensors, systems or machines.

The transmitters accepts inputs from both Pt100 and Pt1000 in 2-, 3- and 4-wire sensor connections.

OEM202 offers high accuracy and fast response time. The small form factor and the three different designs allows it to fit almost any application. The transmitter is connected to the process and sensor with solder pads.

- Inputs from Pt100 and Pt1000 in 2-, 3-, 4-wire connection
- Available in 3 standard form factors
- Easy-to-use Windows PC configuration software
- Available programming adapters for M12 connector, Valve connector form A and for PCB
- Configuration without external power supply
- Customizations upon request, e.g. different PCB form factor, pre-mounted connectors and cables, enable measurements with other types of RTDs

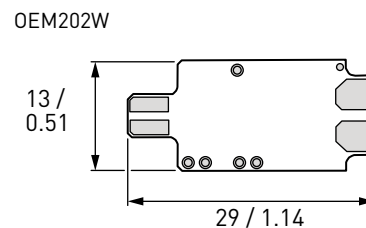
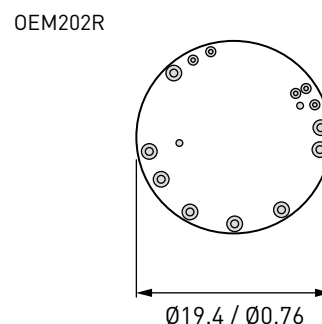
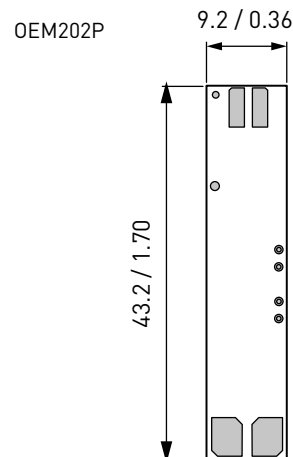
Specifications:

Input RTD	2-, 3-, 4-wire connection
Pt100 (IEC 60751, $\alpha=0.00385$)	-200... +850 °C / -328... +1562 °F
Pt1000 (IEC 60751, $\alpha=0.00385$)	-200... +850 °C / -328... +1562 °F
Output	4-20 mA / 20-4 mA, temperature linear
Sensor failure	Upscale (≥ 21.0 mA) or downscale (≤ 3.6 mA) action
Adjustments - Zero	Any value within range limits
Adjustments - Minimum spans	20 °C / 36 °F
Ambient temperature	Operating: -40...+85°C / -40... +185 °F Storage: -50...+100°C / -58... +212 °F
Humidity	0... 98% RH non condensing
Vibration	Acc. to IEC20068-2-6, test Fc, 10-2000Hz, 10g
Shock	Acc. to IEC60068-2-31, test Ec
EMC	Acc. to IEC61326-1
Typical accuracy	Max of $\pm 0,1^\circ\text{C}$ or $\pm 0,1\%$ of span
Long-term stability	Max of $\pm 0,25^\circ$ or $\pm 0,25\%$ / 5 year of span
Adjustable Filter	0.4 to 9.4 sec.
EMC	Acc. to IEC 61326-1
General data	
Galvanic isolation	No
Power supply	5.0...32.0 VDC
Permissible load	[Supply voltage-5] / 0.022



Go to
Application
Guidelines

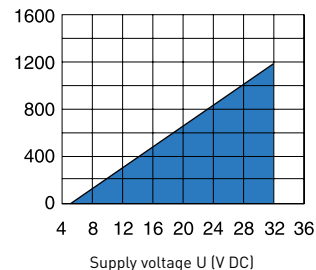
Dimensions



mm/inches

Output load diagram

$$R_{LOAD}(\Omega) = (U-5)/0.022$$



Ordering information

OEM202P	70OEM202P1
OEM202R	70OEM202R1
OEM202W	70OEM202W1



Alarm Unit with Current and Voltage Input and Double Relay Outputs



SR361 is designed for monitoring current and voltage signals in the process industry.

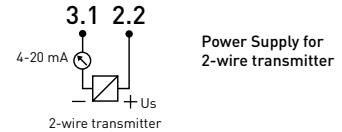
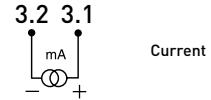
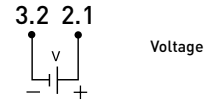
Two output relays can be configured independently or simultaneously of each other. LED's in the front indicate alarm state and correct power supply.

- Current and voltage input
- A transmitter supply is provided for the operation of 2-wire transmitters
- Two relay outputs with independent or simultaneously switch functions
- Monostable relays for safe tripping at power failure
- SPDT relays with 6 A switch capacity
- High configuration flexibility with DIP switches
- Trip levels and hysteresis adjustable from the front
- Three front LED's for trip indication and power supply monitoring
- 4 kV isolation between input, output and power supply
- Protective Separation acc. to EN 61140
- 24 V DC power supply
- DIN-rail mounting

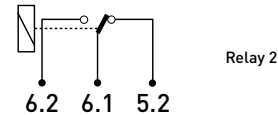
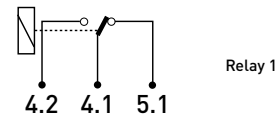
Specifications:

Input Current	0(4) to 20 mA
Input impedance	5 Ω
Maximum overload	200 mA
Input Voltage	0(2) to 10 V
Input impedance	120 kΩ
Maximum overload	300 V
2-wire Transmitter Supply +Us	16 V at U _{Power} = 24 V, [13 ... 22 V depending on the supply voltage] current limited ≤ 30 mA
Output, Relay 1 & 2	
Relay contacts	1-pole switch over contact (SPDT)
Contact rating	250 VAC / 6 A, 1500 VA 250 VDC / 0.2 A, 115 VDC / 0.3 A, 30 VDC / 6 A
Relay function	Monostable, Open/Closed-Circuit Operation (switch selectable)
Alarm functions, relay 1	High/Low alarm (switch selectable)
Alarm functions, relay 2	High/Low alarm (switch selectable)
Alarm indication	Alarm state indicated by yellow LED
Adjustable alarm set-point	0 to 110 % with 12-turn potentiometer, independently adjustable for each relay output
Adjustable hysteresis	0 to 6 % or 0 to 60 % of input span, switchable and adjustable in front
Response time	Ca. 20 ms (fixed)
Operation temperature	-20 to +60 °C / -4 to +140 °F
Galvanic isolation	
Input / power supply / relay outputs	Test Voltage: 4 kV AC Working voltage: 1 kV AC/DC for OVC II, 600 V AC/DC for OVC III)
Relay 1 / Relay 2	Test Voltage: 3 kV AC Working Voltage: 300 V AC/DC
Power supply	
Supply voltage	24 V DC, ± 15 %, approx. 1.0 W
Typical accuracy	Trip point: ±0.2 % of span
Mounting	35 mm DIN rail acc. to EN 60715

Input connections



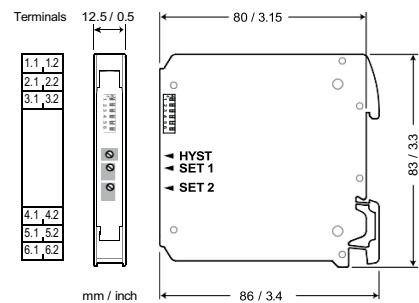
Output connections



Power supply



Dimensions



Ordering information

SR361

70SR361001

SR336

Alarm Unit with RTD Input and Double Relay Outputs



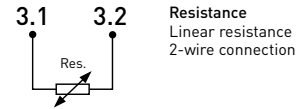
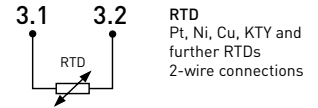
SR336 is designed for monitoring RTD sensor signals in the process industry, it accepts inputs from RTD sensors such as Pt (Pt10...Pt1000), Ni, Cu, KTY and further RTDs in 2-wire sensor connection, as well as linear resistance. Two relay outputs with synchronous trip functions are available. LEDs in the front indicate alarm state and correct power supply.

- Input for RTD sensors and resistances in 2-wire connection
- Two isolated relay outputs (synchronous switching)
- Monostable relays for safe tripping at power failure
- SPDT relays with 6 A switch capacity
- High configuration flexibility with DIP switches
- Trip level and hysteresis adjustable from the front
- Front LEDs for trip indication and power supply monitoring
- 4 kV isolation between input, output and power supply
- Protective Separation acc. to EN 61140
- 24 V DC power supply
- DIN-rail mounting

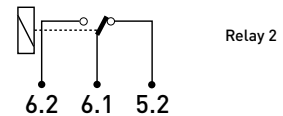
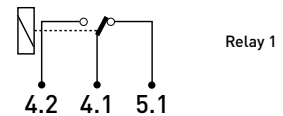
Specifications:

Input ranges (switchable)	0...300 Ω / 0...3 k Ω
Monitoring sensors	RTDs such as Pt, Ni, Cu, KTY and further RTDs and resistances
Sensor current	$\leq 1,5$ mA / 0,15 mA
Sensor connection	2-wire sensor connection, manual compensation of line resistances required
Output, Relay 1 & 2	
Relay contacts	Two isolated 1-pole relays (SPDT), with synchronous switching and functions
Contact rating	250 VAC / 6 A, 1500 VA 250 VDC / 0.2 A, 115 VDC / 0.3 A, 30 VDC / 6 A
Relay function	Monostable, Open/Closed-Circuit Operation (switch selectable)
Alarm function	High/Low alarm (switch selectable)
Alarm indication	Alarm state indicated by yellow LED
Adjustable alarm set-point	0 ... 110 % of input range with 12-turn potentiometer
Adjustable hysteresis	0 to 6 % or 0 to 60 % of input range, switchable and adjustable in front
Response time	< 50 ms
Operation temperature	-20 to +60 °C / -4 to +140 °F
Galvanic isolation	
Input / power supply / relay outputs	Test Voltage: 4 kV AC, 50 Hz, 1 min. Working voltage: 1 kV AC/DC for OVC II, 600 V AC/DC for OVC III acc. to DIN EN 61010
Relay 1 / Relay 2	Test Voltage: 3 kV AC, 50 Hz, 1 min. Working Voltage: 300 V AC/DC
Power supply	
Supply voltage	24 V DC, ± 15 %, approx. 0.7 W
Typical accuracy	Trip point error: < 0.2 % full scale
Mounting	35 mm DIN rail acc. to EN 60715

Input connections



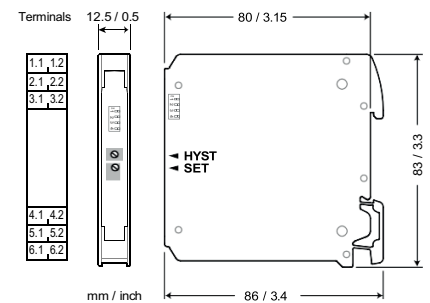
Output connections



Power supply



Dimensions



Ordering information

SR336

70SR336001

ICON-X

Ex-certified Transmitter Configuration Kit



ICON-X is a complete kit for PC configuration of all* PC programmable transmitters in the INOR product line. The kit contains the INOR USB Interface and cables, the configuration software ConSoft is a free download from our website. Communication with the connected transmitter is established automatically, without any problems to match the PC communication port to the software.

ICON-X is Ex-certified, which allows the transmitter to be configured in a safe area with the temperature sensor still connected in an explosive atmosphere.

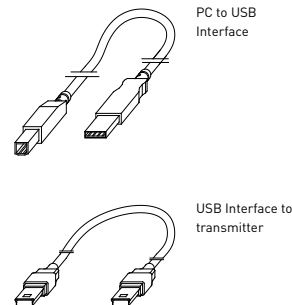
- USB communication
- Automatic matching of communication ports
- Automatic transmitter identification for quick start up
- Diagnostic LED's on the USB Interface show the communication status
- Simple installation of configuration software and drivers for the USB Interface
- Free download of the transmitter configuration software ConSoft from our website
- Protection against supply of energy in an explosive atmosphere

Specifications:

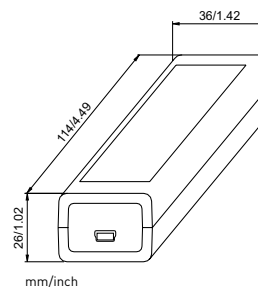
Connection (PC to USB Interface)	USB cable type A to type B (included)
Connection (USB Interface to transmitter)	USB cable type Mini-B to Mini-B (included)
Power Supply	PC's USB port, 5 VDC, 74 mA max
Ambient temperature	
Operation	0 to 50 °C / 32 to 122 °F
Storage	-20 to 70 °C / -4 to 140 °F
Humidity	0 to 90 % RH
Galvanic isolation	1500 VAC
USB compliance	1x USB 1.1 or higher port type A
System requirements	
Windows	32- or 64-bit edition of Windows 10 and above
Free hard drive space	185 MB
PC Port	1x USB 1.1 or higher port type A
Intrinsic safety	
ATEX	II (1) G [Ex ia Ga] IIC
IECEX	[Ex ia Ga] IIC
cFMus	AIS CL I, Div 1 and 2, GP A-D, CL I, Zn 0, 1 and 2, [AEx/Ex ia Ga] IIC

* Connection cables and adapters for transmitter OEM202 and compact sensors with integrated transmitter OEM202 are not included in the kit and must be ordered separately. IPAQ R460 is configured with USB Interface / Software INOR-Set.

Connection cables



USB Interface



Ordering information

ICON-X Configuration Kit (ATEX, IECEx, cFMus) 70CFGUSX01

Adapter cables and adapters ordered separately

Adapter cable	USB Interface to M12 (F)	4004430401
Adapter	M12 (M) to Valve form A	4004854101
Adapter	M12 (M) to PCB OEM202P/W	70ADA00100
Adapter	M12 (M) to PCB OEM202R	70ADA00101



ICON-BT

Configuration kit for remote configuration and monitoring



ICON-BT is a Bluetooth® modem for wireless communication between smartphones/tablets and INOR temperature transmitters. Together with the app INOR Connect, you can configure and monitor the transmitter while it is still mounted in the process. Simply plug in your ICON-BT to the USB connector on the transmitter and connect with your portable device. Thanks to the extended range that Bluetooth offers you can communicate with the transmitter remotely.

- Communication via Bluetooth®
- Great tool for service and maintenance
- Optimised for work on the field
- Small form factor of ICON-BT modem
- Live monitoring and diagnostics

Specifications:

Ambient temperature operating	-20... +50 °C / - 4...+122 °F.
Bluetooth	BLE 4.2
Size	71 x 28 x 24 mm
Weight	50 gram including batteries
DID	D038134
Included in the kit	ICON-BT, Bluetooth® modem USB-Cable Batteries Quick guide

Download Inor Connect

App Store



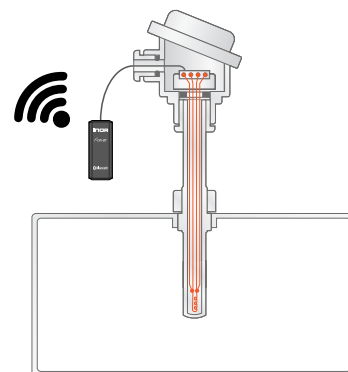
Google Play Store



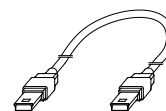
Huawei AppGallery



Installation

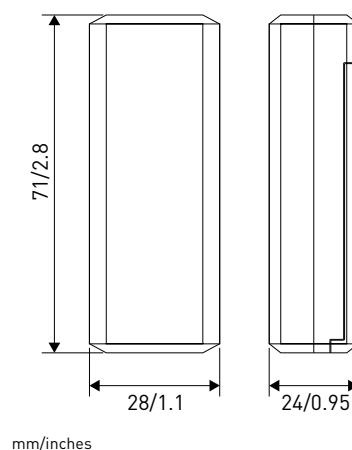


Connection cable



USB Mini-B
From Bluetooth modem
to transmitter

Dimensions



Ordering information

ICON-BT, Bluetooth® configuration kit 70CFG8T001

INOR-Set

Programming interface for IPAQ R460



Configuration Software INOR-Set

- Programming and diagnostic software for INOR transmitter IPAQ R460
- Easy configuration of all transmitter functions
- Quickly save and distribute your settings
- Programming without further transmitter wiring and power supply
- Documentation of the measuring point
- USB driver included in the installation file
- Runs on Windows 8.1 or higher
- Diagnostic and simulation functions for the transmitter helping the integration into your system
- Displays connection charts depending on your settings
- Visualization of the set transmission function
- Simple creation of configuration protocols

Configuration PC-Software INOR-Set is available for free download from our website.

