Evomini IO-Link series

IO-Link 1.1

Temperature sensor with IO-Link and 4...20 mA loop-powered output

OPERATING MANUAL

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Annex: EvominiIO-Link user parameters

Carefully read and strictly follow the instructions below

1 Safety instructions

Carefully read the instructions below before performing any operations on the device:

¤ The installation, electrical connection, commissioning, programming, configuration, operation and maintenance of the product can only be carried out by specialised personnel authorised to perform the respective task.

ITALCOPPIE SENSORI srl cannot be held responsible for any faults and/or problems caused by the use of this product. Please be fully aware of this before using the product.

¤ This product has been exclusively designed for industrial applications and is not for use in situations where strict safety precautions are necessary such as those either directly or indirectly related to medical equipment.

¤ The product is NOT designed for operation in environments with a hazardous atmosphere (flammable or explosive) or with corrosive gases.

¤ If there is the risk of a serious accident due to a fault or a defect in this product, the device should be equipped with an appropriate protection system.

¤ The product must be used as indicated in the operating manual, any other use does not comply with the method of use. ITALCOPPIE SENSORI srl assumes no responsibility for any damage or harm deriving from non-compliant use.

¤ Do not repair or modify the product. Only refer to ITALCOPPIE SENSORI srl for repairs.

¤ Make sure that the power supply corresponds with that reported on the housing of the product: after the power supply is connected, the unit will automatically become operative.

¤ This product is sensitive to electrostatic energy: do not touch or insert foreign objects into the connectors. Before removing the protective plastic cap from the connector, discharge the static electricity from your body.

1.1 Staff requirements

When performing their duties, staff must meet the following requirements:
¤ The operators must have qualifications that are relevant to the assigned functions and roles.
¤ The operators must be authorised by the owner of the system.
¤ The operators must be familiar with federal/nations regulations.
¤ Before starting work, the operators must have read and understood the instructions in this manual and any supplementary documentation (if available and depending on the application).
¤ The operators must comply with the instructions and basic conditions.

1.2 Occupational health and safety

Refer to the regulations in force.

2 Description and intended use

This device must be used for temperature measurement and monitoring. The effect that the temperature has on the RTD (Resistance Temperature Detector) probe generates a signal, which is amplified, digitalized and processed.
The device has three operating modes: IO-Link*, 4…20 mA loop-powered (passive system) output for alarm thresholds (SIO).
According to specification 1.1 the IO-Link interface supports SDCI (Single Drop Communication Interface) bidirectional communication and is used to exchange process data, parameters, diagnostic information and status messages; any IO-Link master can be used for the configuration.
The SIO operating mode with NPN or PNP configurable output allows the device to be used as a programmable thermostat.
An LED indicator light reports the operating status of the device (only in IO-Link and SIO modes).
This temperature sensor is particularly suitable for use in automated industrial systems in sectors such as HVAC (Heating, Ventilation, and Air Conditioning), Food & Pharmaceutical, Industrial Refrigeration, Food Refrigeration, Cryogenics, Agriculture, Animal Husbandry, Meteorology, etc.

ITALCOPPIE SENSORI srl is not liable in any way for damage or injury caused by tampering or incorrect or improper use of the device.

The basic principles of IO-Link communication are available on the website* ***www.IO-Link.com*

2.1 Hazardous materials

The use of hazardous materials as a medium may cause abrasions and corrosion to the components of the product that come into contact with the medium. The medium could leak out and become a fire risk and health hazard.
Evaluate the risk by taking into account the safety data sheet for the hazardous substance relating to the monitoring, operation, maintenance, cleaning and disposal:

- Perform a comparison and a systemic check of how long the product came into contact with the medium and the permissible environmental affects.
- Evaluate the risk to people and the environment.
- Evaluate the fire hazard associated with the materials of the product, the permissible environmental affects and the electrical power supply.

3 Identification of the product

The model and the main characteristics of the product are marked on the housing of the device

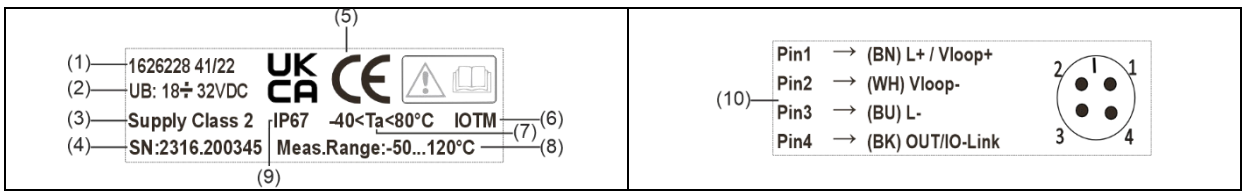


Figure 1

1) Manufacturing code, week number/year of production
2) Operating voltage range
3) This indication must be present if the UL marking is present on the certifications (5). In this case, the device must only be fed by a power supply unit with a Class 2 limited power electric circuit according to UL1310 (SELV or Class 2 circuit)
4) Serial number
5) Certifications
6) Model code
7) Ambient temperature range for the correct operation of the device
8) Measurement range for the sensing element
9) Degree of protection against external agents (according to IEC 60529)
10) Pin-out (the colouring of the wires is indicated in accordance with IEC 60947-5-2 which is only valid for A-coded standard wires). BN=brown, WH=white, BU=blue, BK=black)

