

Product Manual

ITMA / IRMA

temperature converters



Models No. ITMA0001 / IRMA0001
Drawing No. LP1099
Version No. 103
Revision Date 19/06



6 mm series of temperature converters ITMA / IRMA

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Warning



GENERAL

To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following. Prior to the commissioning of the device, this installation guide must be examined carefully. Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Until the device is fixed, do not connect hazardous voltages to the device.



**HAZARDOUS
VOLTAGE**

To avoid explosion and serious injury: Modules having mechanical failures must be returned to Red Lion Controls for repair or replacement.

Repair of the device must be done by Red Lion Controls only.

In applications where hazardous voltage is connected to in-/outputs of the device, sufficient spacing or isolation from wires, terminals and enclosure - to surroundings (incl. neighboring devices), must be ensured to maintain protection against electric shock.



CAUTION

Potential electrostatic charging hazard. To avoid the risk of explosion due to electrostatic charging of the enclosure, do not handle the units unless the area is known to be safe, or appropriate safety measures are taken to avoid electrostatic discharge.

Symbol identification



Triangle with an exclamation mark: Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage.



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



Ex devices have been approved acc. to the ATEX directive for use in connection with installations in explosive areas.

Safety instructions

Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

Environment

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

The device can be used for Measurement Category II and Pollution Degree 2.

The device is designed to be safe at least under an altitude up to 2000 m.

Mounting

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

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

Red Lion Controls
www.redlion.net

Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location.

Descriptions of input / output and supply connections are shown in this installation guide and on the side label.

The device is provided with field wiring terminals and shall be supplied from a Power Supply having double / reinforced insulation. A power switch should be easily accessible and close to the device. The power switch shall be marked as the disconnecting unit for the device.

ITMA and IRMA must be mounted on a DIN rail according to EN 60715.

UL installation

Use 60/75°C copper conductors only.

Wire size AWG 26-12

UL file number E179259

The device is an Open Type Listed Process Control Equipment. To prevent injury resulting from accessibility to live parts the equipment must be installed in an enclosure.

The power supply unit must comply with NEC Class 2, as described by the National Electrical Code® (ANSI / NFPA 70).

In class I, Division 2 or Zone 2 installations, the subject equipment shall be mounted within a tool-secured enclosure which is capable of accepting one or more of Class I, Division 2 wiring methods specified in the National Electrical Code (ANSI/NFPA 70) or in Canada in the Canadian Electrical Code (C22.1).

The ITMA / IRMA Isolators and Converters must be connected to limited output NEC Class 2 circuits, as outlined in the National Electrical Code® (ANSI / NFPA 70), only. If the devices are connected to a redundant power supply (two separate power supplies), both must meet this requirement.

Where installed in outdoor or potentially wet locations the enclosure shall at a minimum meet the requirements of IP54.

Warning: Substitution of components may impair suitability for zone 2 / division 2.

Warning: To prevent ignition of the explosive atmospheres, disconnect power before servicing and do not separate connectors when energised and an explosive gas mixture is present.

IECEX, ATEX installation in Zone 2

IECEX DEK 19.0002 X Ex nA IIC T4Gc

DEKRA 19ATEX0002 X II 3G Ex nA IIC T4 Gc

For safe installation the following must be observed. The device shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

The devices shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN60529, taking into account the environmental conditions under which the equipment will be used.

When the temperature under rated conditions exceeds 70°C at the cable or conduit entry point, or 80°C at the branching point of the conductors, the temperature specification of the selected cable shall be in compliance with the actual measured temperature.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40%.

To prevent ignition of the explosive atmospheres, disconnect power before servicing and do not separate connectors when energised and an explosive gas mixture is present.

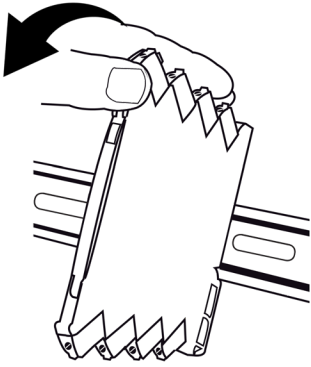
Cleaning

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

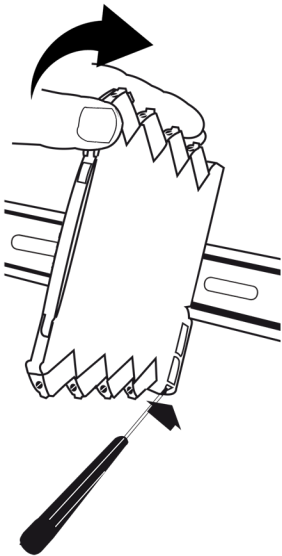
Liability

To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against Red Lion Controls that would otherwise exist according to the concluded sales agreement.