USB-Interface INOR-Set

- USB-Interface for programming INOR transmitter IPAQ R460
- Connects to a PC's USB type A port
- Galvanic isolation (Test voltages AC 4 kV, 1 minute)
- Power supplied from the PC's USB-port
- No extra cables or adapters needed

Protocol of Programming

Point of measuring	
Device	Temp./Univ. Transmitter IPAQ-R460-6MM-Uni
Firmware	
Sensor	Pt 100
Compensation	3-wire
Measuring range	
Begin of measuring range	0,0 °C
End of measuring range	100,0 °C
Output	4 ... 20 mA
Characteristics	rising
On Error	22 mA; upscale

DIP switches

S1: 1 2 3 4 5 6 7 8 9 10

S2: 1 2 3 4 5 6 7 8 9 10

15.11.2022

Signature _____

Date

INORset :: IPAQ-R460-6MM-Uni :: INOR Process AB
File Device Settings Help

Temp./Univ. Transmitter IPAQ-R460-6MM-Uni

Sensor type: Pt 100

Connector: 3-wire

Measuring range: 0,0 °C to 100,0 °C

Open file
Load from device

Save dataset
Save into device

Point of measuring

Output: 4 ... 20 mA

Characteristics: rising

On Error: 22 mA; upscale

S1: 1 2 3 4 5 6 7 8 9 10

S2: 1 2 3 4 5 6 7 8 9 10

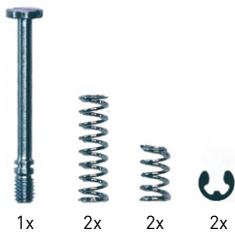
Ordering information

USB-Interface INOR-Set

70USBIM010

Mounting Accessories

Head mounting kit



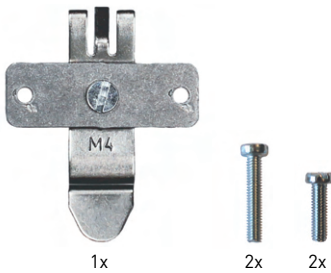
In-head mounting kit, e.g. in DIN B heads, that fits all INOR In-head transmitters

Ordering information

Head mounting kit 70ADA00017



Rail clip - heavy duty

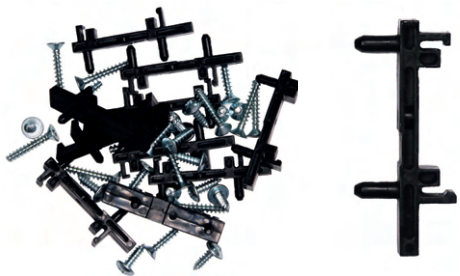


- Rail clip with heavy duty aluminium plate to mount in-head transmitter on 35 mm DIN rail.
- Fits all in-head transmitters

Ordering information

Rail clip, heavy duty 70ADA00013

Rail clip - with general purpose

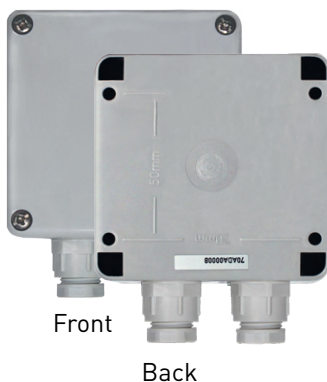


- Rail clip made of PA6 to mount in-head transmitter on 35 mm DIN rail.

Ordering information

Rail clip	Fits MinIPAQ C230, IPAQ C310RTD/C330/C520/C530	70ADA00015
Rail clip (10 pcs / set)	Fits All INOR In-Head transmitters (with fastening screw for APAQ C130)	70ADA00027

Surface mount box

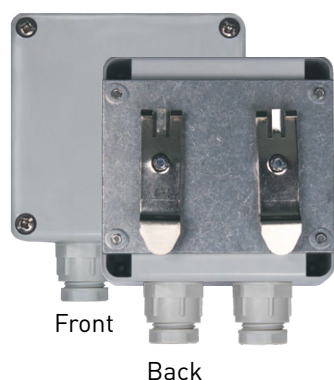


- Field box for In-head Transmitters
- For surface mounting
- Measurements: D:55/2.17, H:100/3.94, W:82/3.23 mm/inches
- Fits all in-head transmitters

Ordering information

Surface mount box 70ADA00008

Rail mount box



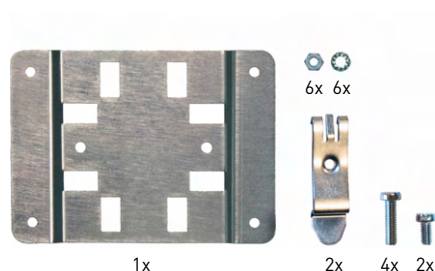
- Field box for In-head Transmitters
- For mounting on a 35 mm DIN rail
- Measurements: D:55/2.17 H:100/3.94 W:82/3.23 mm/inches
- Fits all in-head transmitters

Ordering information

Rail mount box

70ADA00009

DIN Rail mounting kit



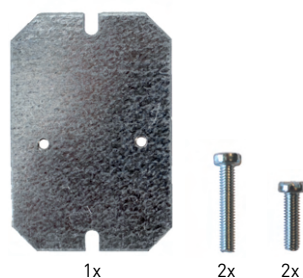
Kit for mounting Indicator LCD-W110 on a 35 mm DIN rail

Ordering information

DIN Rail mounting kit

70ADA00022

Transmitter mounting kit



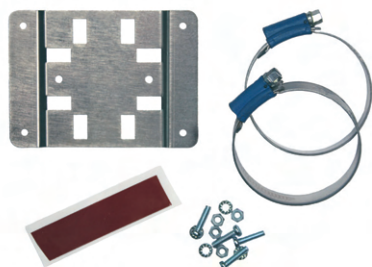
Kit for mounting an In-head transmitter inside Indicator LCD-W110

Ordering information

Transmitter mounting kit

70ADA00024

Pipe mounting kit



Kit for mounting Indicator LCD-W110 on pipes

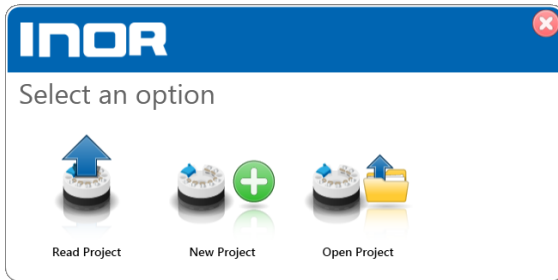
- Clamping range 50 - 65 mm

Ordering information

Pipe mounting kit

70ADA00021

ConSoft - INOR Configuration Software



Consoft is an intuitive tool for safe and simple configuration of all PC programmable INOR transmitters. The configuration software offers a wide range of functions such as real-time monitoring with logging. ConSoft is available in 5 languages making it an easy-to-use tool for many markets.

Measurements with RTDs and other resistances

The transmitters can be configured for inputs from standardized Platinum and Nickel RTDs like the ones mentioned in the list below, as well as inputs from plain resistance sensors such as potentiometers.

- Pt10 to Pt1000 acc. to IEC 60751 ($\alpha = 0.00385$)
- Pt100 ($\alpha = 0.003916$ or 0.003902)
- Ni100/Ni1000 acc. to IEC 60751

2-, 3- or 4-wire connection can be chosen and the measuring ranges are freely selectable.

Measurements with thermocouples and voltage

The configuration possibilities also cover inputs from 11 types of standardized thermocouples as well as plain mV input. The measuring ranges are freely selectable. For T/C input, the CJC (cold junction compensation) is fully automatic, by means of an accurate measurement of the terminal temperature.

Descriptions of the most common features

Filter function

The filter function provides a stable signal even in noisy environments or when the measurement varies rapidly. By measuring the average value within the set filter time, the fluctuations of the signal are reduced.

Password protection

In ConSoft you have the possibility to set password in the transmitter. The password can be 8 letters or numbers long and prevents non authorized people to do changes in the configuration of the transmitter.

Runtime counter

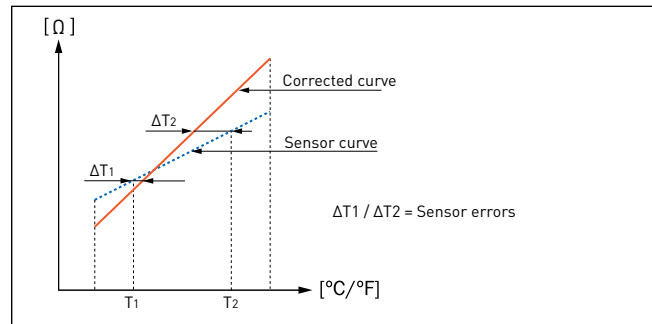
The runtime function counts the number of hours the transmitter has been in operation. This makes it easy to check how long it was since the last calibration.

Simulated output

The simulated output function makes it possible to set fixed current output during maximum time of 15 min regardless of the input signal. In that way you can ensure the function of the output. This is feature facilitates easier commissioning and troubleshooting.

Sensor error correction

Known sensor errors compared to the standard curve, e.g. for a calibrated sensor, are entered, and the transmitter automatically corrects for the sensor errors.



System error correction

This method is used to correct the system errors (sensor and/or transmitter error) by exposing the sensor to one or two accurately measured temperatures (true temperatures). The true temperature(s) and the corresponding transmitter reading(s) are entered, and the transmitter automatically corrects for the system errors.

Sensor failure detection

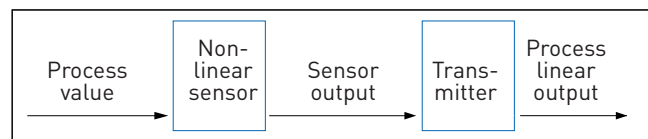
The Sensor failure detection checks the sensor leads and forces the output signal to a user defined level, if any of the sensor leads are broken or short circuited.

Customized linearization

A very accurate and versatile multi-point customized linearization is available for IPAQ 330, IPAQ 530 and IPAQ 520. It offers up to 50 linearization points. In Consoft it is also possible to use the Callendar-Van Dusen equation that describes the relationship between resistance (R) and temperature (t) of platinum resistance thermometers (RTD).

The multi-point linearization can be used to create almost any type of linearization curve for RTD, T/C, resistance and mV inputs.

By combining Customized linearization with the use of engineering units, the transmitters can be programmed to give a linear output corresponding to a specific measuring range of the primary process value.



Example of a system (sensor + transmitter) with an output linear to the process value, in spite of a non-linear sensor.

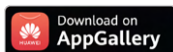
Operating system requirements

ConSoft is compatible with Windows 10 and above.

INOR Connect - App for Configuration

INOR offers a new way of configuring and monitoring your transmitter. Connect your smartphone/ tablet to your transmitter via NFC or Bluetooth® and configure it through the new app: INOR Connect. Thanks to the wireless communication, the transmitter can remain installed in the process.

With the intuitive and easy-to-use interface in the app, the work becomes a pleasure. INOR Connect offers the same great configuration capabilities as the ConSoft software but with an even more user-friendly interface. Configuration of a transmitter has never been easier and more convenient!

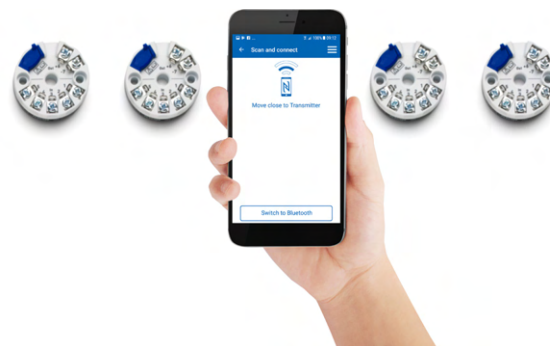


Accessible configuration tool that you always carry in your pocket.



Configure with the app: INOR Connect

In addition to the user-friendly interface, INOR Connect also offers automatic updates. That means you never have to worry about using the latest software. We have also added quick links to each product page if you need extra information about the transmitter. INOR Connect is available for both iOS and Android.



Copy and save time

The great benefit of NFC is the smooth and fast communication between the transmitter and the smartphone without any cables. INOR has taken advantage of that by creating a new function that makes it possible to copy and paste a configuration to as many transmitters as you like without making any changes and it only takes seconds.



Monitor and configure your transmitter even in the tightest mounting locations.

Remote configuration and monitoring via Bluetooth®

With ICON-BT you can configure and monitor the transmitter while it is still mounted in the process. Simply plug in your ICON-BT to the USB connector on the transmitter and connect with your smartphone. Thanks to the extended range that Bluetooth offers you can communicate with the transmitter remotely.

Great tool for service and maintenance

The wireless concept is a great tool for people working with service and maintenance as it provides a quick health check of your process. The live monitoring and diagnostics in the INOR Connect app makes it possible to follow the process temperature in real time.

In the app you can also see the ambient temperature and supply voltage the transmitter has been exposed to. This allows you to detect peaks that could damage the process control.



ICON-BT, INOR Connect and IPAQ C/R530





LCD-W110

Loop Powered LCD Indicator with backlight for field mounting



LCD-W110 is a digital indicator with backlight for installation directly in a 4-20 mA loop without need for external power. The backlight makes it easy to read and LCD-W110 comes with a high contrast LCD display. The indicator is designed for field mounting on wall, pipe or DIN rail and have a rugged and splash proof housing. The scale is easily programmable with push buttons or via NFC communication using the app INOR Connect. A temperature transmitter can be integrated for direct sensor input.

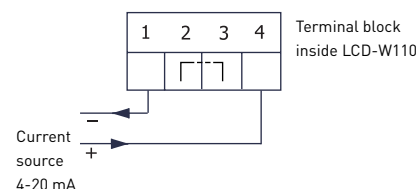
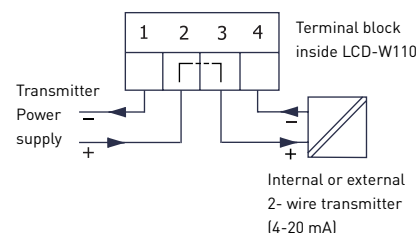
LCD-W110

- High contrast, 4-digit LCD display with 17.8 mm / 0.7" digits
- Installation directly in a 4-20 mA loop without need for separate power supply
- Loop powered backlight
- Simple scaling with push buttons or NFC communication
- Any range between -1999 to 9999 for 4 to 20 mA input
- Labels for different engineering units are included
- Typical accuracy of 0.05 % allows for high precision read-outs
- HART transparent
- Integrated transmitter as added option
- Field mounting in rugged IP65 / NEMA 4X housing with double cable conduits
- Stores max and min value

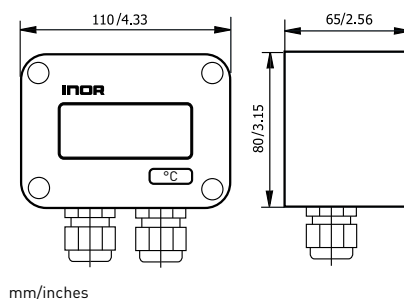
Specifications:

Input Current	4-20 mA
Maximum current	30 mA
Minimum current for operation	-3.5 mA
Voltage drop	4.2 V
Indication	
Display	7-segment black LCD with clear background
Backlight	White LED powered from the 4-20 mA loop
Indication range	4 digits (-1999 to 9999)
Digit height	17.8 mm / 0.7"
Decimals	Selectable, 0 to 3
Under range / Over range	Flashing symbols Lo ($I \leq 3.6$ mA) / HI ($I \geq 21.0$ mA)
Engineering units	Set of self-adhesive labels included for units: °C, °F, mA, mV, V, bar, mbar, Pa, kPa, MPa, pH, %, s, ms, µs, mm, cm, m
Response time	Appr. 1 s Power on delay: 5 s and stable after 1 min
Temperature influence	$\leq \pm 0.01$ % FS / °C
Configuration method	3 push buttons or NFC, located on the rear of the display
Operation temperature	-20 to +70 °C / -4 to +158 °F
Typical accuracy	$\pm 0.05\%$ of span ± 1 digit
Dimensions	80 x 110 x 65 mm / 3.15 x 4.33 x 2.56"
Protection	IP65 / NEMA 4X
Connections	Push-in spring connection, Wire cross section 0.25 mm ² -1.5 mm ² AWG 24-16
Cable entries	2x cable glands M20x1.5 for cable diameter 5-13 mm (0.20-0.51") (1x blanking plug included)
NAMUR NE 43 compliance	Yes
HART transparent	Yes
Mounting	Wall, 35 mm DIN rail acc. to EN 60715 or 50-65 mm (2-2.55") pipe with mounting kit

Connections



Dimensions



Ordering information

LCD-W110	70LCDW1102
Pipe mounting kit	70ADA00021
DIN-Rail mounting kit	70ADA00022
In-head transmitter mounting kit	70ADA00024

LCD-H210

Digital Loop Powered LCD Indicator Integrated into a Connection Head



LCD-H210 is a digital loop powered LCD indicator integrated into a sensor connection head with window. The LCD indicator is installed directly in a 4-20 mA loop without need for external power supply and the sensor connection head is designed to be fitted to a temperature sensor.

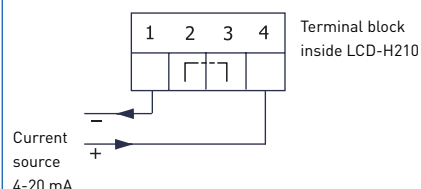
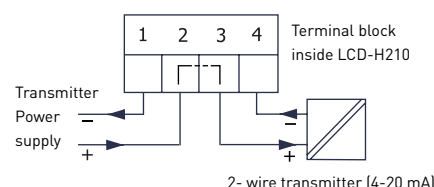
A typical application is to use LCD-H210 fitted to a temperature sensor and connected to the 4-20 mA loop from a 2-wire temperature transmitter for local view of the measured temperature. The indicator is equipped with a high-contrast, easy-to-read 4-digit LCD display with backlight for easy reading of the process value.