4 Dimensions (mm) and functional indications

Model IOC-

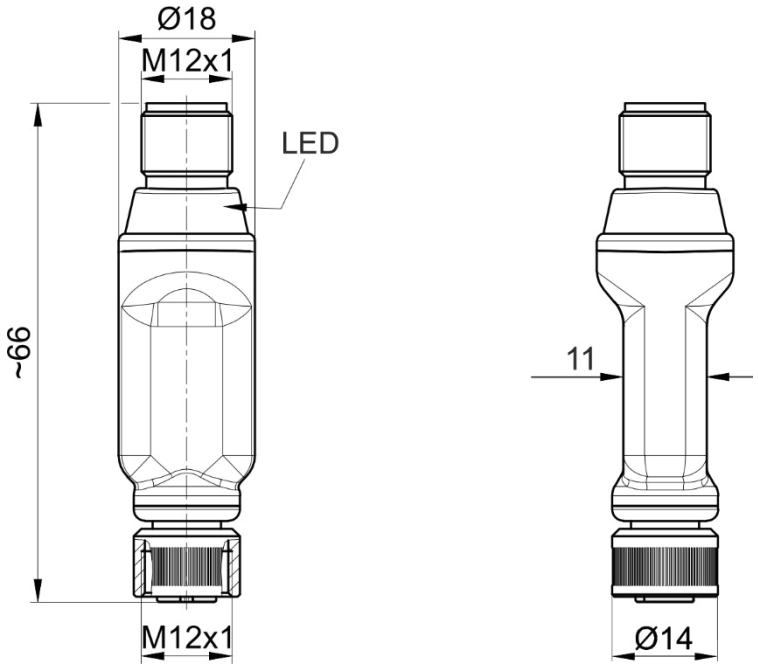


Figure 2

- Plastic device housing (operating range -40 to +70°C)
- Input sensor range: -200 to +800°C
- The temperature sensor is not included in the package. This device is compatible with Italcoppie TRM and TRC (Pt100/Pt1000) series RTD thermometers. For more information consult the website www.italcoppie.com

Model IOCM

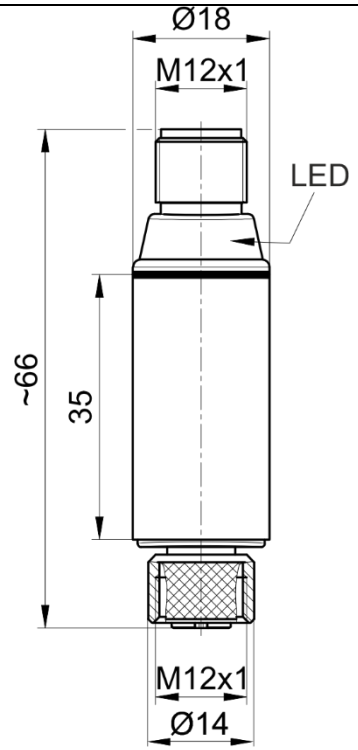


Figure 3

- Metal device housing made of AISI 316L stainless steel (operating range -40 to +80°C)
- Input sensor measurement range: -200 to +800°C
- The input temperature sensor is not included in the package.
- This device is compatible with Italcoppie TRM and TRC (Pt100/Pt1000) series RTD thermometers. For more information consult the website www.italcoppie.com

