

Temperature Converters

IM34-11Ex-i

IM34-12Ex-Ri

Short Description

- Inputs for Ni100 or Pt100 acc. to IEC 751, thermoelements acc. to IEC 584 and for low voltages (mV range)
- Intrinsically safe input circuit [EEx ia] IIC
- Area of application acc. to ATEX: II (1) GD
- Wire-break monitoring
- Short-circuit monitoring of Pt100 or Ni100 components
- Galvanic isolation between input and output circuits and supply
- Analogue current output 0/4-20 mA
- Limit value relay (IM34-12Ex-Ri only)
- Temperature linear conversion
- Device configuration on side of housing
- Housing with coded and removeable terminal blocks


Terminal Configuration

Intrinsically safe inputs at terminals 1-6

1, 2	Thermoelement and mV input
3-6	Ni100 or Pt100 input
7, 8	Analogue current output
9,10	Limit value relay (IM34-12Ex-Ri only)
11,12	Supply voltage connection 20-250 VAC/20-125 VDC, ≤3 W

Connection via flat screw terminals with self-lifting pressure plates, connection profile $\leq 1 \times 2.5 \text{ mm}^2$, $2 \times 1.5 \text{ mm}^2$ or $2 \times 1.0 \text{ mm}^2$ with wire sleeves.

LED Indications

Pwr	green power on (1)
	red error (2)
1	yellow relay energised (3) (IM34-12Ex-Ri only)

Attention: Status indications, see table on page 64.

Adjustments

The device settings are accomplished with 4 rotary switches and 10 slide switches (IM34-12Ex-Ri: 7 rotary switches and 13 slide switches) located on the right side of the housing.

- **High Temperature Value T_H :** the upper temperature range value according to an output current of 20 mA is set with the two rotary switches (1, 2). Rotary switch 2 serves to set temperature values in increments of a hundred degrees celsius. Switch 1 serves to set the temperature in steps of ten degrees. Thus, the temperature values can be set in steps of 10 K. (Example for switch position: 53 \Rightarrow 530°C). If the slide switch S6 is in position 1, the temperature range is automatically increased by a 1000°C to 1000-1990°C. Add a 1000°C to the temperature value adjusted with rotary switches 1 and 2. (Examples for switch position: 53 \Rightarrow 1530°C; 00 \Rightarrow 1000°C).
- **Low Temperature Value T_L :** the two rotary switches (3, 4) serve to set the temperature which accords to an output current of 0 or 4 mA (determined by slide switch S8). If slide switch S5 is in position 1, rotary switch number 4 is used to adjust the temperature in hundreds, while switch 3 adjusts the tens place. Adjustment takes place in a temperature range of 0 to +990°C in increments of 10 K (e.g. rotary switch setting 23 accords to a temperature of 230°C). If slide switch S5 is in position 0, rotary switch 4 adjusts the negative tens places and rotary switch 3 adjusts the ones. Adjustments are possible in a temperature range of -100 to -1°C in increments of 1 K. (Examples for rotary switch position: 23 \Rightarrow -23°C; 00 \Rightarrow -100 °C).
- **Switching Threshold for Relay**
(IM34-12Ex-Ri only)
Rotary switch 5 = hundred degree values
Rotary switch 6 = ten degree values
Rotary switch 7 = one degree values
S11 and S12 = 1: add 1000°C to the adjusted value. S11 = 0: the adjusted value is negative. The output mode is adjusted with S13.