- * High contrast, 4-digit LCD display with 8.9 mm / 0.35" digit height
- * Loop powered backlight
- * Any range between -1999 to 9999 for 4 to 20 mA input
- * HART transparent
- * Aluminum connection head with window
- * Type DIN B head mounted 2-wire transmitter can be integrated
- * Designed for installation on a temperature sensor
- * High accuracy allows for high precision read-outs
- * Customized versions on request
- * LCD-H210 can be ordered pre-fitted to a temperature sensor, with a built-in temperature transmitter and in customized versions on request

Specifications:

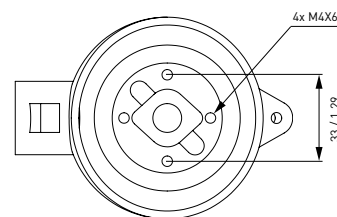
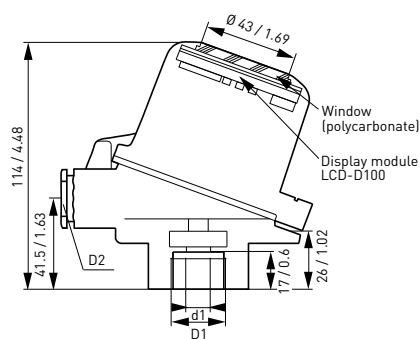
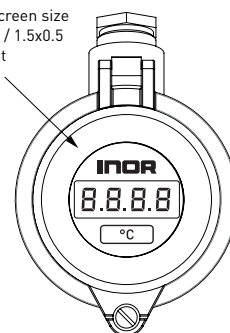
Display module	
Type	INOR model LCD-D100
Input Current	4-20 mA
Maximum current	30 mA
Minimum current for operation	~3.5 mA
Voltage drop	4.5 V
Indication	
Display	7-segment black LCD with clear background
Backlight	White LED powered from the 4-20 mA loop
Indication range	4 digits [-1999 to 9999]
Digit Height	8.89 mm / 0.35"
Decimals	Selectable, 0 to 3
Display rotation possibility	180°
Underrange / Overrange	Flashing symbols Lo ($I \leq 3.6$ mA) / HI ($I \geq 21.0$ mA)
Response time	Appr. 1 s, Power on delay: 5 s and stable after 1 min
Temperature influence	$\leq \pm 0.01$ % FS / °C
Configuration method	3 push buttons or NFC, located on the rear of the display
Typical accuracy	± 0.05 % of span ± 1 digit
Operation temperature	-20 to +70 °C / -4 to +158 °F
NAMUR NE 43 compliance	Yes
HART transparent	Yes
Electrical connection	Push-in spring connections, Wire cross section 0.25 mm ² -1.5 mm ²
Connection head	
Type	INOR model BUZ-HW
Material of body / window	Aluminium pressure die-casting / Polycarbonate
Cable gland thread D2	M20x1.5
Process connection thread D1 / Hole d1	M24x1.5 / Ø14 mm
Paint type/colour	Polyester/white aluminium (RAL 9006)
Protection class	Up to IP65 (depending on applied cable gland and sealing)

Electrical connections to the indicator



Dimensions connection head

Display screen size
39.5x14.0 / 1.5x0.5
Digit height
8.9 / 0.35



mm / inch

Ordering information

LCD-H210	70LCDH2101
LCD-H210 - Customized	On request
LCD-D100 - Display module only*	70D1000001

* See the LCD-H210 manual for more information



LCD-H300 AL

Loop Powered Heavy-duty LCD Field Indicator in Aluminium



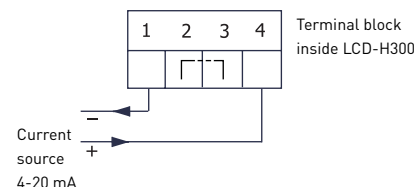
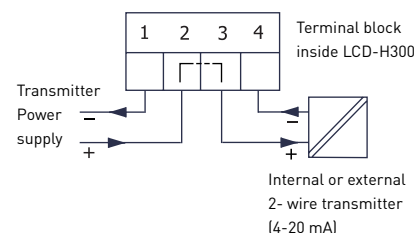
LCD-H300 is a field mounted digital loop powered LCD indicator for installation directly in a 4-20 mA loop without need for external power supply. The field indicator is used to show numerical values proportional to the signal current from any type of signal transmitter or device producing 4-20 mA. The robust instrument housing is suitable for industrial environment and contains a high-contrast, easy-to-read 4-digit LCD display with backlight. Programming of the indicator is done with push buttons or with a smartphone via NFC.

- High contrast, 4-digit LCD display with 8.9 mm / 0.35" digit height
- Loop powered backlight
- Installation directly in a 4-20 mA loop without need for separate power supply
- Simple scaling with push buttons or NFC communication
- Any range between -1999 to 9999 for 4 to 20 mA input
- Labels for different engineering units are included
- High accuracy allows for high precision read-outs
- HART transparent
- Robust Aluminum instrument housing with up to IP68
- Designed for field mounting on wall or pipe
- 3x M20 or 3x 1/2 NPT threaded ports
- Type DIN B head mounted 2-wire transmitter can be integrated
- Customized versions on request

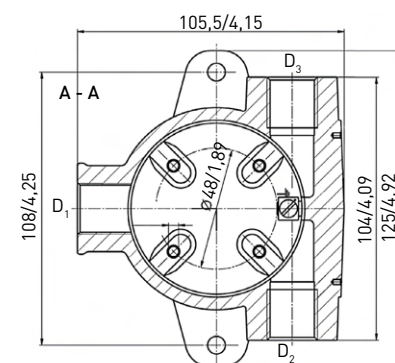
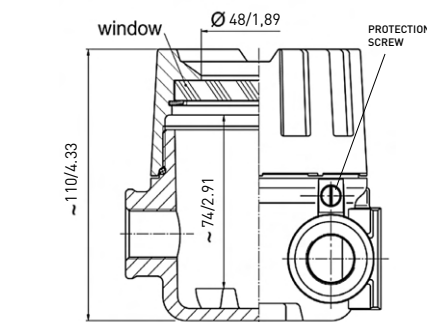
Specifications:

Input Current	4-20 mA
Maximum current	30 mA
Minimum current for operation	~3.5 mA
Voltage drop	4.5 V
Indication	
Display	7-segment black LCD with clear background
Backlight	White LED powered from the 4-20 mA loop
Indication range	4 digits (-1999 to 9999)
Digit height	8.89 mm / 0.35"
Decimals	Selectable, 0 to 3
Under range / Over range	Flashing symbols Lo ($I \leq 3.6$ mA) / HI ($I \geq 21.0$ mA)
Engineering units	Set of self-adhesive labels included for units: °C, °F, mA, mV, V, bar, mbar, Pa, kPa, MPa, pH, %, s, ms, µs, mm, cm, m
Response time	Appr. 1 s, Power on delay: 5 s and stable after 1 min
Temperature influence	$\leq \pm 0.01$ % FS / °C
Configuration method	3 push buttons or NFC, located on the rear of the display
Operation temperature	-20 to +70 °C / -4 to +158 °F
Typical accuracy	± 0.05 % of span ± 1 digit
NAMUR NE 43 compliance	Yes
HART transparent	Yes
Protection	Up to IP68 (depending on applied cable glands and sealing)
Mounting	Wall mount or pipe mount (with pipe mounting bracket)
Enclosure	
Material of body, cover and O-ring	Aluminium pressure die-casting, sealing silicone VMQ rubber gasket
Coating	Chromating and chemically resistant paint (outside only)
Paint	Spray Epoxy, Color RAL 9006 White aluminium
Connections	Push-in spring connection, Wire cross section 0.25 mm ² -1.5 mm ² AWG 24-16
Threaded ports (threads only)	3x M20x1.5 or 3x 1/2 NPTmod

Connections



Dimensions



mm/inches

Part no.	Thread entry D1	Thread entry D2, D3
70LCDH3001	M20x1.5 6H	M20x1.5 6H
70LCDH3002	1/2 NPTmod	1/2 NPTmod

Ordering information

LCD-H300 - M20x1.5	70LCDH3001
LCD-H300 - 1/2 NPT	70LCDH3002
LCD-H300 - Customized	On request
Mounting bracket for pipe Ø 1.5"-2"	4003435101

LCD-H300 SS

Loop Powered Heavy-duty LCD Field Indicator in Stainless Steel



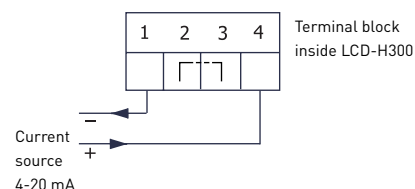
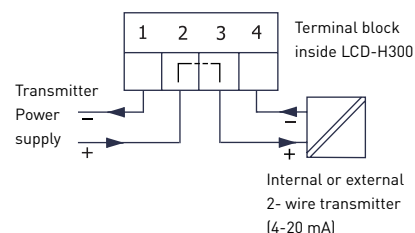
LCD-H300 is a field mounted digital loop powered LCD indicator for installation directly in a 4-20 mA loop without need for external power supply. The field indicator is used to show numerical values proportional to the signal current from any type of signal transmitter or device producing 4-20 mA. The robust instrument housing is suitable for industrial environment and contains a high-contrast, easy-to-read 4-digit LCD display with backlight. Programming of the indicator is done with push buttons or with a smartphone via NFC.

- High contrast, 4-digit LCD display with 8.9 mm / 0.35" digit height
- Loop powered backlight
- Installation directly in a 4-20 mA loop without need for separate power supply
- Simple scaling with push buttons or NFC communication
- Any range between -1999 to 9999 for 4 to 20 mA input
- Labels for different engineering units are included
- High accuracy allows for high precision read-outs
- HART transparent
- Robust Stainless steel instrument housing with up to IP68
- Designed for field mounting on wall or pipe
- 3x M20 or 3x 1/2 NPT threaded ports
- Type DIN B head mounted 2-wire transmitter can be integrated
- Customized versions on request

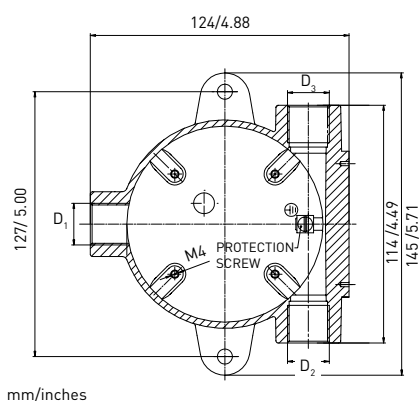
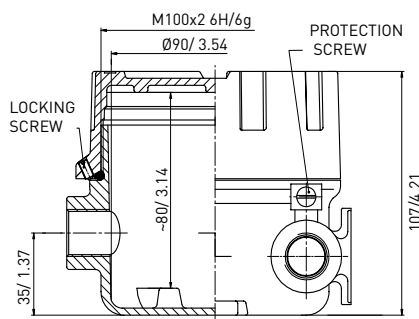
Specifications:

Input Current	4-20 mA
Maximum current	30 mA
Minimum current for operation	~3.5 mA
Voltage drop	4.5 V
Indication	
Display	7-segment black LCD with clear background
Backlight	White LED powered from the 4-20 mA loop
Indication range	4 digits (-1999 to 9999)
Digit height	8.89 mm / 0.35"
Decimals	Selectable, 0 to 3
Under range / Over range	Flashing symbols Lo ($I \leq 3.6$ mA) / HI ($I \geq 21.0$ mA)
Engineering units	Set of self-adhesive labels included for units: °C, °F, mA, mV, V, bar, mbar, Pa, kPa, MPa, pH, %, s, ms, µs, mm, cm, m
Response time	Appr. 1 s, Power on delay: 5 s and stable after 1 min
Temperature influence	$\leq \pm 0.01$ % FS / °C
Configuration method	3 push buttons or NFC, located on the rear of the display
Operation temperature	-20 to +70 °C / -4 to +158 °F
Typical accuracy	± 0.05 % of span ± 1 digit
NAMUR NE 43 compliance	Yes
HART transparent	Yes
Protection	Up to IP68 (depending on applied cable glands and sealing)
Mounting	Wall mount or pipe mount (with pipe mounting bracket)
Enclosure	
Material of housing	Stainless steel DIN 1.4401, AISI 316
Material of seal	VMQ silicone rubber
Connections	Push-in spring connection, Wire cross section 0.25 mm ² -1.5 mm ² AWG 24-16
Threaded ports (threads only)	3x M20x1.5 or 3x 1/2 NPTmod

Connections



Dimensions



mm/inches

Ordering information

LCD-H300 SS

Contact INOR

Safe Potential Separation and System Integration

Based on know-how combined with an innovative approach, the IsoPAQ family of Isolators and Isolation Transmitters offers high-quality products for signal isolation in the process and automation industry. The versatility and performance of the products, such as accuracy, response time and isolation level, can be chosen to meet requirements of very cost-effective basic installations as well as applications with the highest demands on performance and safety for service personnel and connected equipment.

Extensive Range Selection

The input and output signals can easily be selected by the integrated DIP switches. For some units recalibration is not even necessary. This feature provides excellent flexibility and low storage and installation costs.

Universal Power Supply for 20 to 253 VAC/DC

The universal power supply for 20 to 253 VAC/DC (24 VAC/DC for *COMPACT LINE*) allows for a world-wide use of the IsoPAQ products. With only one version needed, storage and maintenance are simplified. The universal power supply provides immunity to voltage variations as well as mistakes in the power supply connection.

Compact Line

COMPACT LINE is a line of very compact and cost-optimized Isolators, Transmitter Repeaters and Isolating Transmitters within the IsoPAQ family.

The small dimensions - only 60 mm deep and 11.2 mm wide - and the favorable pricing allow for space saving and economic installations.

6 mm Line

The 6 mm line offers the same high standards as the other products in IsoPAQ family but in just 6.2 mm thin housing. The units can be mounted close to each other without air gap, which saves space in the cabinet and allows more devices to be installed.

In-Rail-Bus System

The In-Rail-Bus system is a user-friendly system for distributing the power supply to Signal conditioners and Isolators with integrated In-Rail-Bus connector, it can be easily integrated in the 35 mm standard DIN rail. The great benefit of the In-Rail-Bus system is that it reduces costs for wiring when it comes to connection.

Protective Separation

IsoPAQ products with the feature "Protective Separation" have a 3-port isolation with high test voltage and are designed according to EN 61010. They provide a safe protection for service personnel and downstream devices against impermissibly high voltages.

Innovative design

Thanks to an efficient and patented signal conditioning and high cut-off frequency, the IsoPAQ products have negligible distortion of the measurement signals. The input circuits are designed to minimize the load of the primary signals.

All Isolation Transmitters have linear zero crossing, which makes zero and span adjustments very easy (on transmitters with this feature) and provides accurate measurement values also close to zero.

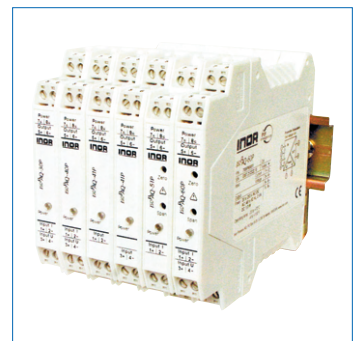
The EMC design includes no Y-capacitors, which gives an excellent decoupling of the sensor circuit even for fast input signal changes and an efficient rejection of transient interferences.

Excellent Reliability and Long Term Stability



Based on a special circuitry for the universal power supply with a special switching technique, the IsoPAQ transmitters have extremely low energy losses. Self heating is therefore strongly minimized, which also reduces the component aging efficiently. Integrated protection components and big load margins are further important features for a stable and safe operation over many years.



5 Year Warranty

As all other Inor products for signal conditioning the IsoPAQ products are supplied with a 5 year limited warranty.