Model IOTP

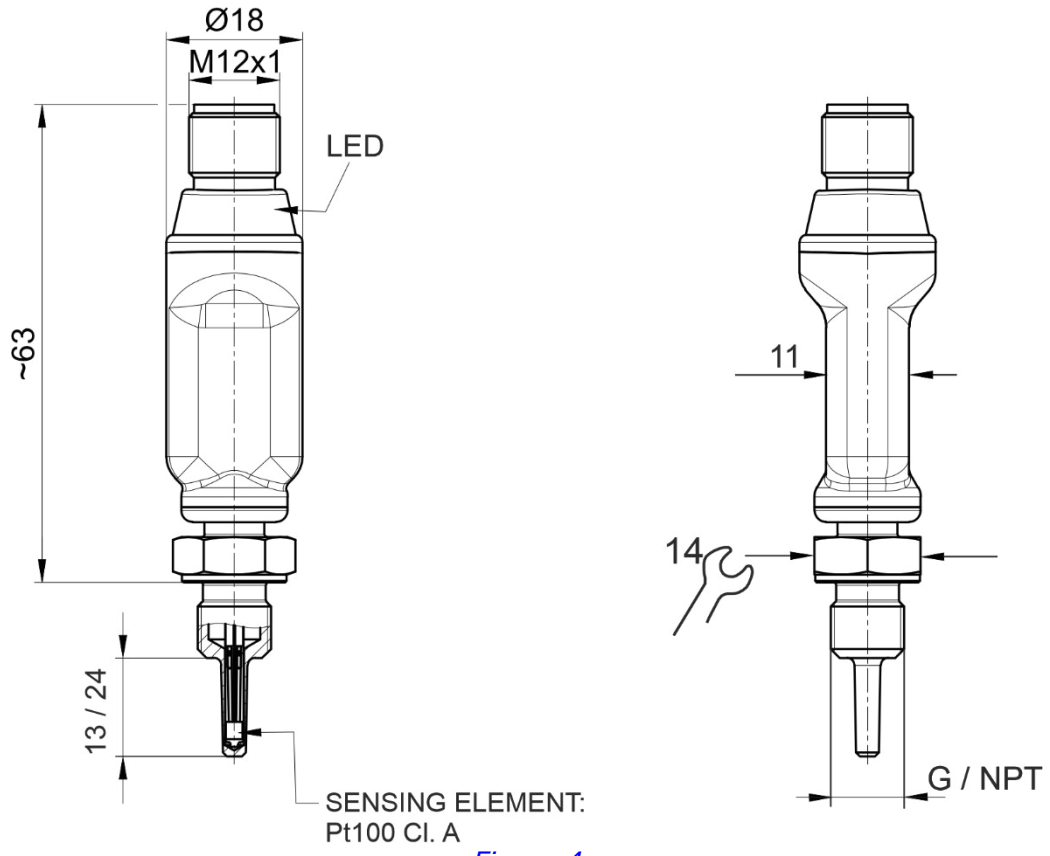


Figure 4

Possible process connections

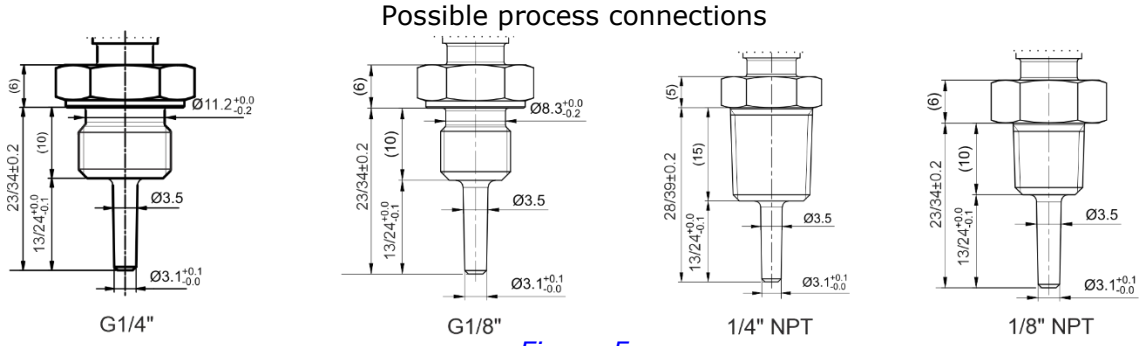


Figure 5

- Plastic device housing (operating range -40 to +70°C)
- Sensor measurement range: -50 to +110°C (refer to the T.max process/T.ambient graph)
- Suitable for measurements in liquids; it is not recommended for measurements in air.
- If a pipe is installed, the ideal immersion length corresponds to half the diameter of the pipe.
- Maximum working pressure (referring to a stem L of 13/24 mm): PN 100 BAR @Tamb
- For cylindrical threading, it is recommended that a thread sealer or gasket be used; the operator must check the suitability of these gaskets at the operating conditions. Replace the gasket when disassembling. For conical threading, the operator must check if additional sealing is required, for example using PTFE tape.