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Switch Position				Functions of slide switches S1-S4: The 4 switches serve to select the following functions:
S1	S2	S3	S4	
0	0	0	0	Thermoelement Type B (IEC 584)
0	0	0	1	Type E
0	0	1	0	Type J
0	0	1	1	Type K
0	1	0	0	Type N
0	1	0	1	Type R
0	1	1	0	Type S
0	1	1	1	Type T (IEC 584)
1	0	0	0	Type L (DIN 43710)
1	0	1	0	Voltage input: the input for thermoelements can be used for linear conversion of low voltages from -100 to +160 mV. In this case the rotary switches are used to adjust mV values while the slides switches operate with different range indications: S5 = 0: -100 to -1 mV or S5 = 1: 0 to +99 mV for the lower range; S6 = 0: 0 to +99 mV or S6 = 1: +100 to +160 mV for the upper range;
1	1	0	0	Pt100 or Ni100 components with 4-wire connection;
1	1	0	1	Pt100 or Ni100 components with 3-wire connection, observe bridge;
1	1	1	0	Pt100 or Ni100 components with 2-wire connection, observe bridge;
1	1	1	1	Line compensation: when using 2-wire connections, the line length resistance must be adjusted. Line compensation is also necessary when using thermo-elements with an external cold junction. For this it is necessary to short-circuit the measuring point and to select the code for line compensation as shown on the left. The Pwr and the $\frac{1}{2}$ LED flash alternately. Successful line compensation is indicated by mutual flashing of both LEDs. Please select a different function and remove the short-circuit.

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Functions of slide switches **S5-S10** (IM34-12Ex-Ri: **S5-S13**):

The following functions can be selected with the switches:

- **S5** Lower range selection: selection of temperature range of low temp. value T_L
S5 = 0: -100 to -1°C
S5 = 1: 0 to +990°C
- **S6** Upper range selection: selection of temperature range of high temp. value T_H :
S6 = 0: 0 to +990°C
S6 = 1: +1000 to +1990°C
- **S7** output current during an error condition:
If an input circuit error is detected, the output current is as follows
S7 = 0: 0 mA
S7 = 1: >22 mA
- **S8** output current range:
S8 = 0: 0-20 mA
S8 = 1: 4-20 mA
- **S9** Reference point compensation: when using thermoelements, reference point compensation is carried out as follows:
 - **externally** via 2-wire Ni100 or Pt100 in S9 = 0 or
 - **internally**: S9 = 1

Mounting and Installation

The connected apparatus (Ni100/Pt100, thermoelements) must meet the requirements for use in explosion hazardous areas (EN60079-14). The device is suited for snap-on clamps for hat rail mounting (EN 50022) or for screw panel mounting. Devices **of the same type** may be mounted directly next to each other. It must be ensured that heat is conducted away from the device. Mounting and installation must be carried out in accordance with the applicable regulations. The removeable terminal blocks are coded and may only be plugged into the designated sockets. The coding system may not be altered or damaged. The device must be protected against dust, dirt, moisture and other environmental influences as well as against strong electro-magnetic emissions. It should also be protected against the risks of mechanical damaging, unauthorised access and incidental contact. All installations must be carried out observing the regulations of EMC protection.

With **internal** reference point compensation, care must be taken that heat is conducted away from the housing. Heat accumulation can corrupt measuring data.

- **S10** resistor type: indication of the connected resistor type:
S10 = 0: Pt100
S10 = 1: Ni100

With a voltage input or in case of thermoelement operation, the type of resistor does not have to be adjusted.

Referring to IM34-12Ex-Ri only:

- **S11, S12 and S13** Selection of switching threshold for limit value relay:
S11 = 0: -100 to -1°C
S11 = 1: >0°C

Only if S11 = 1
S12 = 0: 0 to +999°C
S12 = 1: +1000 to +1990°C
S13 Output performance of relay:
S13 = 0: relay energised, if measuring value > switching threshold
S13 = 1: relay energised, if measuring value < switching threshold

General information on use of devices with "IS" circuits

This device is equipped with circuits featuring protection type "intrinsic safety" for explosion protection per EN 50020 at terminals 1-6 which are marked in blue. The intrinsically safe circuits are approved by the authorised bodies for use in those countries to which the approval applies.

For **correct usage** in explosion hazardous areas it is required to **observe and follow the national regulations and directives strictly**. Following please find some guidelines referring to the framework directive of the European Union 94/9/EC (ATEX 100a).