IsoPAQ Selection Tables






Loop-Powered (passive) Isolators	IsoPAQ-611 Loop Powered Isolator	IsoPAQ-612 Loop Powered Isolator	IsoPAQ-11L Loop Powered Isolator	IsoPAQ-12L Loop Powered Isolator	IsoPAQ-110L Loop Powered Isolator	IsoPAQ-21L Loop Powered Isolator	IsoPAQ-22L Loop Powered Isolator
							
Page	52	52	54	54	56	58	58
One channel	✓	–	✓	–	✓	✓	–
Two channels	–	✓	–	✓	✓	–	✓
Passive input	✓	✓	✓	✓	✓	✓	✓
Input signal	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA
Output signal	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA	0(4)...20 mA
Typical accuracy	±0.1 % FS	±0.1 % FS	±0.1 % FS	±0.1 % FS	±0.15 % FS	±0.1 % FS	±0.1 % FS
Isolation voltage: test, working	3 kV AC, 600 VAC/DC	3 kV AC, 600 VAC/DC	1.5 kV AC	1.5 kV AC	2.5 kV AC, 600 VAC/DC	4 kV AC, 600 VAC/DC	4 kV AC, 600 VAC/DC
Protective separation	✓	✓	–	–	✓	✓	✓
Cut-off frequency -3 dB	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz
Response time T ₉₉	5 ms	5 ms	5 ms	5 ms	5 ms	5 ms	5 ms
Voltage drop	< 2.3 V	< 2.3 V	< 2.0 V	< 2.0 V	< 3.0 V	< 2.0 V	< 2.0 V
Power Supply	–	–	–	–	–	–	–
Operation temperature	-25...+70 °C	-25...+70 °C	-20...+70 °C	-20...+70 °C	0...+55 °C	-20...+70 °C	-20...+70 °C
Plug-in screw terminals	–	–	✓	✓	–	✓	✓
Housing dimensions (W x D x H)	6.2 x 107 x 96.5 mm	6.2 x 107 x 96.5 mm	12.5 x 111 x 99 mm	12.5 x 111 x 99 mm	11.2 x 67 x 60 mm	12.5 x 111 x 99 mm	12.5 x 111 x 99 mm

Transmitter Repeater	IsoPAQ-610 Transmitter Repeater Power Supply HART	IsoPAQ-110R Passive Transmitter Repeater
		
Page	60	62
Active input	✓	✓
Passive input	✓	✓
Input for passive signal	0(4)...20 mA* (from input 2-/3-wire transmitter)	4...20 mA (from input 2-wire transmitter)
Supply for input transmitter	16 VDC	VLoop-4.7 VDC
Input for active signal	0(4)...20 mA*	4...20 mA 2-wire Loop-Powered
Output signal	0(4)...20 mA*	Supply voltage 15-30 VDC / 4...20 mA loop
Typical accuracy	±0.1 % FS	±0.1 % FS
Isolation voltage: test, working	3 kV AC, 600 VAC/DC	2.5 kV AC, 600 VAC/DC
Protective separation	✓	✓
Cut-off frequency -3 dB	100 Hz, > 2.5 kHz HART	500 Hz
Response time T ₉₉	7 ms	2 ms
Voltage drop	–	~4.7 V
Power Supply	24 VDC	15...30 VDC Output Loop-Powered
Operation temperature	-25...+70 °C	0...+55 °C
Plug-in screw terminals	–	–
Housing dimensions (W x D x H)	6.2 x 107 x 96.5 mm	11.2 x 67 x 60 mm
In-Rail-Bus connector	✓	–

*HART transparent for 4...20 mA

Isolation Signal Splitter (signal doubler)	IsoPAQ-632 Signal Splitter/Repeater
	
Page	68
Active input	✓
Passive input	✓
Input for passive signal	0(4)...20 mA (from input 2-wire transmitter)
Supply for input transmitter	16 V
Input for active signal	0...20 mA 4...20 mA
Output signal (output 1 & 2)	0...5 V 0...10 V 1...5 V 2...10 V
Calibrated range selection via DIP switch	✓
Typical accuracy	±0.1 % FS
Isolation voltage: test, working	3 kV AC, 600 VAC/DC
Protective separation	✓
Cut-off frequency -3 dB	5 kHz
Response time T ₉₉	150 µs
Power supply	24 VDC
Operation temperature	-25...+70 °C
Plug-in screw terminals	–
Housing dimensions (W x D x H)	6.2 x 107 x 96.5 mm
In-Rail-Bus connector	✓

Isolation Transmitters	IsoPAQ-30P Universal	IsoPAQ-131P	IsoPAQ-641 Universal	IsoPAQ-40P Universal	IsoPAQ-41P
					
Page	64	66	70	72	74
Input signal	0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA
Output signal	0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA	0...10 V 0...20 mA 4...20 mA
Bipolar input	-	-	-	-	-
Bipolar output	-	-	-	-	-
Calibrated range selection via DIP switch	✓	-	✓	✓	-
Range settings via DIP switch + potentiometers	-	-	-	-	-
Fixed range as ordered	-	✓	-	-	✓
Zero/Span compensation via potentiometers	-	-	-	-	-
Typical accuracy	±0.3 % FS	±0.2 % FS	±0.1 % FS	±0.1 % FS	±0.1 % FS
Isolation voltage: test, working	2.5 kV AC, 600 VAC/DC	2.5 kV AC, 600 VAC/DC	3 kV AC, 600 VAC/DC	4 kV AC, 600 VAC/DC	4 kV, 600 VAC/DC
Protective separation	-	✓	✓	✓	✓
Cut-off frequency -3 dB [* switchable]	1 kHz	200 Hz	5 kHz / 100 Hz / 10 Hz *	1 kHz / < 30 Hz *	1 kHz
Response time T ₉₉	0.7 ms	3.5 ms	150 µs / 7 ms / 70 ms	0.7 ms / 20 ms	0.7 ms
Power supply	20-253 VAC/DC	24 VAC/DC	24 VDC	20-253 VAC/DC	20-253 VAC/DC
Operation temperature	-10...+60 °C	0...+55 °C	-25...+70 °C	-20...+70 °C	-20...+70 °C
Plug-in screw terminals	✓	-	-	✓	✓
Housing dimensions [W x D x H]	12.5 x 111 x 99 mm	11.2 x 67 x 60 mm	6.2 x 107 x 96.5 mm	12.5 x 111 x 99 mm	12.5 x 107 x 96.5 mm
In-Rail-Bus connector	-	-	✓	-	-

Isolation Transmitters	IsoPAQ-51P	IsoPAQ-661 Universal	IsoPAQ-161P	IsoPAQ-60P Universal	IsoPAQ-80S Universal, Shunt/mV
					
Page	76	78	80	82	84
Input signal	0(4)...20 mA	±10 mA 0...10 mA 0...20 mA ±20 mA 2...10 mA 4...20 mA	±5 V 0...5 V 0...10 V ±10 V 1...5 V 2...10 V	±10 mA 0...10 mA 0...20 mA ±20 mA 2...10 mA 4...20 mA	±5 V 0...5 V 0...10 V ±10 V 1...5 V 2...10 V
Output signal	0(4)...20 mA	±10 mA 0...10 mA 0...20 mA ±20 mA 2...10 mA 4...20 mA	±5 V 0...5 V 0...10 V ±10 V 1...5 V 2...10 V	±10 mA 0...10 mA 0...20 mA ±20 mA 2...10 mA 4...20 mA	±5 V 0...5 V 0...10 V ±10 V 1...5 V 2...10 V
Bipolar input	-	✓	✓	✓	✓
Bipolar output	-	✓	-	✓	✓
Calibrated range selection via DIP switch	-	✓	-	-	-
Range settings via DIP switch + potentiometers	-	-	-	✓	✓
Fixed range as ordered	-	-	✓	-	-
Zero/Span compensation via potentiometers	✓	✓	✓	✓	✓
Typical accuracy	±0.1 % FS	±0.1 % FS	±0.2 % FS	±0.1 % FS	±0.1 % FS
Isolation voltage: test, working	4 kV AC, 600 VAC/DC	3 kV AC, 600 VAC/DC	2.5 kV AC, 600 VAC/DC	4 kV AC, 1000 VAC/DC	4 kV AC, 1000 VAC/DC
Protective separation	✓	✓	✓	✓	✓
Cut-off frequency -3 dB [* switchable]	1 kHz	8 kHz / 100 Hz *	500 Hz	10 kHz / 30 Hz *	10 kHz / 30 Hz *
Response time T ₉₉	0.7 ms	100 µs / 7 ms	< 2 ms	80 µs / 20 ms	80 µs / 20 ms
Power supply	20-253 VAC/DC	24 VDC	24 VAC/DC	20-253 VAC/DC	20-253 VAC/DC
Operation temperature	-20...+70 °C	-25...+70 °C	0...+55 °C	-20...+70 °C	-20...+70 °C
Plug-in screw terminals	✓	-	-	✓	✓
Housing dimensions [W x D x H]	12.5 x 111 x 99 mm	6.2 x 107 x 96.5 mm	11.2 x 67 x 60 mm	12.5 x 111 x 99 mm	12.5 x 111 x 99 mm
In-Rail-Bus connector	-	✓	-	-	-

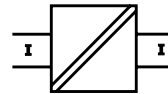
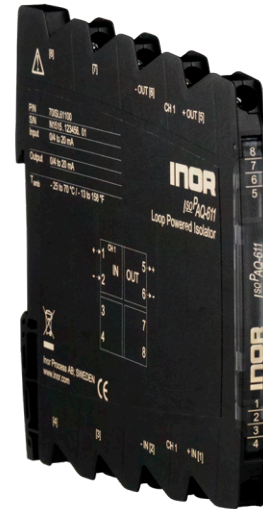
1- & 2-channel Loop Powered Isolators for separation of 0(4)-20 mA Signals

The input loop-powered isolators IsoPAQ-611/-612 provides galvanic separation for 0(4) ... 20 mA standard signals, while transferring the measurement signal to the output with a high degree of accuracy.

The unit avoids interference voltage carry-over and effectively suppressing parasitic noise. The very low drop voltage of 2.3 V and the high level of accuracy work together to make the IsoPAQ-611/-612 the first choice in system design.

Intelligent design and their consequential avoidance of highly integrated components result in extremely long service lives and reliability - without any falsification of the measurement signal.

The IsoPAQ-611/-612 requires no additional power supply since the auxiliary power is obtained from the input signal without distorting it. This not only saves costs during installation, but also increases reliability.



- **Galvanic isolation across input and output**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **No power supply required**
Saving costs since wiring is reduced and line influences are omitted
- **Extremely slim design**
Only 3.1 mm DIN-rail per channel
- **Protective Separation acc. to EN 61140**
Protects service personnel and downstream devices against impermissibly high voltage
- **Maximum reliability**
No maintenance costs



Specifications:

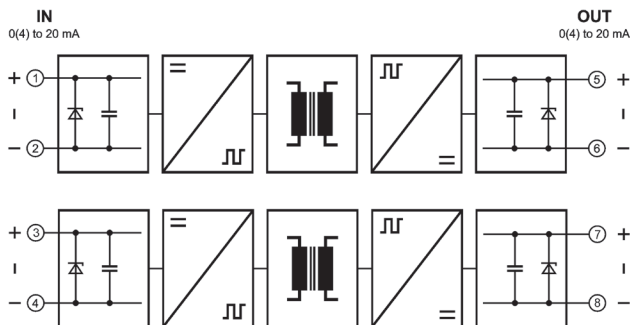
Input			
Input signal	0(4) ... 20 mA		
Start-up current	< 200 µA		
Voltage drop	Approx. 2.3 V at 20 mA		
Overload	≤ 50 mA, 30 V		
Output			
Output signal	0(4) ... 20 mA		
Load	600 Ω		
Cut-off frequency -3 dB	100 Hz		
Response time T ₉₉	5 ms		
Residual ripple	< 10 mV _{rms}		
General Data			
Transmission error	< 0.1 % full scale		
Load error	< 0.05 % of measured value / 100 Ω load		
Temperature coefficient ¹⁾	< 100 ppm/K		
Test voltage	3 kV AC, 50 Hz, 1 min. all circuits against one another		
Working voltage ²⁾ [Basic insulation]	600 V AC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010-1		
Protection against electrical shock ²⁾	Protective separation according to EN 61140 by reinforced insulation in accordance with EN 61010-1 up to 300 V AC/DC for overvoltage category II and pollution degree 2 between all circuits		
Ambient temperature	Operation	-25 to +70 °C	(-13 to +158 °F)
	Transport and Storage	-40 to +85 °C	(-40 to +185 °F)
EMC ³⁾	EN 61326-1		
Construction	6.2 mm (0.244") housing, protection class IP 20, mounting on 35 mm DIN rail acc. to EN 60715		
Weight	Approx. 70 g		

1) Average TC related to full scale value in specified operating temperature range, reference temperature 23 °C

2) For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

3) Minor deviations possible during interference

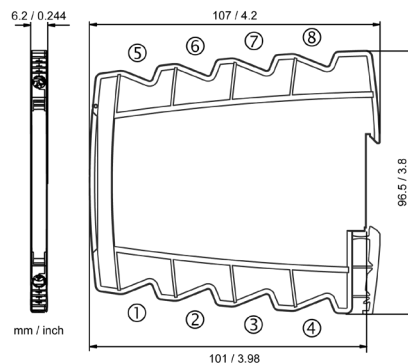
Block diagram/Connections



Ordering information

Product	Channels	Part No.
IsoPAQ-611	1-channel loop powered isolator	70ISL61100
IsoPAQ-612	2-channel loop powered isolator	70ISL61200

Dimensions



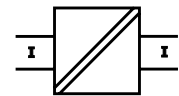
1- & 2-channel Loop Powered Isolators for Separation of 0(4)-20 mA Signals

IsoPAQ-11L and IsoPAQ-12L are 1- and 2-channel loop powered isolators used for electrical isolation of 0(4)-20 mA signals to avoid measurement errors due to different voltage potentials or ground loops in an instrument installation.

The 2-channel version, IsoPAQ-12L offers a very cost effective alternative combined with a high-density mounting.

The isolators need no power supply, which contributes to reduced installation costs compared to isolation transmitters.

The high reliability ensures a safe system operation and low maintenance costs.



- **Input to output galvanic isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **1- and 2-channel versions**
Allows for optimal cost efficiency
- **No power supply required**
Reduced wiring saves installation costs
- **Low voltage drop**
Input voltage drop of less than 2 V reduces impact on the primary current loop
- **High accuracy**
Negligible additional measurement errors in the loop
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance

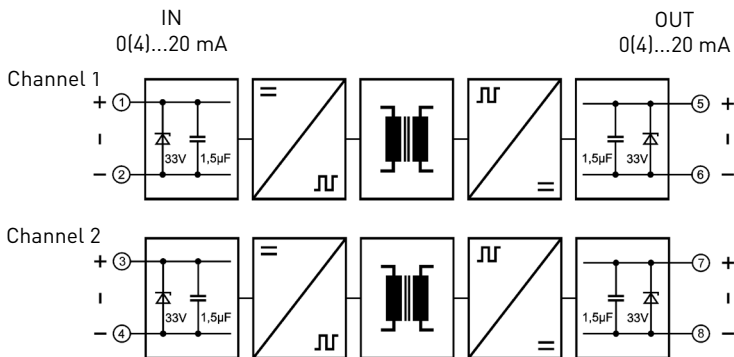
Specifications:

Input		
Input signal	0(4)-20 mA/max. 30 V	
Operating current	< 20 µA	
Voltage drop	< 2 V	
Overload	≤ 100 mA, ≤ 30 V	
Output		
Output signal	0(4)-20 mA/max. 28 V	
Response time (10 to 90 % of end value)	2 ms @ 250 Ω load/6 ms @ 750 Ω load	
Ripple	< 0.07 % of measured value, ~100 kHz	
General data		
Transmission error	± 0.1 % of end value	
Load error	± 0.03 % of measured value/100 Ω load	
Temperature coefficient ¹⁾	± 0.0015 %/K of measured value/100 Ω load	
Test voltage	1.5 kV, 50 Hz	Between all circuits
Ambient temperature	Operation	-20 to +70 °C (-4 to +158 °F)
	Transport and storage	-35 to +85 °C (-31 to +185 °F)
EMC ²⁾	EN 61326-1	
Construction	12.5 mm (0.5") housing, protection class: IP20	
Connection	≤ 2.5 mm², AWG 14	
Weight	Approx. 100 g	

1) Average TC in specified operating temperature range

2) Minor deviations possible during interference

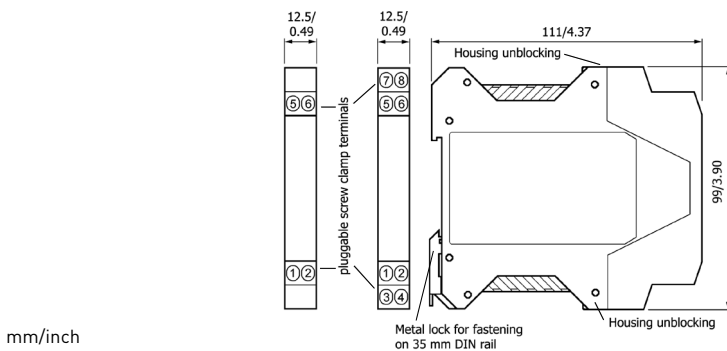
Block diagram/Connections



Ordering information

Product	Input / Output	Part No.
IsoPAQ-11L	1-channel, 0(4)-20 mA	70ISL11001
IsoPAQ-12L	2-channel, 0(4)-20 mA	70ISL12001

Dimensions



mm/inch

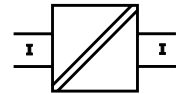
1- & 2-channel Loop Powered Isolators for 0(4)-20 mA Signals

IsoPAQ-110L is a loop powered isolator, available in 1- and 2-channel versions. It is used for electrical isolation of 0(4)-20 mA signals to avoid measurement errors due to different voltage potentials or ground loops in an instrument installation.

The 2-channel version, IsoPAQ-110L offers a very cost effective alternative combined with a high-density mounting.

The isolator need no power supply, which contributes to reduced installation costs compared to Isolation Transmitters.

The high reliability ensures a safe system operation and low maintenance costs.



Compact line

Compact line is a line of very compact and cost-optimized Isolators, Transmitter Repeaters and Isolating Transmitters within the IsoPAQ family.

The small dimensions - only 60 mm deep and 11.2 mm wide - and the favorable pricing allow for space saving and economic installations.