Model IOTM

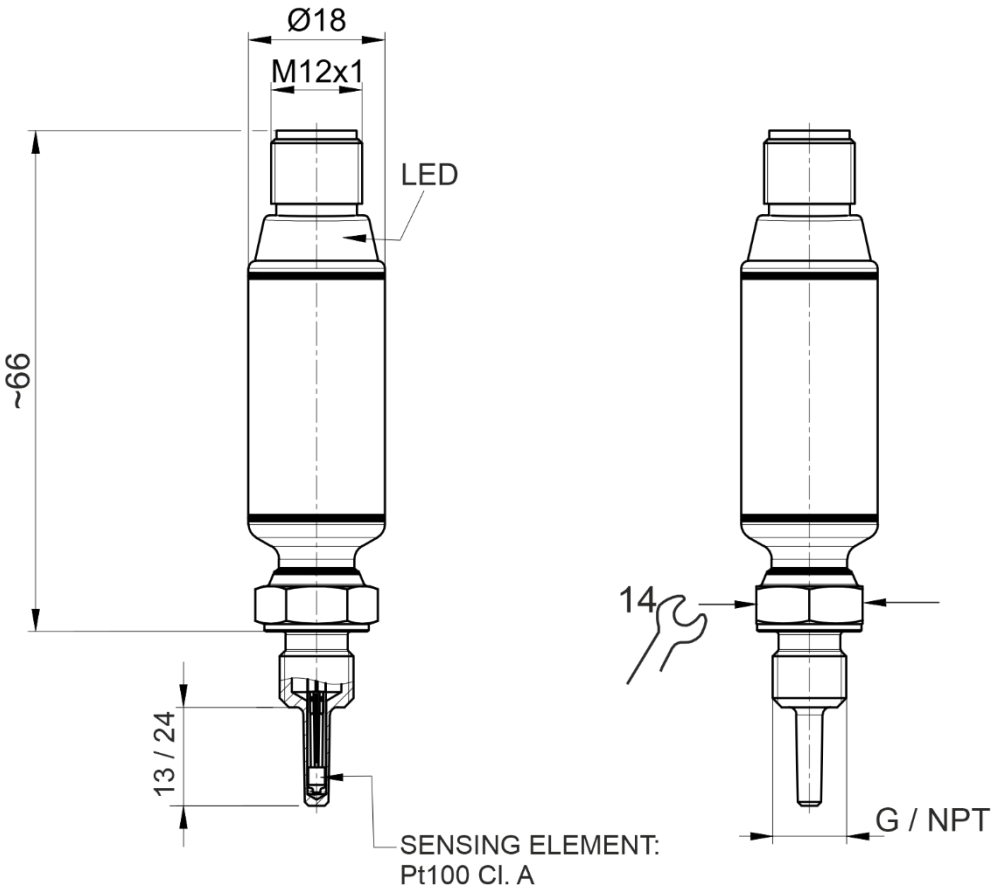


Figure 6

Possible process connections

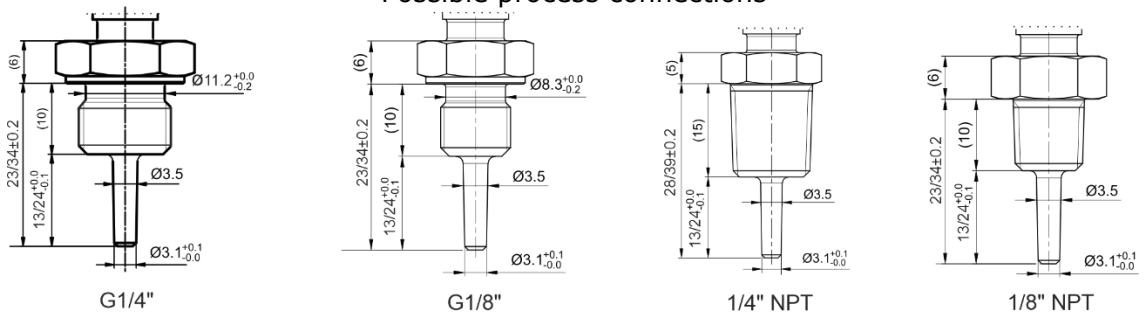
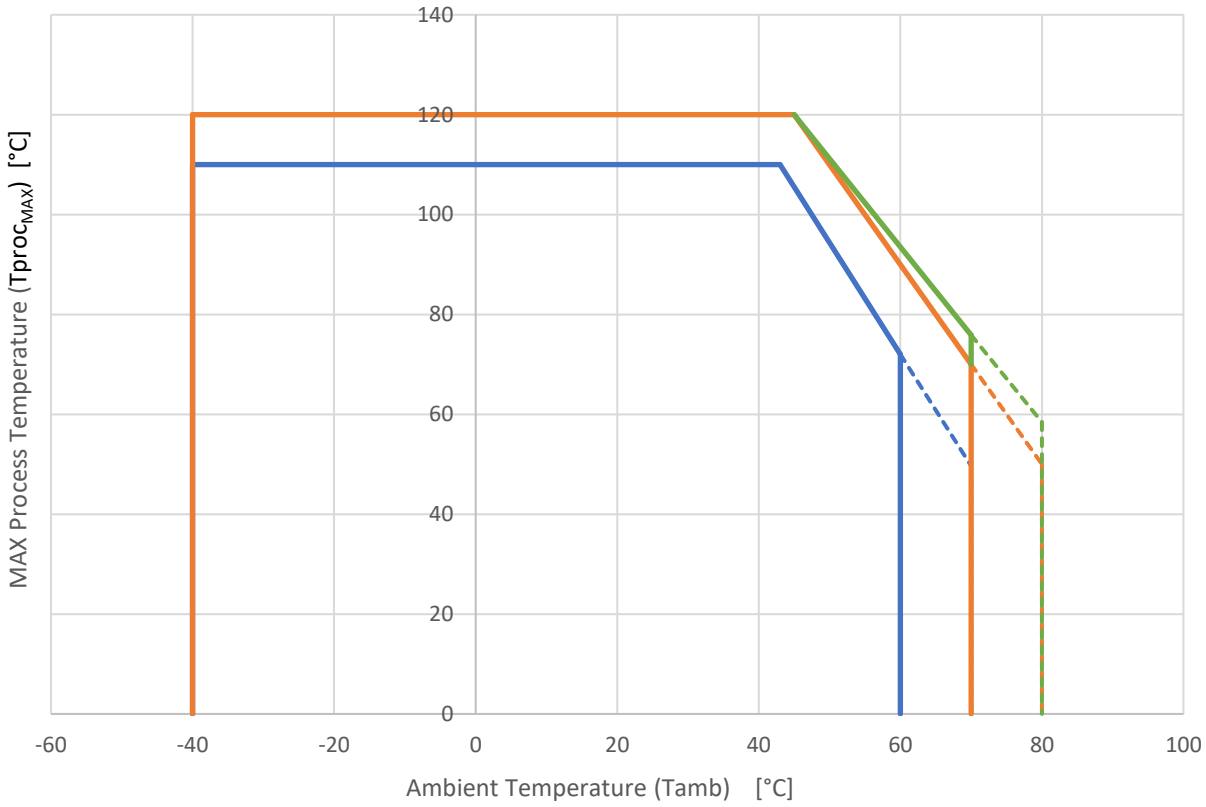


Figure 7

- Metal device housing made of AISI 316L stainless steel (cylindrical zone operating range -40 to +80°C)
- Sensor measurement range: -50 to +120°C (refer to the T.max process/T.ambient graph)
- Suitable for measurements in liquids; it is not recommended for measurements in air.
- If a pipe is installed, the ideal immersion length corresponds to half the diameter of the pipe.
- Maximum working pressure (referring to a stem L of 13/24 mm): PN 100 BAR @Tamb

- For cylindrical threading, it is recommended that a thread sealer or gasket be used; the operator must check the suitability of these gaskets at the operating conditions. Replace the gasket when disassembling. For conical threading, the operator must check if additional sealing is required, for example using PTFE tape.

For the correct use of IOTx models, refer to the derating diagram in Figure 8. Temperatures above that indicated on the graph could damage the electronics due to the transfer of processing heat to the housing of the device.



IOTM IO-Link

Tproc$_{MAX}$ = 120°C	-40°C ≤ Tamb ≤ 45°C	
Tproc$_{MAX}$ = 210-2Tamb	45°C < Tamb ≤ 80°C	Tamb > 80°C not allowed due electronics limit

IOTM loop powered

Tproc$_{MAX}$ = 120°C	-40°C ≤ Tamb ≤ 45°C	
Tproc$_{MAX}$ = 199.19-1.7605Tamb	45°C < Tamb ≤ 80°C	Tamb > 80°C not allowed due electronics limit

IOTP IO-Link = loop powered

Tproc$_{MAX}$ = 110°C	-40°C ≤ Tamb ≤ 43°C	
Tproc$_{MAX}$ = 206.14-2.2356Tamb	43°C < Tamb ≤ 70°C	Tamb > 70°C not allowed due electronics limit