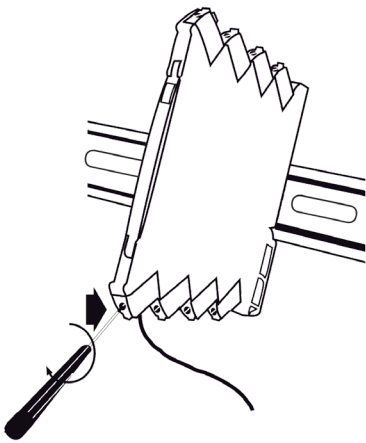
Mounting and demounting of ITMA or IRMA



Picture 1:
Mounting on DIN rail.
Click the device onto the rail.



Picture 2:
Demounting from DIN rail.
First, remember to demount the connectors with hazardous voltages.
Detach the device from the DIN rail by lifting the bottom lock.



Picture 3:
Wire size AWG 26-12 / 0.13 x 2.5 mm² stranded wire.
Screw terminal torque 0.5 Nm.

Installation on DIN rail

The ITMA and IRMA can be installed on a DIN rail.



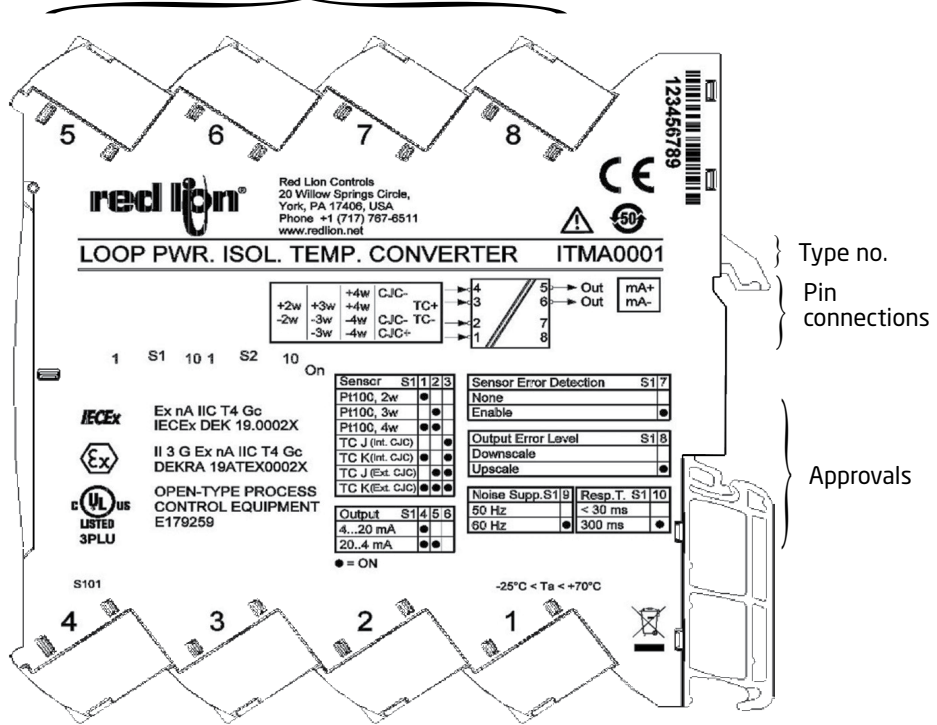
Marking

The front cover of the ITMA and IRMA has been designed with an area for affixation of a click-on marker. The area assigned to the marker measures 5 x 7.5 mm. Markers from Weidmüller's MultiCard System, type MF 5/7.5, are suitable.