- **Input to output galvanic isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **1- and 2-channel versions**
Allows for optimal cost efficiency
- **No power supply required**
Reduced wiring saves installation costs
- **Fixed ranges**
Ready to use without any settings
- **Protective Separation acc. to EN 61140**
The design and high isolation level (2.5 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **Compact DIN-rail mounting**
11.2 mm (0.44") housing combined with very low self heating allows for high density mounting. With a depth of only 60 mm, compact standard boxes can be used



Specifications:

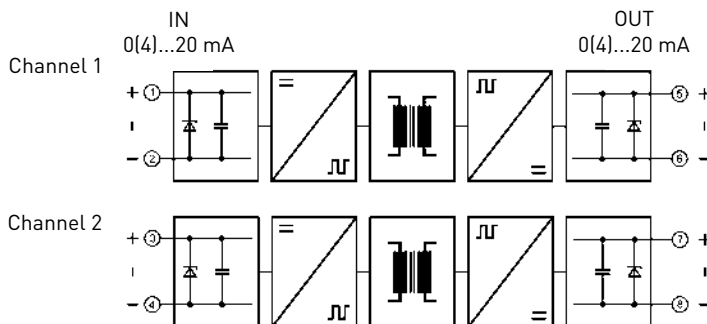
Input	
Input signal	0(4)-20 mA
Operating current	< 100 μ A
Voltage drop	< 3 V
Overload	≤ 50 mA, ≤ 15 V
Output	
Output signal	0(4)-20 mA
Load	< 600 Ω
Response time (10 to 90 % of end value)	5 ms @ 500 Ω load
Ripple	< 0.1 % of end value, ~ 100 kHz
General data	
Transmission error	± 0.1 % of end value
Load error	± 0.05 % of measured value/100 Ω load
Temperature coefficient ¹⁾	± 0.004 %/K of measured value/100 Ω load
Test voltage	2.5 kV, 50 Hz Between all circuits
Working voltage ²⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.
Ambient temperature	Operation 0 to +55 °C (32 to +131 °F) Transport and storage -25 to +80 °C (-13 to +176 °F)
EMC ³⁾	EN 61326-1
Construction	11.2 mm (0.44") housing, protection class: IP20
Connection	≤ 2.5 mm ² , AWG 14
Weight	Approx. 50 g

1) Average TC in specified operating temperature range

2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

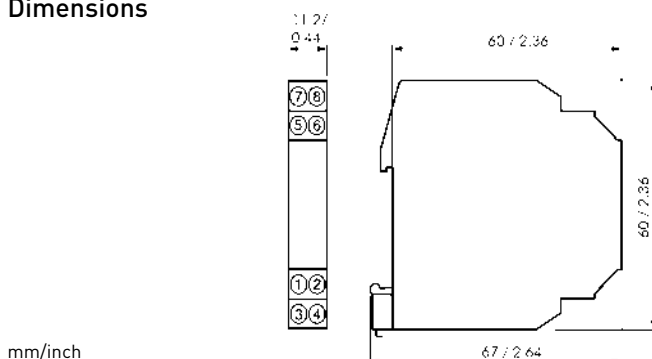
Block diagram/Connections



Ordering information

Product	Input / Output	Part No.
IsoPAQ-110L	1-channel, 0(4)-20 mA	70ISC11001
IsoPAQ-110L	2-channel, 0(4)-20 mA	70ISC11002

Dimensions



mm/inch

1- & 2-channel Loop Powered Isolators for 0(4)-20 mA Signals with High Isolation and Protective Separation

IsoPAQ-21L and IsoPAQ-22L are 1- and 2-channel loop powered isolators used for electrical isolation of 0(4)-20 mA signals to avoid measurement errors due to different voltage potentials or ground loops in an instrument installation.

The isolators need no power supply, which contributes to reduced installation costs compared to isolation transmitters.

The high isolation level of 4 kV provides an effective protection for downstream devices.

The 2-channel version, IsoPAQ-22L offers a very cost effective alternative combined with a high-density mounting.

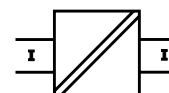
The high reliability and the Protective Separation are additional features that ensure a safe system operation.

- **Input to output galvanic isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **1- and 2-channel versions**
Allows for optimal cost efficiency
- **No power supply required**
Reduced wiring saves installation costs
- **Low voltage drop**
Input voltage drop of less than 2 V reduces impact on the primary current loop
- **Protective Separation acc. to EN 61140**
The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **High accuracy**
Negligible additional measurement errors in the loop
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance

IsoPAQ-21L



IsoPAQ-22L



Specifications:

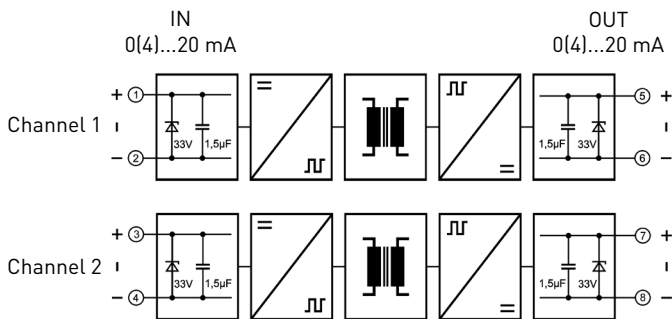
Input	
Input signal	0(4)-20 mA / max. 30 V
Operating current	< 20 μ A
Voltage drop	< 2 V
Overload	≤ 100 mA, ≤ 30 V
Output	
Output signal	0(4)-20 mA / max. 28 V
Response time (10 to 90 % of end value)	2 ms @ 250 Ω load / 6 ms @ 750 Ω load
Ripple	< 0.07 % of measured value, ~100 kHz
General data	
Transmission error	± 0.1 % of end value
Load error	± 0.03 % of measured value / 100 Ω load
Temperature coefficient ¹⁾	± 0.0015 %/K of measured value / 100 Ω load
Test voltage	4 kV, 50 Hz Between all circuits
Working voltage ²⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.
Ambient temperature	Operation -20 to +70 °C [-4 to +158 °F] Transport and storage -35 to +85 °C [-31 to +185 °F]
EMC ³⁾	EN 61326-1
Construction	12.5 mm [0.5"] housing, protection class: IP20
Connection	≤ 2.5 mm ² , AWG 14
Weight	Approx. 100 g

1) Average TC in specified operating temperature range

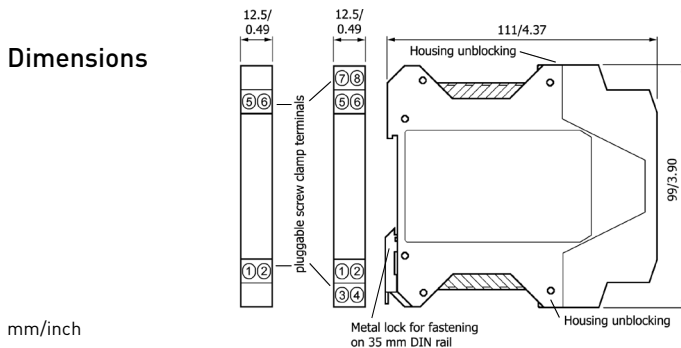
2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

Block diagram/Connections



Dimensions



Ordering information

Product	Input / Output	Part No.
IsoPAQ-21L	1-channel, 0(4)-20 mA	70ISL21001
IsoPAQ-22L	2-channel, 0(4)-20 mA	70ISL22001

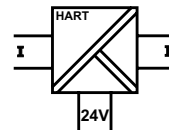
Transmitter repeater for powering and isolation of 2-,3- and 4-wire transmitters

The Repeater Power Supply IsoPAQ-610 is used to supply and separate 2- and 3-wire SMART Transmitters and active sensor signals with HART communication.

It supplies the transmitter with power and transmits the measuring signal with high accuracy galvanic isolated to the output. Alternative the measuring input accepts active 0/4 ... 20 mA signals from 4-wire transmitters.

In addition to the analog signal, the IsoPAQ-610 also transmits data protocols for HART communication. It allows bidirectional communication with the field device from every point of the cabling.

The auxiliary power can be supplied via the connection terminals or via the In-Rail-Bus connector. A green LED on the front of the unit has been provided to monitor the power supply.



- **Universal operation of SMART Transmitters**
Energization and separation of field located 2-, 3- and 4-wire transmitters
- **Bidirectional HART transmission**
HART data transfer for repeater and isolator operation
- **3-Port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **Extremely slim design**
6.2 mm slim housing for a simple and space saving installation
- **Integrated In-Rail-Bus mounting rail connector**
Allows for the power supply to be supplied via the connection terminals or via the In-Rail-Bus connector
- **Protective Separation acc. to EN61140**
Protects service personnel and downstream devices against impermissibly high voltage

Specifications:

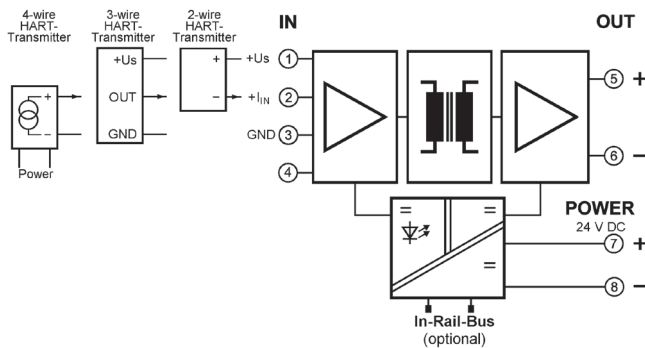
Input			
Input signal	0/4... 20 mA	(4... 20 mA with HART signal)	
Input resistance	≤50 Ω		
Over load	50 mA / 30 V		
Transmitter supply (Tx)	16 V (open circuit voltage/short circuit current < 22 V/35 mA)		
Communication signal	Bidirectional HART transmission, internal AC impedance 250 Ω		
Output			
Output signal	0/4... 20 mA	(4... 20 mA with HART signal)	
Load	0... 600 Ω (at 20 mA)	(230... 600 Ω with HART signal)	
Linear transmission range	-1... +110 %		
Residual ripple	< 10 mV _{rms}		
General Data			
Transmission error	< 0.1 % full scale		
Temperature coefficient ¹⁾	< 100 ppm/K		
Cut-off frequency -3 dB	100 Hz	> 2,5 kHz HART signal	
Response time T ₉₉	7 ms		
Test voltage	3 kV AC, 50 Hz, 1 min.	Input against output against power supply	
Working voltage ²⁾ (Basic Insulation)	600 V AC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010-		
Protection against electrical shock ²⁾	Protective separation according to EN 61140 by reinforced insulation in accordance with EN 61010 -1 up to 300 V AC/DC for overvoltage category II and pollution degree 2		
Ambient temperature	Operation	-25°C to +70°C	(-13 to +158°F)
	Transport and storage	-40°C to +85°C	(-40 to +185°F)
Power supply	24 V DC	voltage range 16.8 V ... 31.2 V DC, approx. 1.3 W	
EMC ³⁾	EN 61326-1		
Construction	6.2 mm (0.244") housing, protection class IP 20, mounting on 35 mm DIN rail acc. to EN 60715		
Weight	Approx. 70 g		

1) Average TC related to full scale value in specified operating temperature range, reference temperature 23 °C

2) For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

3) Minor deviations possible during interference

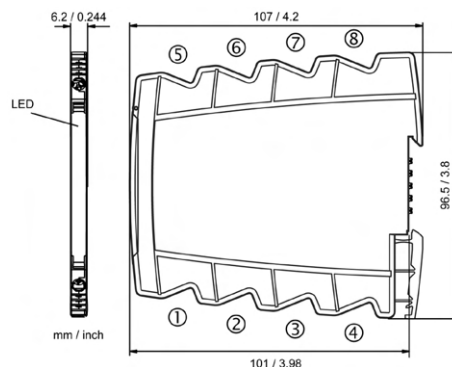
Block diagram/Connections



Ordering information

Product	Type	Part No.
IsoPAQ-610	Transmitter repeater	70ISR61000

Dimensions



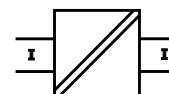
Transmitter Repeater for Powering and Isolation of 2-wire Transmitters

IsoPAQ-110R is a Transmitter Repeater for powering and isolation of a non-isolated 2-wire transmitter.

Thanks to the isolation, the 4-20 mA transmitter signal can be connected to a grounded input circuit of a control system without risk for measurement errors due to ground loops.

The Transmitter Repeater needs no power supply, which contributes to reduced installation costs.

The high reliability ensures a safe system operation and low maintenance costs.



Compact line

Compact line is a line of very compact and cost-optimized Isolators, Transmitter Repeaters and Isolating Transmitters within the IsoPAQ family.

The small dimensions - only 60 mm deep and 11.2 mm wide - and the favorable pricing allow for space saving and economic installations.

- **Transmitter isolation**
Problem-free connection of non-isolated 2-wire transmitters to grounded control system inputs
- **Transmitter powering**
The 24 VDC power from the control system is transferred to the 2-wire transmitter
- **High accuracy**
Negligible additional measurement errors in the loop
- **HART communication**
Separate input terminals with built-in 250 Ω load resistor
- **Fixed ranges**
Ready to use without any settings
- **Protective Separation acc. to EN 61140**
The design and high isolation level (2.5 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **Compact DIN-rail mounting**
11.2 mm (0.44") housing combined with very low self heating allows for high density mounting. With a depth of only 60 mm, compact standard boxes can be used



Specifications:

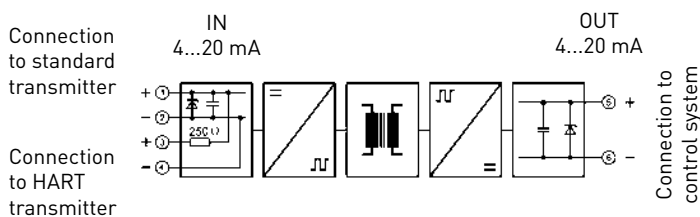
Input	
Input signal	4-20 mA
Operating current range	2-23 mA
Voltage drop	~ 4.7 V
HART communication	Separate terminals with 250 Ω input resistance. Additional voltage drop 5V @ 20 mA
Short circuit input current	≤ 50 mA
Output	
Output signal	4-20 mA
Supply voltage	15-30 VDC
Response time (10 to 90 % of end value)	< 10 ms
Ripple	< 0.2 % of end value, ~ 100 kHz
General data	
Transmission error	± 0.1 % of end value
Supply voltage influence	± 0.01 % of end value/V (deviation from 24 VDC)
Temperature coefficient ¹⁾	± 0.01 %/K of end value
Test voltage	2.5 kV, 50 Hz Between all circuits
Working voltage ²⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.
Ambient temperature	Operation 0 to +55 °C (32 to +131 °F)
	Transport and storage -25 to +80 °C (-13 to +176 °F)
EMC ³⁾	EN 61326-1
Construction	11.2 mm (0.44") housing, protection class: IP20
Connection	≤ 2.5 mm ² , AWG 14
Weight	Approx. 50 g

1) Average TC in specified operating temperature range

2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

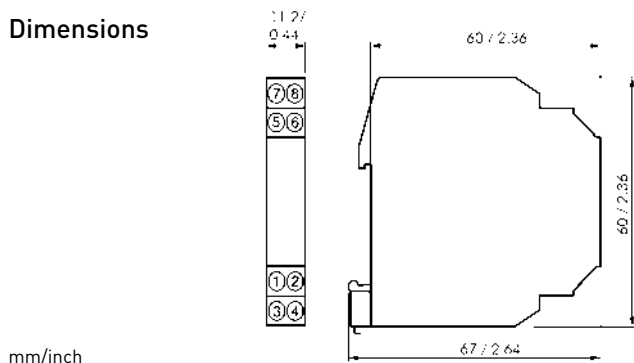
Block diagram/Connections



Ordering information

Product	Input / Output	Part No.
IsoPAQ-110R	4-20 / 4-20 mA	4003083301

Dimensions

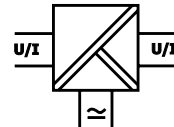


Basic Isolation Transmitter for Unipolar mA/V Signals with Calibrated Range Selection

The Isolation Transmitter IsoPAQ-30P is a low-cost transmitter used for basic isolation and conversion of 0-20 mA, 4-20 mA and 0-10 V unipolar signals.

Due to the calibrated range selection of the input/output signals and the universal power supply, IsoPAQ-30P provides excellent flexibility and low storage and installation costs.

The high reliability ensures a safe system operation and low maintenance costs.