Figure 8

Model IOI-

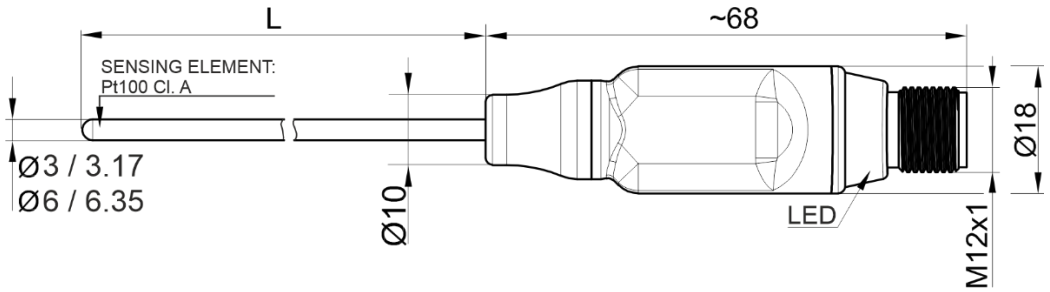


Figure 9

- Plastic device housing (operating range -40 to +70°C)
- Sensor measurement range: -50 to +350°C (also available with sensing element for cryogenics, minimum temperature -200°C)
- The sensing element is installed in the tip of the stem
- The stem can be curved: the bending radius must be at least 3 times the diameter of the shaft (except non-bendable end of the sensing element ~ 30 mm)
- For a correct temperature measurement during the process, the immersion depth of the stem must be at least 6 times the diameter. For example, the immersion depth for the 3 mm diameter stem must be at least 18 mm.
- Maximum operating pressure (referring to the stem): PN 100 BAR @Tamb
- Sliding compression fittings with metal or PTFE ferrules (process connection) or other types of "skin points" to measure the surface temperature are available as an option. For more information consult the website www.italcoppie.com

Model IOF-

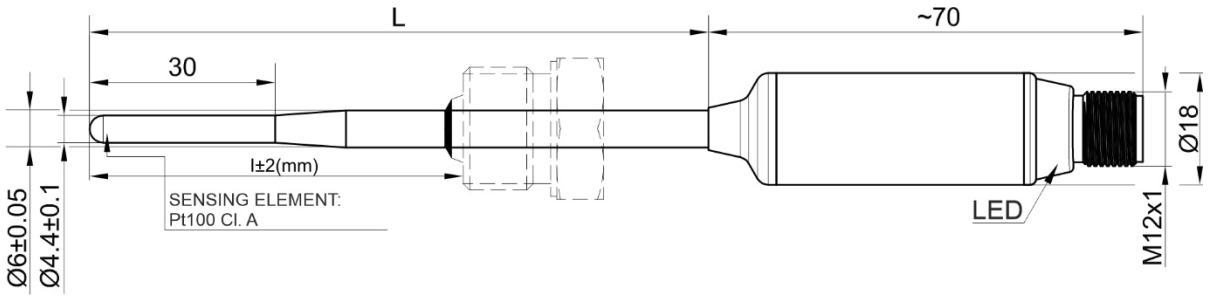
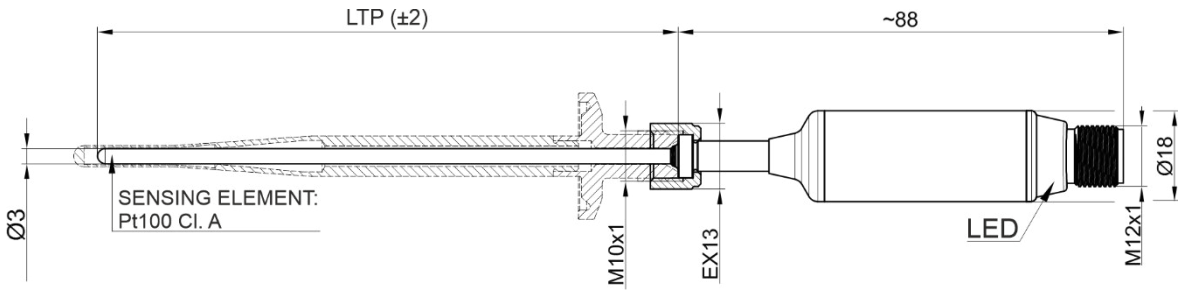


Figure 10

- Metal device housing made of AISI 316L stainless steel (cylindrical zone operating range -40 to +80°C)
- Sensor measurement range: -50 to +350°C (also available with sensing element for cryogenics, minimum temperature -200°C)
- The sensing element is installed in the tip of the stem
- The stem (AISI 316L stainless steel tube) must NOT be curved or bent
- The process connection is factory welded as per the specifications agreed upon with the customer

Model IOD-
 *Figure 11*
• Metal device housing made of AISI 316L stainless steel (cylindrical zone operating range -40 to +80°C) • Sensor measurement range: -50 to +350°C (also available with sensing element for cryogenics, minimum temperature -200°C) • Different types of thermowells are available as options (an example with a TRI-CLAMP supply well is shown in the drawing). For more information consult the website www.italcoppie.com

5 Installation

CAUTION!