This device is classified as an associated apparatus which is equipped with intrinsically safe and non-intrinsically safe circuits. Therefore it may not be installed in explosion hazardous areas. It is permitted to connect intrinsically safe equipment to the intrinsically safe connections of this device, provided the equipment complies with the regulations applying to use in the respective zone of the explosion hazardous area. When interconnecting devices within

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such an assembly it is required to keep and provide a proof of intrinsic safety (EN 60079-14). Once that intrinsically safe circuits have been connected to the non-intrinsically safe circuit, it is not permitted to use the device subsequently as intrinsically safe equipment.

The governing regulations cover installation of intrinsically safe circuits, mounting to external connections, cable characteristics and cable installation. Cables and terminals with intrinsically safe circuits must be marked and separated from non-intrinsically safe circuits or feature appropriate isolation (EN 60079-14). It is required to observe the specified clearances between the intrinsically safe connections of this device and the earthed components and connections of other devices. The approval expires if the device is repaired, modified or opened by a person other than the manufacturer or an expert, unless the device-specific instruction manual explicitly permits such interventions.

Visible damages of the device's housing (e. g. black-brown discolouration due to heat accumulation, perforation or

deformation) indicate a serious error and the device must be turned off immediately. When using associated apparatus it is required to check the connected intrinsically safe equipment too. This inspection may only be carried out by an expert or the manufacturer. Operation of the device must conform to the data printed on the side of the housing.

Prior to initial set-up or after every alteration of the interconnection assembly it must be assured that the relevant regulations, directives and framework regulations are observed, that operation is errorfree and that all safety regulations are fulfilled. Mounting and connection of the device should only be carried out by qualified and trained staff familiar with the relevant national and international regulations of explosion protection.

The **most important data from the EC type examination certificate** are listed overleaf. All valid national and international approvals covering **TURCK** devices can be downloaded from our website www.turck.com. Further information can be provided on request.

Short Description

- Inputs for Ni100 or Pt100 acc. to IEC 751, thermo-elements acc. to IEC 584 and for low voltages (mV range)
- Intrinsically safe input circuit EEx ia
- Area of application acc. to ATEX: II (1) GD
- Wire-break monitoring
- Short-circuit monitoring only of Pt100 or Ni100 components
- Galvanic isolation between input and output circuits and supply
- Analogue current output 0/4-20 mA
- Voltage proof up to 4 kV (IM34-11Ex-Ci/K51 only)
- Fast temperature measurement from a temperature gradient of 200 μ V/s (IM34-11Ex-Ci/K60 only)
- Limit value relay (IM34-12Ex-CRi only)
- Temperature linear conversion
- Parameterisation via PC via programming adapter IM-PROG (to be ordered additionally – ident-no.: 6890422)
- Housing with coded and removeable terminal blocks
- Simulation of outputs

Terminal Configuration


Intrinsically safe inputs at terminals 1–6

1, 2	thermoelement and mV input
3 – 6	Ni100 or Pt100 input
7, 8	analogue current output (0/4-20 mA)
9, 10	Limit value relay (IM34-12Ex-CRi only)
11,12	supply voltage connection 20-250 VAC/20-125 VDC, <3 W

Connection via lifting cages with captive screws, connection profile:

$\leq 1 \times 2.5 \text{ mm}^2$, $2 \times 1.5 \text{ mm}^2$ or $2 \times 1 \text{ mm}^2$ with wire sleeves

LED Indications

Pwr	green power on
	red error
1	yellow relay energised (IM34-12Ex-CRi only)

Attention: Status Indications, see table on page 67.

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Status Indications

LED Pwr	LED ζ	Only IM34-12Ex-CRi	Description
The values agree with the switch-on phase in % 0=0%, 10=10%, 50=50%, 100=100%		Output of error current, moreover relay is de-energized.	
100	0	–	Operation
100	10	•	Input error
10	100	•	Software error
0	100	•	Hardware error
100	50	•	Measuring span too short
100	50	–	Thermoelements/Measuring range/Switching threshold outside the operating range of the RTD or thermo-element
50	50	•	Line compensation (LEDs flashing alternately)
50	50	•	Line compensation finished
100	50	•	Line compensation not correct
50	0	–	Current output and limit value relay in simultaneous operation

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Parameterisation and Adjustments

The IM34... is parameterised and adjusted via the Device Type Manager (see also "PACTware™ and devices DTM software installation"). The **TURCK** adapter IM-PROG is needed to establish the connection between the device and your PC.