- **Calibrated range selection**
Input and output range in mA or V can be set by using DIP switches without any further adjustments
- **Universal power supply for 20 to 253 VAC/DC**
Applicable world-wide for all common supply voltages
- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance
- **Excellent reliability**
Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability

Specifications:

Input				
Input signal	0-20 mA ¹⁾	4-20 mA	0-10 V	Terminal/switch selectable
Input resistance	Current input		22 Ω	
	Voltage input		1 MΩ	
Overload	Current input		≤ 200 mA	
	Voltage input		Voltage limitation via 30 V Z-Diode, max.continuous current 30 mA	
Output				
Output signal	0-20 mA ¹⁾	4-20 mA	0-10 V	Switch selectable
Load	Current output		≤ 500 Ω	
	Voltage output		≥ 1 kΩ	
Offset	20 μA / 10 mV			
Ripple	< 0.2 % of end value, ~150 kHz			
General data				
Transmission error	± 0.3 % of measured value			
Temperature coefficient ²⁾	± 0.015 %/K of end value			
Cut-off frequency (-3 dB)	Approx. 1 kHz			
Test voltage	2.5 kV, 50 Hz		Input against output against power supply	
Working voltage ³⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.			
Ambient temperature	Operation		-10 to +60 °C (+14 to +140 °F)	
	Transport and storage		-20 to +80 °C [-4 to +176 °F]	
Power supply	20 to 253 VAC/DC		AC 48 to 62 Hz, approx. 3 VA	
			DC approx. 1.5 W	
EMC ⁴⁾	EN 61326-1			
Construction	12.5 mm (0.5") housing, protection class: IP20			
Connection	≤ 2.5 mm², AWG 14			
Weight	Approx. 100 g			

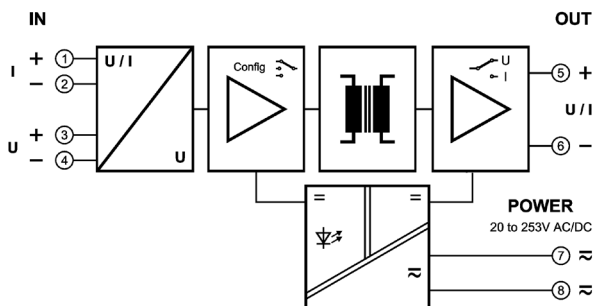
1) Factory setting

2) Average TC in specified operating temperature range

3) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

4) Minor deviations possible during interference

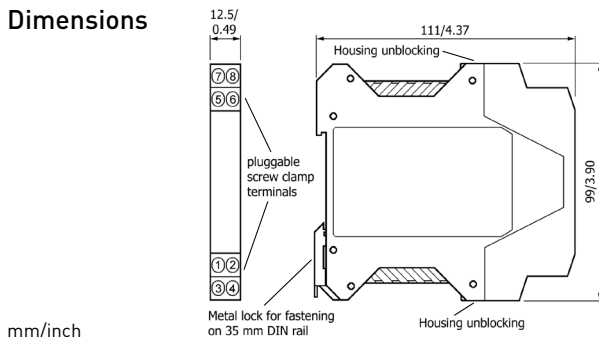
Block diagram/Connections



Ordering information

Product	Input / Output	Part No.
IsoPAQ-30P	Calibrated range selection	70ISP30001

Dimensions



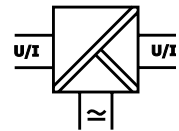
mm/inch

Isolation Transmitter for Unipolar mA/V Signals with Fixed Ranges

The Isolation Transmitter IsoPAQ-131P is used for isolation and conversion of 0-20 mA, 4-20 mA and 0-10 V unipolar signals.

For applications where normally one signal combination only is used, IsoPAQ-131P offers a cost-effective alternative.

The high reliability and the Protective Separation are further features, which ensure a safe system operation.



Compact line

Compact line is a line of very compact and cost-optimized Isolators, Transmitter Repeaters and Isolating Transmitters within the IsoPAQ family.

The small dimensions - only 60 mm deep and 11.2 mm wide - and the favorable pricing allow for space saving and economic installations.

- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **Fixed ranges**
Ready to use without any settings
- **Universal power supply for 24 VAC/DC**
Increased flexibility in industrial applications
- **Protective Separation acc. to EN 61140**
The design and high isolation level (2.5 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **Compact DIN-rail mounting**
11.2 mm (0.44") housing combined with very low self heating allows for high density mounting. With a depth of only 60 mm, compact standard boxes can be used.
- **Excellent reliability**
Low self heating thanks to high-efficiency power supply provides long-term reliability and stability



Specifications:

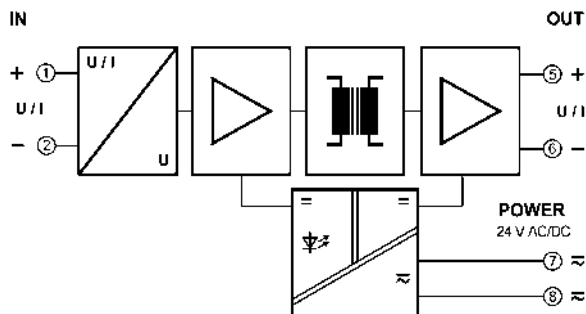
Input				
Input signal	0-20 mA	4-20 mA	0-10 V	Factory set as ordered
Input resistance	Current input	5 Ω		
	Voltage input	1 MΩ		
Overload	Current input	≤ 200 mA		
	Voltage input	≤ 250 V		
Output				
Output signal	0-20 mA	4-20 mA	0-10 V	Factory set as ordered
Load	Current output	≤ 500 Ω		
	Voltage output	≥ 2kΩ		
Ripple	< 0.2 % of end value, ~ 100 kHz			
General data				
Transmission error	± 0.2 % of end value			
Temperature coefficient ¹⁾	± 0.02 %/K of end value			
Response time	< 5 ms			
Test voltage	2.5 kV, 50 Hz	Between all circuits		
Working voltage ²⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.			
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.			
Ambient temperature	Operation	0 to +55 °C (32 to +131 °F)		
	Transport and storage	-25 to +80 °C (-13 to +176 °F)		
Power supply	24 VAC/DC, ± 15 %	AC 48 to 62 Hz, approx. 2 VA		
		DC approx. 0.7 W		
EMC ³⁾	EN 61326-1			
Construction	11.2 mm (0.44 ") housing, protection class: IP20			
Connection	≤ 2.5 mm², AWG 14			
Weight	Approx. 50 g			

1) Average TC in specified operating temperature range

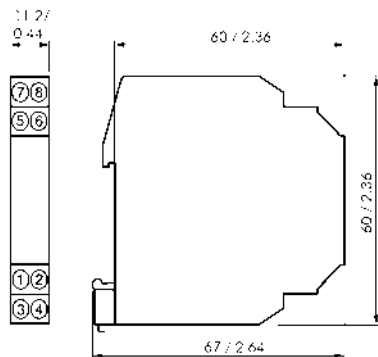
2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

Block diagram/Connections



Dimensions



mm/inch

Ordering information

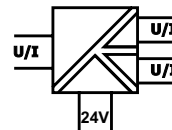
Product	Input / Output	Part No.
IsoPAQ131P	0-20 mA / 0-20 mA	70ISC13112
	4-20 mA / 0-20 mA	70ISC13132
	0-10 V / 0-20 mA	70ISC13152
	0-20 mA / 4-20 mA	70ISC13114
	4-20 mA / 4-20 mA	70ISC13112
	0-10 V / 4-20 mA	70ISC13154
	0-20 mA / 0-10 V	70ISC13116
	4-20 mA / 0-10 V	70ISC13136
	0-10 V / 0-10 V	70ISC13156
Power connector set for up to 10 units		70ADA00030

Signal Splitter/Repeater with double outputs for mA and V signals

The Signal Splitter/Repeater IsoPAQ-632 is used for isolation, conversion and distribution of 0/4 ... 20 mA, 0/1 ... 5 V and 0/2 ... 10 V standard signals. The measuring input can also supply the loop power for 2-wire transmitters.

The input and two isolated outputs can be easily configured by using DIP switch. Due to the calibrated range selection no further adjustment is necessary.

The auxiliary power can be supplied via the connection terminals or via the In-Rail-Bus connector. A green LED on the front of the unit has been provided to monitor the power supply.



- **Calibrated signal setting via DIP switch**
Input and outputs can be set by using DIP switch – high precision without any further adjustment
- **4-Port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **Extremely slim design**
6.2 mm slim housing for a simple and space saving DIN rail mounting
- **Integrated In-Rail-Bus mounting rail connector**
Allows for the power supply to be supplied via the connection terminals or via the In-Rail-Bus connector
- **Protective Separation acc. to EN 61140**
Protects service personnel and downstream devices against impermissibly high voltage
- **Maximum reliability**
No maintenance costs

Specifications:

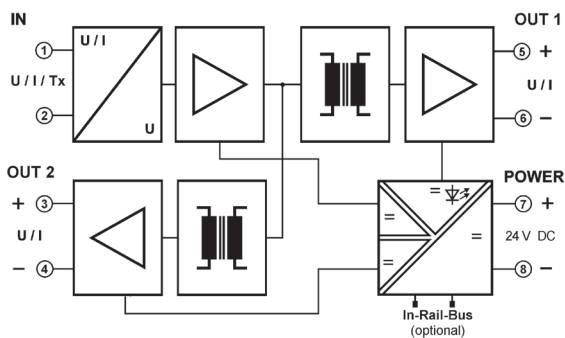
Input			
Input signal	0... 20 mA	0... 10 V	0... 5 V
(calibrated switchable)	4... 20 mA	2... 10 V	1... 5 V
Input resistance	Current input	≤ 35 Ω	
	Voltage input	≥ 100 kΩ	
Overload	Current input	< 50 mA	
	Voltage input	< 30 V	
Transmitter supply Tx (switchable)	16 V (open circuit voltage/short circuit current ≤ 22 V/35 mA)		
Output I / Output II			
Output signal	0... 20 mA	0... 10 V	0... 5 V
(calibrated switchable)	4... 20 mA	2... 10 V	1... 5 V
Load	Current output: ≤ 6 V (300 Ω at 20 mA)		Voltage output: ≤ 5 mA (2 kΩ at 10 V)
Linear transmission range	-1 ... +110 %		
Residual ripple	< 10 mV _{rms}		
General Data			
Transmission error	< 0.1 % full scale		
Temperature coefficient ¹⁾	< 100 ppm/K		
Cut-off frequency -3 dB	5 kHz		
Response time T ₉₉	150 μs		
Test voltage	3 kV AC, 50 Hz, 1 min. Input against Output 1 against Output 2 against power supply		
Working voltage ²⁾ (Basic Insulation)	600 V AC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010-1		
Protection against electrical shock ²⁾	Protective separation according to EN 61140 by reinforced insulation in accordance with EN 61010-1 up to 300 V AC/DC for overvoltage category II and pollution degree 2 between all circuits		
Ambient temperature	Operation	-25°C to +70°C	(-13 to +158°F)
	Transport and storage	-40°C to +85°C	(-40 to +185°F)
Power supply	24 V DC voltage range 16.8 ... 31.2 V DC, approx. 1.4 W		
EMC ³⁾	EN 61326-1		
Construction	6.2 mm (0.244") housing, protection class IP 20, mounting on 35 mm DIN rail acc. to EN 60715		
Weight	Approx. 70 g		

1) Average TC related to full scale value in specified operating temperature range, reference temperature 23 °C

2) For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

3) Minor deviations possible during interference

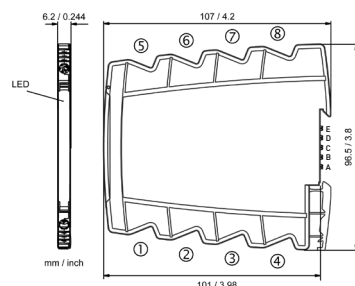
Block diagram/Connections



Ordering information

Product	Type	Part No.
IsoPAQ-632	Signal splitter/repeater	70ISL63200

Dimensions

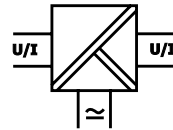


High-performance isolation transmitter for mA/V Signals with calibrated range selection

The Isolation Amplifier IsoPAQ-641 is used for isolation and conversion of 0/4 ... 20 mA and 0/2 ... 10 V standard signals.

The input and output range of IsoPAQ-641 can be easily set by using DIP switch. Due to the calibrated range selection no further adjustment is necessary. Also the cut-off frequency can be adapted to the measurement task by using the DIP Switch.

The auxiliary power can be supplied via the connection terminals or via the In-Rail-Bus connector. A green LED on the front of the unit has been provided to monitor the power supply.



- Calibrated signal setting via DIP switch**
 Input and output range can be set by using DIP switch – high precision without any further adjustment
- 3-Port Isolation**
 Protection against erroneous measurements due to parasitic voltages or ground loops
- Extremely slim design**
 6.2 mm slim housing for a simple and space saving DIN rail mounting
- Integrated In-Rail-Bus mounting rail connector**
 Allows for the power supply to be supplied via the connection terminals or via the In-Rail-Bus connector
- Protective Separation acc. to EN 61140**
 Protects service personnel and downstream devices against impermissibly high voltage
- Maximum reliability**
 No maintenance costs

Specifications:

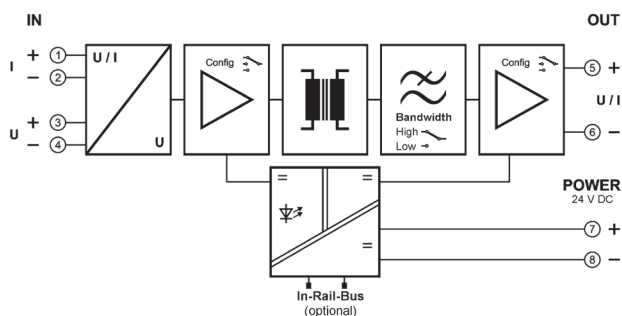
Input			
Input signal	0 ... 20 mA	4 ... 20 mA	
(calibrated switchable)	0 ... 10 V	2 ... 10 V	
Input resistance	Current input	≤ 25 Ω	
	Voltage input	≥100 kΩ	
Overload	Current input	< 50 mA	
	Voltage input	< 30 V	
Output			
Output signal	0 ... 20 mA	4 ... 20 mA	
(calibrated switchable)	0 ... 10 V	2 ... 10 V	
Load	Current output: ≤12 V (600 Ω at 20 mA)	Voltage output: ≤ 5 mA (2 kΩ at 10 V)	
Linear transmission range	-1 ... +110 %		
Residual ripple	< 10 mV _{rms}		
General Data			
Transmission error	< 0.1 % full scale		
Temperature coefficient ¹⁾	< 100 ppm/K		
Cut-off frequency -3 dB (switchable)	5 kHz	100 Hz	10Hz
Response time T ₉₉	150 μs	7 ms	70 ms
Test voltage	3 kV AC, 50 Hz, 1 min.	Input against output against power supply	
Working voltage ²⁾ (Basic insulation)	600 V AC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010-1		
Protection against electrical shock ²⁾	Protective separation according to EN 61140 by reinforced insulation in accordance with EN 61010-1 up to 300 V AC/DC for overvoltage category II and pollution degree 2 between all circuits		
Ambient temperature	Operation	-25°C to +70°C	
	Transport and storage	-40°C to +85°C	
Power supply	24 V DC	voltage range 16.8 V ... 31.2 V, approx. 0.7 W	
EMC ³⁾	EN 61326-1		
Construction	6.2 mm (0.244") housing, protection class IP 20, mounting on 35 mm DIN rail acc. to EN 60715		
Weight	Approx. 70 g		

1) Average TC related to full scale value in specified operating temperature range, reference temperature 23 °C

2) For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

3) Minor deviations possible during interference

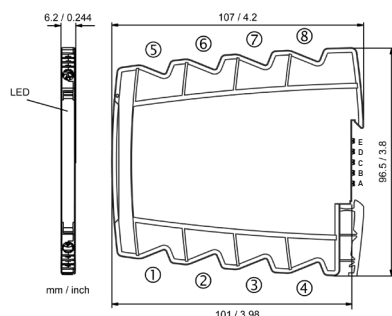
Block diagram/Connections



Ordering information

Product	Type	Part No.
IsoPAQ-641	High performance isolator	70ISL64100

Dimensions

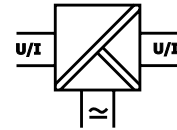


High-performance Isolation Transmitter for Unipolar mA/V Signals with Calibrated Range Selection

The Isolation Transmitter IsoPAQ-40P is used for high-precision isolation and conversion of 0-20 mA, 4-20 mA and 0-10 V unipolar signals.

Due to the calibrated range selection of the input/output signals, the selectable bandwidth and the universal power supply, IsoPAQ-40P provides excellent flexibility and low storage and installation costs.

The high reliability and the Protective Separation are additional features that ensure a safe system operation.