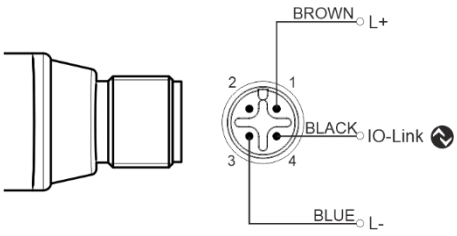
The device must only be installed by qualified and authorised staff.

5.1 General installation instructions

The electronics of the thermometer must be protected against temperatures above 80°C for models IOCM / IOTM / IOD- / IOF- or 70°C for models IOC- / IOTP / IOI- and below -40°C; temperatures outside this range cause malfunction or failure of the thermometer.

Every model has different construction and operating specifications that determine the installation method: based on the model to be installed, refer to chapter *4 Dimensions (mm) and functional indications* and to chapter *12 Technical Data*.

6 Electrical connections

IO-Link operating mode
 *Figure 12*
Power supply voltage (L+/L-): 18…30 Vdc (reverse polarity protection)

Switching output (SIO) operating mode

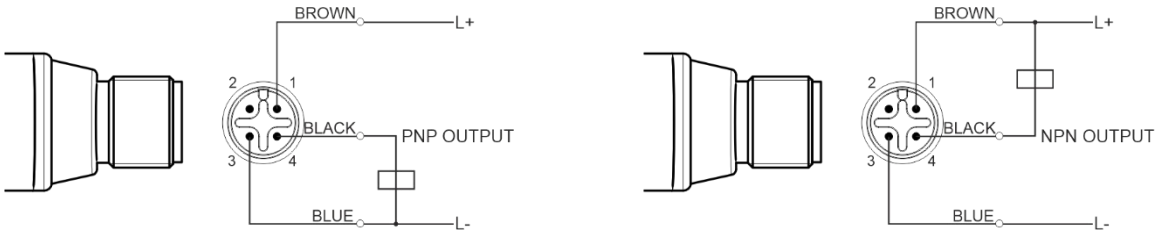


Figure 13

Power supply voltage (L+/L-): 18…30 Vdc (reverse polarity protection)
Maximum current supplied to the NPN or PNP output: 150 mA (short-circuit protection)

4…20 mA (Loop-Powered) operating mode

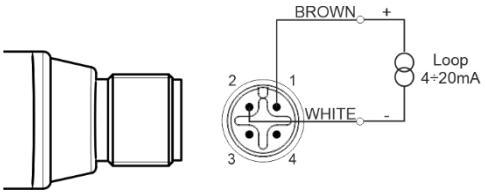


Figure 14

Power supply voltage: 8…32 Vdc (reverse polarity protection)

Assigning of the Pt100 connector pins (only for models IOC and IOCM)

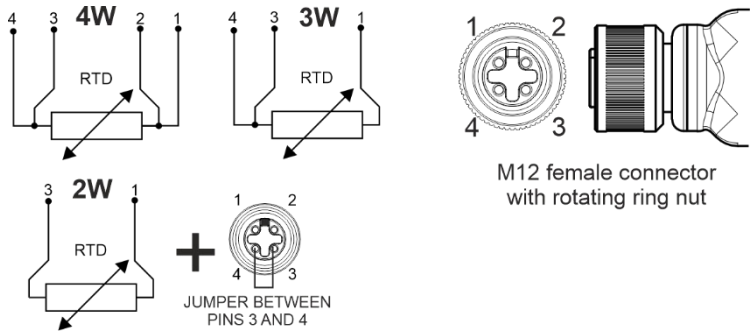


Figure 15

- The M12 connector must not be overly tightened, as to avoid damaging the device or the O-ring seal.
- The degree of protection specified in the technical data is guaranteed if the connector for the M12x1 wire meets the required degree of sealing.
- The colouring of the wires is indicated in accordance with IEC 60947-5-2 and is only valid for A-coded standard wires.
- For models with a metal housing, the temperature sensor must be connected at the same potential as the system by means of the process connection.

7 Device configuration

7.1 Information about IO-Link

IO-Link is a point-to-point connection for communication between the device and an IO-Link master unit. The IO-Link communication interface provides direct access to process and diagnostic data and also allows the device to be configured during operation.
The basic principles of IO-Link communication are available on the website www.IO-Link.com.

The Evomini IO-Link series devices are compatible with the following functions:

IO-Link specifications	Version 1.1
IO-Link Smart Sensor Profile 2nd edition	The following are supported: • Identification • Diagnosis • Digital measurement in accordance with SSP 3.1
SIO mode	Yes
Communication Speed	COM2 (38.4 KBaud)
Minimum cycle time	6.3 ms
Process data length	4 bytes
Data storage	Yes
Block Parameterization	Yes
Device Status and Detailed Device Status	Yes
Locator Function	Yes
BLOB Transfer & Firmware Update (Specifications version 1.1)	Yes

Table 1

7.2 Device integration with the master unit

An IODD (Input Output Device Description) file, which specifies the input data, output data, parameters, transmission speed, etc. is needed to integrate an IO-Link device with a master unit.