Side label

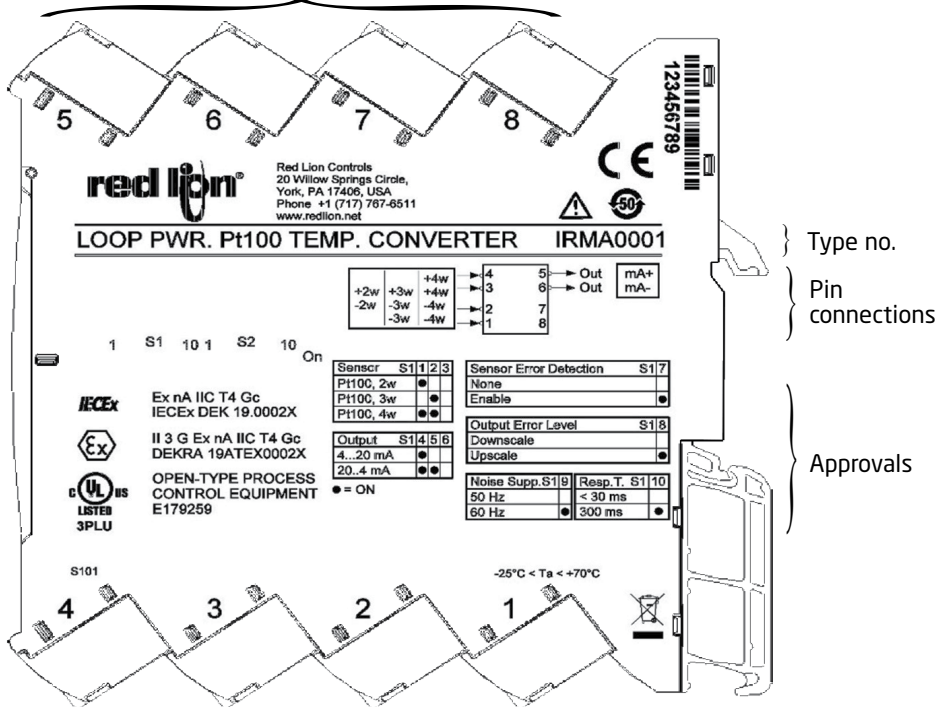
Terminal numbers



Type no.
Pin connections

Approvals

Terminal numbers



Type no.

Pin connections

Approvals

6 mm series of temperature and converters

ITMA / IRMA

- Converts process measurements from Pt100, TC J and K temperature sensors to voltage or current outputs
- Multiple pre-calibrated temperature ranges are selectable via DIP-switches
- High accuracy, better than 0.05% and excellent 50/60 Hz noise suppression
- Fast signal response time < 30 ms
- Slimline 6 mm housing

Applications

- The temperature converters measure standard 2-, 3- or 4-wire Pt100 and/or TC J & K temperature sensors, and provides an analog voltage or current output.
- High 3 port isolation provides surge suppression and protects the control system from transients and noise.
- The loop powered devices have high 2-port galvanic separation to eliminate ground loops.
- The devices can be mounted in the Safe area or in Zone 2 / Division 2 areas.

Technical characteristics

- High conversion accuracy, better than 0.05% of span.
- All terminals are protected against overvoltage and polarity error.
- Meeting the NAMUR NE21 recommendations, the devices ensure top measurement performance in harsh EMC environments.
- The devices meet the NAMUR NE43 standard defining out of range and sensor error output values.
- High galvanic isolation of 2.5 kVAC.
- Excellent signal/noise ratio of > 60 dB.

Mounting / installation

- The narrow 6 mm housing and very low power consumption allows up to 165 units to be mounted per meter of DIN rail, without any air gap between units.
- Wide temperature operation range of -25...+70°C.

Ordering information

	Input				Output	Supply	Isolated
	TC			Pt100	Current		
	J & K	Int. CJC	Ext. CJC	2-, 3-, 4-wire	Passive		
ITMA0001	✓	✓	✓	✓	✓	Loop-powered	2.5 kV
IRMA0001				✓	✓	Loop-powered	2.5 kV

Technical data

Environmental conditions:

Operating temperature -25°C to +70°C
 Storage temperature -40°C to +85°C
 Calibration temperature. 20...28°C
 Relative humidity < 95% RH (non-cond.)
 Protection degree IP20
 Installation in pollution degree 2 & overvoltage category II.

Mechanical specifications:

Dimensions (HxWxD) 113 x 6.1 x 115 mm
 Weight approx. 70 g
 DIN rail type. DIN EN 60715 - 35 mm
 Wire size. 0.13...2.5 mm² / AWG 26...12 stranded wire
 Screw terminal torque. 0.5 Nm
 Vibration. IEC 60068-2-6
 2...25 Hz. ±1,6 mm
 25...100 Hz. ±4 g

Common electrical specifications:

Loop-powered:

ITMA 5.5...35 VDC
 IRMA 3.3...35 VDC

Power requirements:

Type	Max. power dissipation	Max. required power
ITMA	0.80	0.80
IRMA	0.80	0.80

Max. power dissipation is the maximum power dissipated at nominal operating values.