- Calibrated range selection**
 Input and output range in mA or V can be set by using DIP switches without any further adjustments
- Protective Separation acc. to EN 61140**
 The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- High accuracy**
 Negligible additional measurement errors in the loop
- Universal power supply for 20 to 253 VAC/DC**
 Applicable world-wide for all common supply voltages
- 3-port isolation**
 Protection against erroneous measurements due to parasitic voltages or ground loops
- High-density DIN-rail mounting**
 12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- Plug-in screw terminals**
 Simplifies installation and maintenance
- Excellent reliability**
 Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability

Specifications:

Input				
Input signal	0-20 mA ¹⁾	4-20 mA	0-10 V	Terminal/switch selectable
Input resistance	Current input		22 Ω	
	Voltage input		1 MΩ	
Input capacitance	Approx. 1 nF			
Overload	Current input		≤ 200 mA	
	Voltage input		Voltage limitation via 30 V Z-Diode, max.continuous current 30 mA	
Output				
Output signal	0-20 mA ¹⁾	4-20 mA	0-10 V	Switch selectable
Load	Current output		≤ 600 Ω	
	Voltage output		≥ 1 kΩ	
Linear transmission range	-2 to +110 %			
Ripple	< 0.1 % of end value, ~150 kHz			
General data				
Transmission error	± 0.1 % of end value			
Temperature coefficient ²⁾	± 0.005 %/K of end value			
Cut-off frequency (-3 dB)	> 1 kHz ¹⁾ Switchable to < 30 Hz			
Test voltage	4 kV, 50 Hz Input against output against power supply			
Working voltage ³⁾ (Basic insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.			
Protection against electrical shock ³⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.			
Ambient temperature	Operation		-20 to +70 °C (-4 to +158 °F)	
	Transport and storage		-35 to +85 °C (-31 to +185 °F)	
Power supply	20 to 253 VAC/DC		AC 48 to 62 Hz, approx. 2 VA	
			DC approx. 1 W	
EMC ⁴⁾	EN 61326-1			
Construction	12.5 mm [0.5"] housing, protection class: IP20			
Connection	≤ 2.5 mm ² , AWG 14			
Weight	Approx. 100 g			

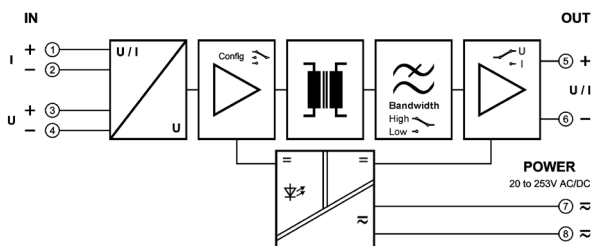
1) Factory setting

2) Average TC in specified operating temperature range

3) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

4) Minor deviations possible during interference

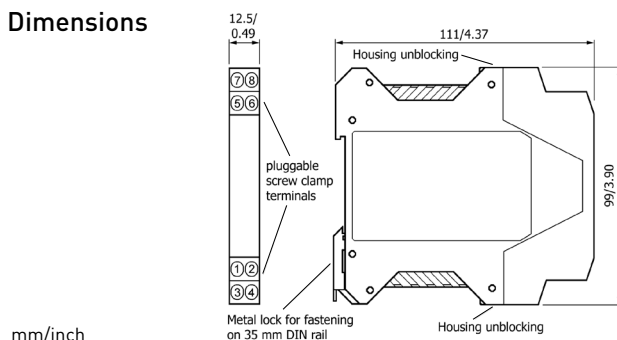
Block diagram/Connections



Ordering information

Product	Input / Output	Part No.
IsoPAQ-40P	Calibrated range selection	70ISP40001

Dimensions



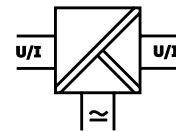
mm/inch

High-performance Isolation Transmitter for Unipolar mA/V Signals with Fixed Ranges

The Isolation Transmitter IsoPAQ-41P is used for high-precision isolation and conversion of 0-20 mA, 4-20 mA and 0-10 V unipolar signals.

For applications where normally only one signal combination is used, IsoPAQ-41P offers a cost-effective alternative.

The high reliability and the Protective Separation are additional features that ensure a safe system operation.



- **Fixed ranges**
Ready to use without any settings
- **Protective Separation acc. to EN 61140**
The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **High accuracy**
Negligible additional measurement errors in the loop
- **Universal power supply for 20 to 253 VAC/DC**
Applicable world-wide for all common supply voltages
- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance
- **Excellent reliability**
Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability



Specifications:

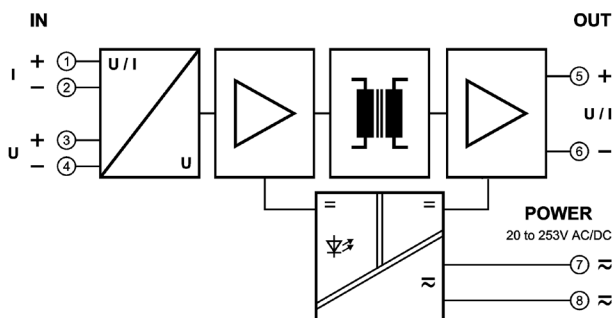
Input				
Input signal	0-20 mA	4-20 mA	0-10 V	Factory set as ordered
Input resistance	Current input		22 Ω	
	Voltage input		1 MΩ	
Input capacitance	Approx. 1 nF			
Overload	Current input		≤ 200 mA	
	Voltage input		Voltage limitation via 30 V Z-Diode, max. continuous current 30 mA	
Output				
Output signal	0-20 mA	4-20 mA	0-10 V	Factory set as ordered
Load	Current output		≤ 600 Ω	
	Voltage output		≥ 1 kΩ	
Linear transmission range	-2 to +110 %			
Ripple	< 0.1 % of end value, ~150 kHz			
General data				
Transmission error	± 0.1 % of end value			
Temperature coefficient ¹⁾	± 0.005 %/K of end value			
Cut-off frequency (-3 dB)	> 1 kHz			
Test voltage	4 kV, 50 Hz		Input against output against power supply	
Working voltage ²⁾ (Basic insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.			
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.			
Ambient temperature	Operation		-20 to +70 °C (-4 to +158 °F)	
	Transport and storage		-35 to +85 °C (-31 to +185 °F)	
Power supply	20 to 253 VAC/DC		AC 48 to 62 Hz, approx. 2 VA	
			DC approx. 1 W	
EMC ³⁾	EN 61326-1			
Construction	12.5 mm (0.5") housing, protection class: IP20			
Connection	≤ 2.5 mm², AWG 14			
Weight	Approx. 100 g			

1) Average TC in specified operating temperature range

2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

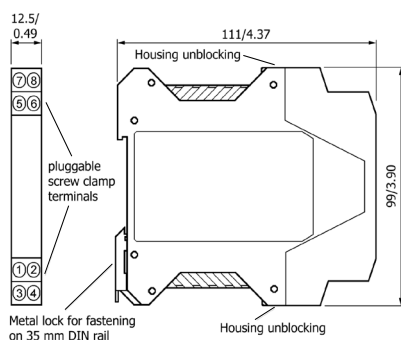
Block diagram/Connections



Ordering information:

Product	Input / Output	Part No.
IsoPAQ-41P	0-20 mA / 0-20 mA	70ISP41012
	4-20 mA / 0-20 mA	70ISP41032
	0-10 V / 0-20 mA	70ISP41052
	0-20 mA / 4-20 mA	70ISP41014
	4-20 mA / 4-20 mA	70ISP41012
	0-10 V / 4-20 mA	70ISP41054
	0-20 mA / 0-10 V	70ISP41016
	4-20 mA / 0-10 V	70ISP41036
	0-10 V / 0-10 V	70ISP41056

Dimensions



mm/inch

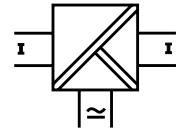
High-performance Isolation Transmitter for Unipolar mA Signals with Fixed Range and Zero/Span Adjustment

The Isolation Transmitter IsoPAQ-51P is used for high-precision isolation of 0(4)-20 mA unipolar signals.

For applications where normally only one signal combination is used, IsoPAQ-51P offers a cost-effective alternative.

The zero and span adjustments allow for a fine-tuning of the measurement loop.

The high reliability and the Protective Separation are additional features that ensure a safe system operation.



- Fixed ranges**
 Ready to use without any settings
- Zero/Span Adjustment**
 Allow for additional fine-tuning of the measurement loop
- Protective Separation acc. to EN 61140**
 The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- High accuracy**
 Negligible additional measurement errors in the loop
- Universal power supply for 20 to 253 VAC/DC**
 Applicable world-wide for all common supply voltages
- 3-port isolation**
 Protection against erroneous measurements due to parasitic voltages or ground loops
- High-density DIN-rail mounting**
 12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- Plug-in screw terminals**
 Simplifies installation and maintenance
- Excellent reliability**
 Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability

Specifications:

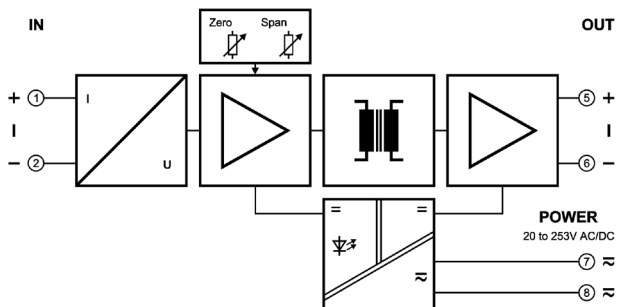
Input		
Input signal	0(4)-20 mA	
Input resistance	Approx. 25 Ω	
Overload	≤ 200 mA	
Output		
Output signal	0(4)-20 mA	
Load	≤ 600 Ω	
Linear transmission range	-2 to +110 %	
Ripple	< 0.1 % of end value, ~150 kHz	
General data		
Transmission error	± 0.1 % of end value	
Temperature coefficient ¹⁾	± 0.01 %/K of end value	
Zero/Span Adjustment	± 5 % of end value	
Cut-off frequency (-3 dB)	> 1 kHz	
Test voltage	4 kV, 50 Hz	Input against output against power supply
Working voltage ²⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.	
Protection against electrical shock ²⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.	
Ambient temperature	Operation	-20 to +70 °C (-4 to +158 °F)
	Transport and storage	-35 to +85 °C (-31 to +185 °F)
Power supply	20 to 253 VAC/DC	AC 48 to 62 Hz, approx. 2 VA DC approx. 1 W
EMC ³⁾	EN 61326-1	
Construction	12.5 mm (0.5") housing, protection class: IP20	
Connection	≤ 2.5 mm², AWG 14	
Weight	Approx. 100 g	

1) Average TC in specified operating temperature range

2) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

3) Minor deviations possible during interference

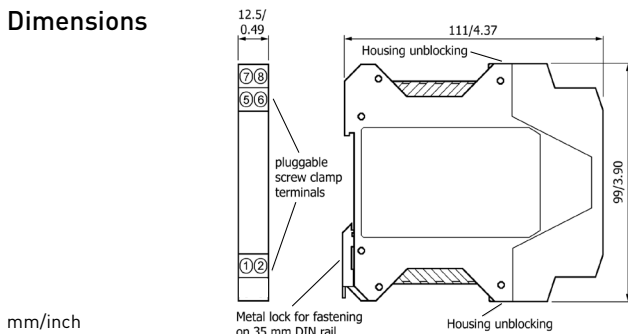
Block diagram/Connections



Ordering information:

Product	Input / Output	Part No.
IsoPAQ-51P	0(4)-20 mA / 0(4)-20 mA	70ISP51012

Dimensions



mm/inch

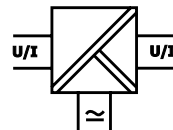
Isolation transmitter for Bipolar and Unipolar mA/V signals with calibrated range selection

The Bipolar Isolation Amplifier IsoPAQ-661 is used for isolation and conversion of bipolar and unipolar industrial standard signals.

The input and output range of IsoPAQ-661 can be easily set by using DIP switch. Due to the calibrated range selection no further adjustment is necessary.

A switchable compensation of the measuring range can be performed at the Zero/Span potentiometers on the front panel. Also the cut-off frequency can be adapted to the measurement task by using the DIP Switch.

The auxiliary power can be supplied via the connection terminals or via the In-Rail-Bus connector. A green LED on the front of the unit has been provided to monitor the power supply.



- **Calibrated signal setting via DIP switch**
Input and output range can be set by using DIP switch – high precision without any further adjustment
- **High bandwidth; short response time**
No signal distortion; no falsification of measured signal
- **Switchable Zero/Span compensation**
For readjustment of the sensor or field device
- **3-Port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **Extremely slim design**
6.2 mm slim housing for a simple and space saving DIN rail mounting
- **Integrated In-Rail-Bus mounting rail connector**
Allows for the power supply to be supplied via the connection terminals or via the In-Rail-Bus connector
- **Protective Separation acc. to EN 61140**
Protects service personnel and downstream devices against impermissibly high voltage

Specifications:

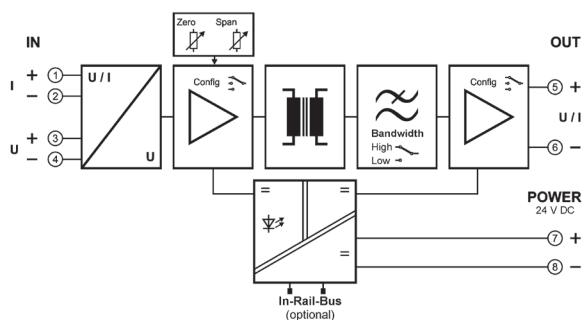
Input	Current			Voltage		
Input signal	±20 mA	0... 20 mA	4... 20 mA	±10 V	0... 10 V	2 ... 10 V
(calibrated switchable)	±10 mA	0... 10 mA	2... 10 mA	±5 V	0... 5 V	1 ... 5 V
Input resistance	≤ 25Ω			≥1 MΩ		
Overload	< 50 mA			< 30 V		
Output	Current			Voltage		
Output signal	±20 mA	0... 20 mA	4... 20 mA	±10 V	0... 10 V	2... 10 V
(calibrated switchable)	±10 mA	0... 10 mA	2... 10 mA	±5 V	0... 5 V	1... 5 V
Load	≤12 V (600 Ω at 20 mA)			≤5 mA (2 kΩ at 10 V)		
Linear transmission range	unipolar: -1... +110 %			bipolar: -110... +110 %		
Residual ripple	< 10 mV _{rms}					
General Data						
Transmission error	< 0.1 % full scale					
Temperature coefficient ¹⁾	< 100 ppm/K					
Zero/Span compensation (switchable)	±5 % of measuring range					
Cut-off frequency -3 dB (switchable)	8 kHz			100 Hz		
Response time T ₉₉	100 μs			7 ms		
Test voltage	3 kV AC, 50 Hz, 1 min.			Input against output against power supply		
Working voltage ²⁾ (Basic Insulation)	600 V AC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010-1					
Protection against electrical shock ²⁾	Protective separation according to EN 61140 by reinforced insulation in accordance with EN 61010-1 up to 300 V AC/DC for overvoltage category II and pollution degree 2 between all circuits					
Ambient temperature	Operation			-25°C to +70°C		(-13 to +158°F)
	Transport and storage			-40°C to +85°C		(-40 to +185°F)
Power supply	24 V DC			voltage range 16.8 V ... 31.2 V DC, approx. 0.8 W		
EMC ³⁾	EN 61326-1					
Construction	6.2 mm [0.244"] housing, protection class IP 20, mounting on 35 mm DIN rail acc. to EN 60715					
Weight	Approx. 70 g					

1) Average TC related to full scale value in specified operating temperature range, reference temperature 23 °C

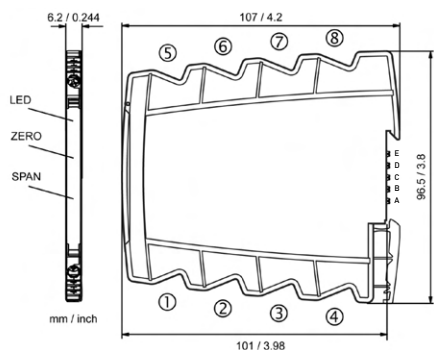
2) For applications with high working voltages, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

3) Minor deviations possible during interference

Block diagram/Connections



Dimensions



Ordering information

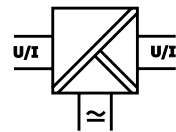
Product	Type	Part No.
IsoPAQ-661	Isolator Bipolar/Unipolar	70ISL66100

Isolation Transmitter for Bipolar and Unipolar mA/V Signals with Fixed Ranges

The Isolation Transmitter IsoPAQ-161P is mainly used for isolation of bipolar signals, such as ± 20 mA, ± 10 mA, ± 10 V, ± 5 V, and conversion into unipolar output signals.

For applications where normally one signal combination only is used, IsoPAQ-161P offers a cost-effective alternative.

The high reliability and the Protective Separation are further features, which ensure a safe system operation.



Compact line

Compact line is a line of very compact and cost-optimized Isolators, Transmitter Repeaters and Isolating Transmitters within the IsoPAQ family.

The small dimensions - only 60 mm deep and 11.2 mm wide - and the favorable pricing allow for space saving and economic installations.

- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **Bipolar input signals**
Bipolar input signals, e.g. $-10..0..+10$ V, as well as special ranges available
- **Fixed ranges**
Ready to use without any settings
- **Universal power supply for 24 VAC/DC**
Increased flexibility in industrial applications
- **Protective Separation acc. to EN 61140**
The design and high isolation level (2.5 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **Compact DIN-rail mounting**
11.2 mm (0.44") housing combined with very low self heating allows for high density mounting. With a depth of only 60 mm, compact standard boxes can be used.
- **Excellent reliability**
Low self heating thanks to high-efficiency power supply provides long-term reliability and stability



Specifications:

Input				
Input signal ¹⁾	± 20 mA	± 10 mA		Factory set as ordered
	± 10 V	± 5 V	0-5 V	
Input resistance	Current input	5 Ω		
	Voltage input	1 MΩ		
Overload	Current input	≤ 200 mA		
	Voltage input	≤ 250 V		
Output				
Output signal ¹⁾	0-20 mA	4-20 mA		Factory set as ordered
	0-10 V	0-5 V		
Load	Current output	≤ 500 Ω		
	Voltage output	≥ 2 kΩ		
Ripple	< 0.1 % of end value, ~ 100 kHz			
General data				
Transmission error	± 0.2 % of measuring span			
Temperature coefficient ²⁾	± 0.02 %/K of measuring span			
Response time	< 5 ms			
Test voltage	2.5 kV, 50 Hz		Between all circuits	
Working voltage ³⁾ (Basic Insulation)	600 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.			
Protection against electrical shock ³⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 300 VAC/DC for overvoltage category II and pollution degre 2 between all circuits.			
Ambient temperature	Operation		0 to +55 °C (32 to +131 °F)	
	Transport and storage		-25 to +80 °C (-13 to +176 °F)	
Power supply	24 VAC/DC, ± 15 %		AC 48 to 62 Hz, approx. 2 VA	
			DC approx. 0.7 W	
EMC ⁴⁾	EN 61326-1			
Construction	11.2 mm [0.44"] housing, protection class: IP20			
Connection	≤ 2.5 mm², AWG 14			
Weight	Approx. 50 g			

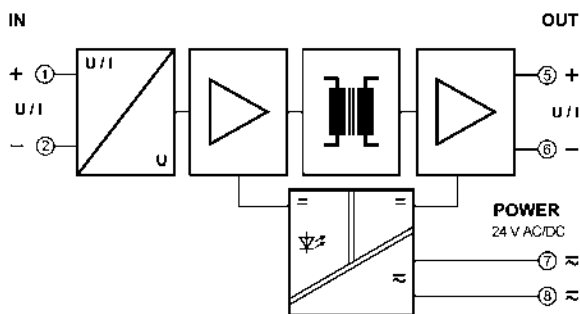
1) Other signals on request

2) Average TC in specified operating temperature range

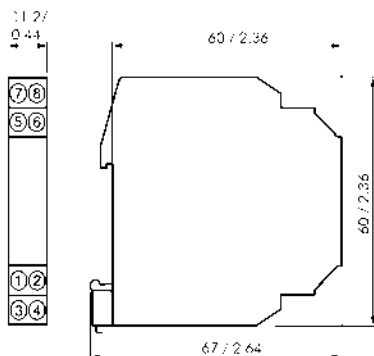
3) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

4) Minor deviations possible during interference

Block diagram/Connections



Dimensions



mm/inch

Ordering information

Product	Input / Output	Part No.
IsoPAQ-161P	$\pm 10 \text{ V} / 4...20 \text{ mA}$	70ISC16114
	$\pm 10 \text{ V} / 0-10 \text{ V}$	70ISC16116
	$\pm 5 \text{ V} / 4...20 \text{ mA}$	70ISC16124
	$\pm 5 \text{ V} / 0-10 \text{ V}$	70ISC16126
	0 - 5 V / 4...20 mA	70ISC16134
	0 - 5 V / 0-10 V	70ISC16136
	$\pm 10 \text{ mA} / 4...20 \text{ mA}$	70ISC16154

Power connector set for up to 10 units	70ADA00030
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High-performance Isolation Transmitter for Bipolar and Unipolar mA/V Signals with Extensive Range Selection and Zero/Span Adjustment

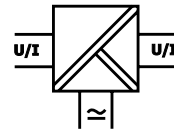
The Isolation Transmitter IsoPAQ-60P is used for highprecision isolation and conversion of 0-20 mA, 4-20 mA and 0-10 V bipolar and unipolar signals.

Due to the extensive range selection with a choice of 144 input/output signal combinations, the selectable bandwidth and the universal power supply, IsoPAQ-60P is a true universal transmitter for any demanding isolation application.

The zero and span adjustments allow for a fine-tuning of the measurement loop.

The high reliability and the Protective Separation are additional features that ensure a safe system operation.

- **Extensive range selection**
Input and output range in mA or V can be set in 144 combinations by using DIP switches
- **Zero/Span Adjustment**
Allow for additional fine-tuning of the measurement loop and recalibration after a range selection
- **Extremely fast response**
Cut-off frequency higher than 10 kHz, switchable to 30 Hz
- **Protective Separation acc. to EN 61140**
The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **High accuracy**
Negligible additional measurement errors in the loop
- **Universal power supply for 20 to 253 VAC/DC**
Applicable world-wide for all common supply voltages
- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance
- **Excellent reliability**
Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability



Specifications:

Input	Voltage			Current		
Input signal (terminal/switch selectable)	± 10 V ¹⁾ ± 5 V	0-10 V 0-5 V	2-10 V 1-5 V	± 20 mA ± 10 mA	0-20 mA 0-10 mA	4-20 mA 2-10 mA
Input resistance	Approx. 1 MΩ			Approx. 25 Ω		
Input capacitance	Approx. 1 nF			Approx. 1 nF		
Overload	Voltage limitation via 30 V Z-Diode, max. continuous current 30 mA			≤ 200 mA		
Output	Voltage			Current		
Output signal (switch selectable)	± 10 V ¹⁾ ± 5 V	0-10 V 0-5 V	2-10 V 1-5 V	± 20 mA ± 10 mA	0-20 mA 0-10 mA	4-20 mA 2-10 mA
Load	≤ 10 mA (1 kΩ @ 10 V)			≤ 12 V (600 Ω @ 20 mA)		
Linear transmission range	Unipolar: -2 to +110 %, Bipolar: -110 to +110 %					
Ripple	< 0.1 % of end value, ~150 kHz					
General data						
Transmission error	± 0.1 % of end value					
Temperature coefficient ²⁾	± 0.01 % /K of end value					
Zero/Span adjustment	± 10 % of end value					
Cut-off frequency (-3 dB)	> 10 kHz ¹⁾			Switchable to approx. 30 Hz		
Test voltage	4 kV, 50 Hz			Input against output against power supply		
Working voltage ³⁾ (Basic Insulation)	1000 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.					
Protection against electrical shock ³⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 600 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.					
Ambient temperature	Operation			-20 to +70 °C (+14 to +158 °F)		
	Transport and storage			-35 to +85 °C (-31 to +185 °F)		
Power supply	20 to 253 VAC/DC			AC 48 to 62 Hz, approx. 2 VA DC approx. 1 W		
EMC ⁴⁾	EN 61326-1					
Construction	12.5 mm (0.5") housing, protection class: IP20					
Connection	≤ 2.5 mm², AWG14					
Weight	Approx. 100 g					

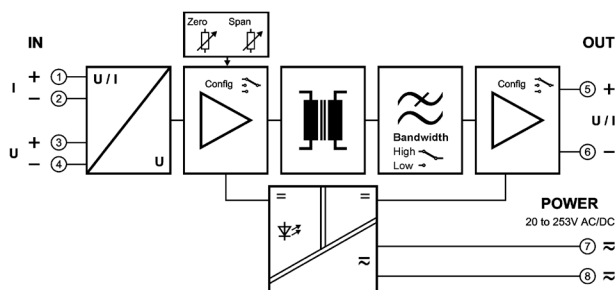
1) Factory settings

2) Average TC in specified operating temperature range

3) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

4) Minor deviations possible during interference

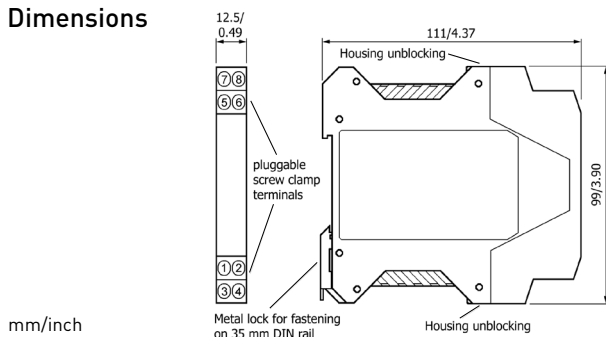
Block diagram/Connections



Ordering information:

Product	Input / Output	Part No.
IsoPAQ-60P	$\pm 10\text{V}/\pm 10\text{V}$	70ISP60001
Calibration for other range		on request

Dimensions



mm/inch

High-performance Isolation Transmitter for Bipolar and Unipolar Shunt Voltages with Extensive Range Selection and Zero/Span Adjustment

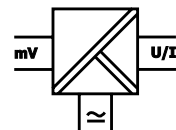
The Isolation Transmitter IsoPAQ-80S is used for high-precision isolation and conversion of bipolar and unipolar shunt voltages into standard mA/V signals.

Due to the extensive range selection, the selectable bandwidth and the universal power supply, IsoPAQ-80S is a true universal transmitter for any demanding shunt voltage isolation application.

The zero and span adjustments allow for a fine-tuning of the measurement loop.

The high reliability and the Protective Separation are additional features that ensure a safe system operation.

- **Extensive range selection**
Input ranges in mV and output ranges in mA or V can be set in 144 combinations by using DIP switches
- **Zero/Span Adjustment**
Allow for additional fine-tuning of the measurement loop and recalibration after a range selection
- **Extremely fast response**
Cut-off frequency higher than 10 kHz, switchable to 30 Hz
- **Protective Separation acc. to EN 61140**
The design and high isolation level (4 kV) provides protection for service personnel and downstream devices against impermissibly high voltage
- **High accuracy**
Negligible additional measurement errors in the loop
- **Universal power supply for 20 to 253 VAC/DC**
Applicable world-wide for all common supply voltages
- **3-port isolation**
Protection against erroneous measurements due to parasitic voltages or ground loops
- **High-density DIN-rail mounting**
12.5 mm (0.5") housing combined with very low self heating allows for high density mounting
- **Plug-in screw terminals**
Simplifies installation and maintenance
- **Excellent reliability**
Low self heating thanks to patented high-efficiency power supply provides long-term reliability and stability



Specifications:

Input	Voltage					
Input signal	± 60 mV ¹⁾	± 100 mV	± 150 mV	± 250 mV	± 300 mV	± 500 mV
(terminal/switch selectable)	0-60 mV	0-100 mV	0-150 mV	0-250 mV	0-300 mV	0-500 mV
Input resistance	> 100 kΩ					
Input capacitance	Approx. 1 nF					
Overload	Voltage limitation via 30 V Z-Diode, max. continuous current 30 mA					
Output	Voltage			Current		
Output signal	± 10 V ¹⁾	0-10 V	2-10 V	± 20 mA	0-20 mA	4-20 mA
(switch selectable)	± 5 V	0-5 V	1-5 V	± 10 mA	0-10 mA	2-10 mA
Load	≤ 10 mA (1 kΩ @ 10 V)			≤ 12 V (600 Ω @ 20 mA)		
Linear transmission range	Unipolar: -2 to +110 %, Bipolar: -110 to +110 %					
Ripple	< 0.2 % of end value, ~150 kHz					
General data						
Transmission error	± 0.1 % of end value					
Temperature coefficient ²⁾	± 0.01 %/K of end value					
Zero/Span adjustment	± 10 % of end value					
Cut-off frequency (-3 dB)	> 10 kHz ¹⁾ Switchable to approx. 30 Hz					
Test voltage	4 kV, 50 Hz		Input against output against power supply			
Working voltage ³⁾ (Basic Insulation)	1000 VAC/DC for overvoltage category II and pollution degree 2 acc. to EN 61010 part 1 between all circuits.					
Protection against electrical shock ³⁾	Protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010 part 1 up to 600 VAC/DC for overvoltage category II and pollution degree 2 between all circuits.					
Ambient temperature	Operation		-20 to +70 °C (-4 to +158 °F)			
	Transport and storage		-35 to +85 °C (-31 to +185 °F)			
Power supply	20 to 253 VAC/DC		AC 48 to 62 Hz, approx. 2 VA DC approx. 1 W			
EMC ⁴⁾	EN 61326-1					
Construction	12.5 mm (0.5") housing, protection class: IP20					
Connection	≤ 2.5 mm², AWG 14					
Weight	Approx. 100 g					

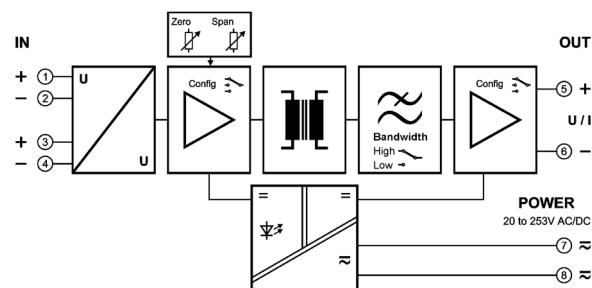
1) Factory setting

2) Average TC in specified operating temperature range

3) As far as relevant the standards and rules mentioned above are considered by development and production of our devices. In addition relevant assembly rules are to be considered by installation of our devices in other equipments. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent situated devices.

4) Minor deviations possible during interference

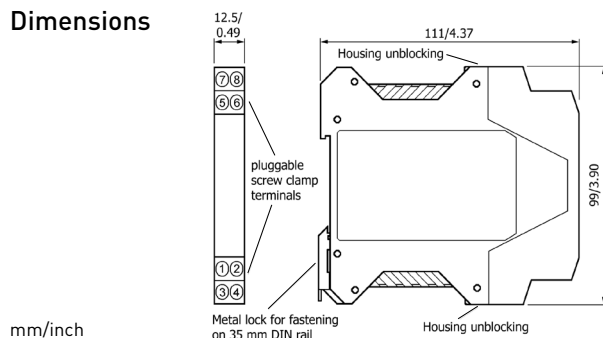
Block diagram/Connections



Ordering information:

Product	Input / Output	Part No.
IsoPAQ-80S	$\pm 60 \text{ mV} / \pm 10 \text{ V}$	70ISS80001
Calibration for other range		on request

Dimensions



mm/inch

In-Rail-Bus Power Terminal

The 6.2 mm wide IsoPAQ-Connect power terminal is used for supplying the In-Rail-Bus DIN rail connector with supply voltage. Two separate and reverse polarity protected voltage inputs allow a redundant voltage supply of 24 V DC and a maximum current of 3 A (recommended fuse: 3,5 A, Slow-blow).

The status of the power supply of both voltage inputs will be displayed each by a LED on front. A green LED lights up when there is supply voltage on the voltage input. A red LED indicates reversed polarity.



- Feed-in of power supply to the In-Rail-Bus
- For 3 A maximum
- For up to 80 In-Rail-Bus devices
- Redundant power supply possible, decoupled via diodes
- Operating and fault indication by LED
- Output voltage = input voltage – 0.5 V
- Construction: 6.2 x 96 x 107 mm



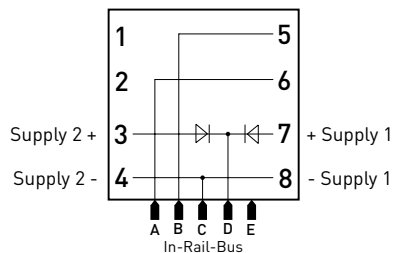
Specifications:

Supply voltage	≤ 32 V DC
Input current	≤ 3 A
Recommended fuse	3.15 A Slow-blow
Drop voltage	≤ 0.5 V
Operating and fault indication	LED green / red
Feeding	2 redundant inputs, decoupled via diodes
Connection	Captive plus-minus clamp screws Wire cross-section max. 2.5 mm ² / AWG 14 Stripped length 6 to 8 mm / 0.28 in Screw terminal torque 0.8 Nm / 7 lbf in
Construction	6.2 x 96 x 107 mm

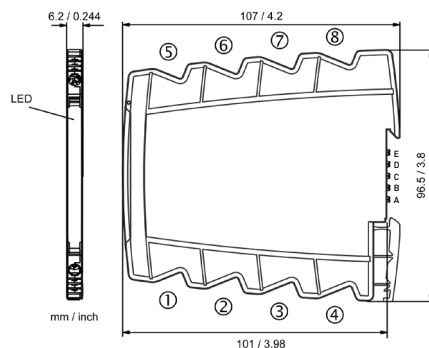
Ordering information

Product	Type	Part No.
IsoPAQ-Connect	In-Rail-Bus Power connector	70ISB60200

Block diagram/Connections



Dimensions



In-Rail-Bus Bus Connector

5-wire bus system for DIN rail

The In-Rail-Bus system is a user-friendly system for distributing the power supply to Signal conditioners and Isolators with integrated In-Rail-Bus connector, it can be easily integrated in the 35 mm standard DIN rail. The great benefit of the In-Rail-Bus system is that it reduces costs for wiring when it comes to connection. The integrated In-Rail-Bus connector is standard on selected Signal conditioners and Isolation Transmitters.



The IsoPAQ-Connect power terminal is used for supplying the In-Rail-Bus DIN rail connector with supply voltage.

- Delivered in kit with a In-Rail-Bus for DIN rail and safety end caps right/left
- User friendly and easy to service
- Free choice of positions
- Connecting rather than wiring
- Highly scalable
- High contact reliability
- Cost-effective installation



Ordering information

Product	Type	Part No.
IsoPAQ-Rail Bus-250T	In-Rail-Bus for DIN rail 35 x 7.5 mm, length 250 mm	70IST25075
IsoPAQ-Rail Bus-250D	In-Rail-Bus for DIN rail 35 x 15 mm, length 250 mm	70IST25015
IsoPAQ-Rail Bus-500T	In-Rail-Bus for DIN rail 35 x 7.5 mm, length 500 mm	70IST50075
IsoPAQ-Rail Bus-500D	In-Rail-Bus for DIN rail 35 x 15 mm, length 500 mm	70IST50015
IsoPAQ-Rail Bus-caps	Din Rail safety end caps right/left as a spare part	70IST00001
Rail bus cover	Cover to protect open In-Rail-Bus, length 250 mm	70IST25000
Connector protective cover	Protecting label for Bus connector on signal conditioners	70ISB00001

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