For this it is necessary to connect the 3.5 mm connector to the measuring amplifier (PCCconnect) and the RS232 connector to the serial interface of your PC. The following settings are available as an entry or numerical setting via the DTM:

- **Mode**

Selection of the connection element: Pt/Ni100, thermo-element, mV input and selection of line compensation. The following settings depend on the selections made in the "Mode" menu:

- **Thermo-element**

Type selection: E, J, K, N, R, S, T, L, B

- **Connection Mode of Temperature Resistor**

2, 3 or 4-wire connection technology

- **Measuring Range**



The measuring range is composed of the lower and upper temperature value. After selecting the connecting type, the measuring range is indicated in the lower section of the DTM. These indications accord to the adjusted analogue output signal of 0/4-20 mA. The lower temperature depends on the type of thermoelement/temperature resistor and accords to an output signal of 0/4 mA. The upper limit temperature also depends on the type of thermo-element/temperature resistor. The adjusted upper limit temperature accords to an analogue output signal of 20 mA.

- **Output Signal**

The selection comprises 0-20 mA, 4-20 mA signals. The adjusted values correspond to the adjusted lower and upper limit temperatures.

- **Line Compensation**

In case of 2-wire connections, the resistor can be adapted to the connection cable. For this it is necessary to short the measuring point.

The LEDs Pwr and  flash alternately. If they start flashing mutually line compensation has been carried out. Continue by selecting another function and removing the short-circuit. If the LED  continues to flash, line compensation has not been accomplished successfully. Line compensation must also be carried out if thermo-elements with external cold junction are used.

- **Error Current**

Either 0 mA or >22 mA

- **Switching Threshold (IM34-12Ex-CRi only)**

Entry of a temperature value or a low voltage value at which the limit value relay is activated.

Mounting and Installation

The connected apparatus (Ni100/Pt100, thermo-elements) must meet the requirements for use in explosion hazardous areas (EN 60079-14). The device is suited for snap-on clamps for hat rail mounting (EN 50022) or for screw panel mounting. Devices **of the same type** may be mounted directly next to each other. It must be ensured that heat is conducted away from the device. Mounting and installation must be carried out in accordance with the applicable regulations. The operator is responsible for compliance with the regulations. The removeable terminal blocks are coded and may only be plugged into the designated sockets. The coding system may not be altered or damaged. The device must be protected against dust, dirt, moisture and other environmental influences as well as against strong electromagnetic emissions. It should also be protected against the risks of mechanical damaging, unauthorised access and incidental contact. All installations must be carried out observing the regulations of EMC protection.

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Important information on use of devices with "IS" circuits

This device is equipped with circuits featuring protection type intrinsic safety for explosion protection per EN 50020 at terminals 1– 6 which are marked in blue. The intrinsically safe circuits are approved by the authorised bodies for use in those countries to which the approval applies.

For **correct usage** in explosion hazardous areas please **observe and follow the national regulations and directives strictly**.

Following please find some guidelines referring to the frame-work directive of the European Union 94/9/EC (ATEX 100a).

This device is classified as an associated apparatus which is equipped with intrinsically safe and nonintrinsically safe circuits. Therefore it may only be installed in the non-explosion hazardous area in dry clean and well monitored locations. It is permitted to connect intrinsically safe equipment to the intrinsically safe connections of this device.

All electrical equipment must comply with the regulations applying to use in the respective zone of the explosion hazardous area. If the intrinsically safe circuits lead into explosion hazardous areas subject to dust hazards, i.e. zone 20 or 21, it must be ensured that the devices which are to be connected to these circuits, meet the requirements of category 1D or 2D and feature an according approval.