Isolation voltage, test 2.5 kVAC
 Isolation voltage working 300 VAC (reinforced) /
 250 VAC (Zone 2, Div. 2)
 Double isolation Input / output 1 / output 2 / supply
 Signal dynamics, input 23 bit
 Signal dynamics, output 18 bit
 Signal / noise ratio Min. 60 dB

	Response time	
	Selectable	
	< 30 ms	< 300 ms
ITMA	✓	✓
IRMA	✓	✓

Incorrect DIP-sw setting identification:

Loop-powered 3.5 mA output

Device	Input	Basic accuracy	General accuracy	Temperature coefficient
ITMA	Pt100	$\leq 0.1^{\circ}\text{C}$	$\leq \pm 0.05\%$ of span	$0.02^{\circ}\text{C}/^{\circ}\text{C}$ (basic) or $\leq \pm 0.01\%$ of span / $^{\circ}\text{C}$
ITMA	TC	$\leq 0.5^{\circ}\text{C}$		$0.1^{\circ}\text{C}/^{\circ}\text{C}$ (basic) or $\leq \pm 0.01\%$ of span / $^{\circ}\text{C}$
IRMA	Pt100	$\leq 0.2^{\circ}\text{C}$	$\leq \pm 0.1\%$ of span	$0.02^{\circ}\text{C}/^{\circ}\text{C}$ (basic) or $\leq \pm 0.01\%$ of span / $^{\circ}\text{C}$

EMC immunity influence < $\pm 0.5\%$ of span

Extended EMC immunity:

NAMUR NE 21 < $\pm 1\%$ of span

Input specifications:

Specifications for Pt100 input:

Temperature range, Pt100 $-200\dots+850^{\circ}\text{C}$ - IEC 60751
 Min. measuring range (span) 10°C
 Sensor current < 150 mA
 Sensor cable resistance < $50\ \Omega$ per wire
 Effect of sensor cable resistance, 3- / 4-wire < $0.002\ \Omega / \Omega$
 Sensor error detection Yes - selectable via DIP-switch
 Broken sensor detection > $800\ \Omega$
 Shorted sensor detection < $18\ \Omega$

Specifications for TC input:

Temperature range, TC J $-100\dots+1200^{\circ}\text{C}$ - IEC 60584-1
 Min. measuring range (span) 50°C
 Temperature range, TC K $-180\dots+1372^{\circ}\text{C}$ - IEC 60584-1
 Min. measuring range (span) 50°C
 Sensor cable resistance < $5\ \text{k}\Omega$ per wire
 Cold junction compensation (CJC) accuracy:
 Accuracy @ external Pt100 Better than $\pm 0.15^{\circ}\text{C}$
 Accuracy @ internal CJC Better than $\pm 2.5^{\circ}\text{C}$
 Open Thermocouple detection Yes - selectable via DIP-switch
 Internal CJC error detection Yes
 External CJC error detection Yes - selectable via DIP-switch

Output specifications:

	Passive	Selectable			NAMUR NE43		Max. load
		Invert	Range	Limit	Sensor error	Range 4...20 mA	
ITMA	✓	✓	4...20 mA	3.8...20.5 mA	3.5 / 23 mA	✓	$(V_{\text{supply}}-5.5)/0.023 [\Omega]$
IRMA	✓	✓	4...20 mA	3.8...20.5 mA	3.5 / 23 mA	✓	$(V_{\text{supply}}-3.3)/0.023 [\Omega]$

Updating time 10 ms
 Load stability $\leq 0.01\%$ of span / 100 Ω

Observed authority requirements:

EMC 2014/30/EU
 EMC Emission CISPR 22, Class B
 LVD 2014/35/EU
 RoHS 2011/65/EU

Approvals:

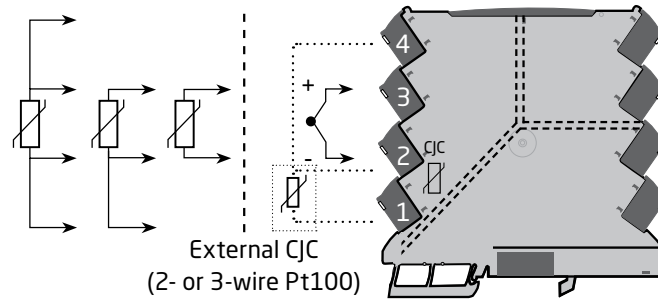
UL, Standard for Safety UL 61010-1
 Safe Isolation EN 61140

I.S. / Ex approvals:

ATEX 2014/34/EU DEKRA 19ATEX0002 X
 IECEx IECEx DEK 19.0002 X

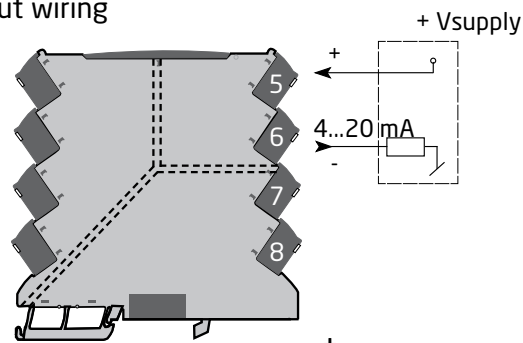
Connections

Input wiring



			+	-	CJC	Type
1,2 & 3,4	1,2 & 3	2 & 3	3	2	Y	ITMA
1,2 & 3,4	1,2 & 3	2 & 3	-	-	N	IRMA

Output wiring



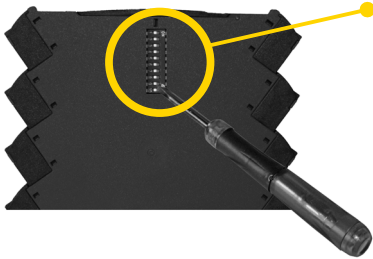
	+	-
ITMA	5	6
IRMA	5	6

IRMA:
ITMA:

No galvanic isolation
2 port isolation (reinforced)

DIP-switch configuration

The devices can be configured via DIP-switches. The DIP-switches are located on the side of the device and can be adjusted with a small screwdriver or other implement.



Default configurations

	ITMA, IRMA
Sensor type	Pt100, 3 wire
Output range	4...20 mA
Error detection	Short circuit detection Broken circuit detection
Error output current	3.5 mA
Noise suppression	50 Hz
Input lower limit	0°C
Input upper limit	150°C
Response time	< 30 ms
Configuration mode	-

ITMA - Pt100 & TC J/K

Sensor	S1	1	2	3	Sensor Error Detection	S1	7	
Pt100, 2w		●			None			
Pt100, 3w			●		Enable		●	
Pt100, 4w		●	●					
TC J (Int. CJC)				●	Output Error Level	S1	8	
TC K (Int. CJC)		●			Downscale			
TC J (Ext. CJC)		●	●		Upscale		●	
TC K (Ext. CJC)		●	●					
Output	S1	4	5	6	Noise Supp. S1	9	Resp.T. S1	10
4...20 mA		●			50 Hz		< 30 ms	
20..4 mA		●	●		60 Hz	●	300 ms	●

● = ON

IRMA - Pt100

Sensor	S1	1	2	3	Sensor Error Detection	S1	7	
Pt100, 2w		●			None			
Pt100, 3w			●		Enable		●	
Pt100, 4w		●	●					
Output	S1	4	5	6	Output Error Level	S1	8	
4...20 mA		●			Downscale			
20..4 mA		●	●		Upscale		●	
					Noise Supp. S1	9	Resp.T. S1	10
					50 Hz		< 30 ms	
					60 Hz	●	300 ms	●

● = ON

(Power must be cycled after DIP-switch positions are changed).

Temperature range programming

DIP S2				● = ON										Temperature Range °C											
Start Temp.	1	2	3	4	End Temp.	5	6	7	8	9	10	End Temp.	5	6	7	8	9	10	End Temp.	5	6	7	8	9	10
-200					0							105		●		●	●	●	375	●	●	●	●		
-180				●	5						●	110		●		●	●		400	●	●	●	●		
-150			●		10						●	115		●		●	●	●	450	●	●	●	●		
-100			●	●	15						●	120		●	●				500	●	●	●	●	●	
-50			●		20						●	125		●	●			●	550	●	●	●	●	●	
-25			●	●	25						●	130		●	●		●		600	●	●	●	●	●	
-10			●	●	30						●	135		●	●		●	●	650	●	●				
-5			●	●	35						●	140		●	●				700	●	●				
0		●			40						●	145		●	●		●		750	●	●			●	
5		●		●	45						●	150		●	●		●	●	800	●	●			●	●
10		●		●	50						●	160		●	●		●	●	850	●	●			●	●
20		●		●	55						●	170		●					900	●	●			●	●
25		●			60						●	180		●					950	●	●			●	●
50		●		●	65						●	190		●				●	1000	●	●			●	●
100		●		●	70						●	200		●				●	1050	●	●			●	●
200		●		●	75						●	225		●				●	1100	●	●			●	●
					80						●	250		●				●	1150	●	●			●	●
					85						●	275		●				●	1200	●	●			●	●
					90						●	300		●				●	1250	●	●			●	●
					95						●	325		●				●	1300	●	●			●	●
					100						●	350		●				●	1350	●	●			●	●
																			1372	●	●			●	●

Sens. type:	Temp. range °C
Pt100	-200 - +850°C
TC J	-100 - +1200°C
TC K	-180 - +1372°C

Please note:

- "Start temp" must be lower than "End temp" = correct DIP-switch setting
- Power must be cycled after DIP-switch positions are changed