When interconnecting devices within such an assembly it is required to keep and provide a proof of intrinsic safety (EN 60079-14). Once that intrinsically safe circuits have been connected to the non-intrinsically safe circuit, it is not permitted to use the device subsequently as intrinsically safe equipment. The governing regulations cover installation of intrinsically safe circuits, mounting to external connections, cable characteristics and cable

installation. Cables and terminals with intrinsically safe circuits must be marked and separated from nonintrinsically safe circuits or feature appropriate isolation (EN 60079-14). Please observe the specified clearances between the intrinsically safe connections of this device and the earthed components and connections of other devices.

The approval expires if the device is repaired, modified or opened by a person other than the manufacturer or an expert, unless the device-specific instruction manual explicitly permits such interventions.

Visible damages of the device's housing (e. g. blackbrown discolouration due to heat accumulation, perforation or deformation) indicate a serious error and the device must be turned off immediately. When using associated apparatus it is required to check the connected intrinsically safe equipment too. This inspection may only be carried out by an expert or the manufacturer.

Operation of the device must conform to the data printed on the side of the housing. Prior to initial set-up or after every alteration of the interconnection assembly it must be assured that the relevant regulations, directives and framework conditions are observed, that operation is error-free and that all safety regulations are fulfilled. Mounting and connection of the device may only be carried out by qualified and trained staff familiar with the relevant national and international regulations of explosion protection.

The **most important data from the EC type examination certificate** are listed overleaf. All valid national and international approvals covering **TURCK** devices are obtainable via the Internet (www.turck.com). Further information on explosion protection is available on request.

PACTware™ and Devices DTM Software Installation

You will require the following software components on your computer for the installation of PACTware:

- **PACTware software for parameterising of interface modules and excom®**
- **DTM**

These software components are available on the Internet at www.turck.com as a free-of-charge download.

- Select the homepage www.turck.com → Download → Software.

Your PC then requests the name of a directory at which it should save the files on the harddrive of your computer. The files are self-extracting archives, ZIP files, which extract independently when accessed.

- Simply double click on the ZIP archive to extract the files.
- You commence extraction of the file when you click on "Extract".

The "TURCK_FILES" directory is created on the current drive (e.g. C:\). Extract both file archives: (PACTware and DTM) before you commence with the actual software installation.

1. Installation of PACTware

Now start the installation of PACTware on your computer.

- Start Windows Explorer and change over to the "TURCK_FILES\PACTware...SetupTurck\PACTware" directory.
- Start the "setup.exe" file located there.

Follow the self-explanatory instructions displayed by the installation program and complete the installation.

2. Installation of the HART® Communication Driver

After the installation of PACTware has been successfully completed, the HART communication driver must now be installed.

Start the "setup.exe" file located at "TURCK_FILES...Dtms\Hart"

Follow the self-explanatory instructions displayed by the installation program and complete the installation.

3. Installing of the Devices DTM

After the installation of the HART communication driver been successfully completed, the devices DTM must be installed. A directory has been created to reflect the DTM which you have

downloaded. The name commences with the first 4 or 5 letters of the device type which you have selected.

- Start for example "setup.exe" in the "TURCK_FILES\IM34...Setup..." directory in order to install the devices DTM for the IM34.

Configuration of PACTware

Please restart your PC after installation in order to update the Windows registry. Then open PACTware and carry out configuration:

Make the following entries:

- User: "Administrator"
 - Password: "manager"
- Prior to parameterising a device, a project has to be created. For this, please select the device catalogue from the "View" menu or the < F3 > key. A new window with the name "Device catalogue" will open. This window contains all available "Device Type Managers - DTMs". Should a required DTM not be listed, please click on the button "Re-initialize the device catalogue"
- First add the HART protocol driver from the company Codewrights GmbH
 - Then add the DTMs from **TURCK**

Parameter entries for HART protocol driver parameters:

(Open the window by a double click):

- Communication-Interface:
"HART Multiplexer"
- Select serial interface
- Baud rate: "9600"

Possible error sources:

- RS232 port not addressable or being used by another application, Remedy: use different port or exit the application causing problems
- RS232 line too long (max. line length approx. 10 m), Remedy: shorten line

After successful installation and configuration it is now possible to communicate with the IM34....