The IODD file can be downloaded either from the website www.italcoppie.com or from IODDfinder (https://ioddfinder.io-link.com)

7.3 Device identification

The device is identified by means of two parameters: The Vendor ID, which is a unique code that the Profibus PA consortium issues to each member, and the Device ID, which is a unique code that identifies the product.

Vendor ID	0x0717 (1815)
Device ID	*Models* IOC-/IOCM: 0x000001 (1) IOTP: 0x000002 (2) IOTM: 0x000003 (3) IOI-: 0x000004 (4) IOD-: 0x000005 (5) IOF-: 0x000006 (6)

Table 2

7.4 Process data

Process data (temperature and other information) are cyclically transmitted with a minimum cycle time of 6.3 ms in 32-bit blocks (4 bytes).
Two mappings can be selected through the "Process value mapping" (Index 77) parameter:

- 16-bit process data (temperature expressed in tenths of a degree C)
- 24-bit process data (temperature expressed in mK)

7.4.1 16-bit process data

bit offset	16	8	0
IntegerT(16)	IntegerT(8)	8 bit	
Measured value	Scale	Vendor specific.	

Figure 16

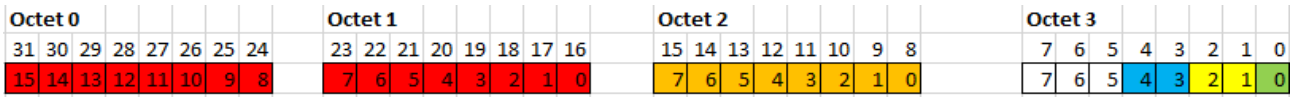
Measured value: Temperature expressed in tenths of a degree °C (16 bit)
Scale: (-1) the process value (temperature) must be multiplied by $10exp^{(Scale)}$

Specific device data: see Table 3

Measured value status [bit 4 -3]	0=Bad*	The measured value is invalid. The temperature of the device is outside the allowed range (Ta<-42°C or Ta>85°C)
	1=Uncertain*	The measured value may have an uncertainty. The temperature of the device is slightly outside the allowed range (-40<Ta<-42°C or 80<Ta<85°C)
	2=-	Code not used
	3=Good	The measured value is valid
Status of the sensor limits [bit 2 -1] (See Table 4)	0=Not limited	The measured value is within the allowed limits
	1=Low limited	The measured value is below the allowed lower limit
	2=High Limited	The measured value is above the allowed upper limit
Contact output [bit 0]	0=Off	Output contact open
	1=On	Output contact closed

Table 3

	*For the IOC-, IOTP, IOI- plastic models, the maximum ambient operating temperature is 70°C, as stated in the technical specifications in Chapter 12. The device can operate correctly up to 80°C, but the plastic enclosure may become damaged. Device failures caused by temperatures exceeding 70°C are not covered under warranty. The status of the measured value (Error/Uncertain) still refers to the data provided in Table 3.* *For ambient temperatures above 70°C, the use of the metallic models IOCM, IOTM, IOF-, IOD- is recommended.*



Item	Data type	Length in bits
Measured value		
Temperature	IntegerT	16
Scale	IntegerT	8
Data specific for the device (Vendor specific.)		
● = Measured value status	IntegerT	2
● = Status of the sensor limits	IntegerT	2
● = contact output	BooleanT	1

Figure 17

7.4.2 24-bit process data

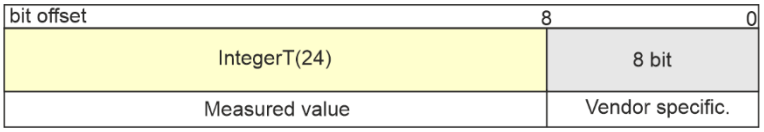
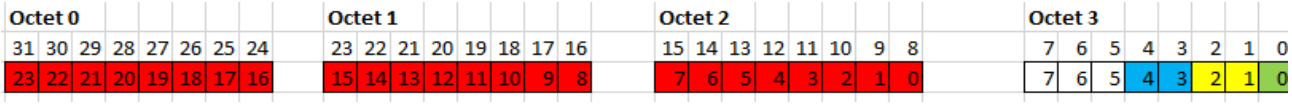


Figure 18

Measured value: Temperature expressed in mK (24 bit)
Specific device data: see Table 3



Item	Data type	Length in bits
Measured value		
Temperature	IntegerT	24
Data specific for the device (Vendor specific.)		
● = Measured value status	BooleanT	2
● = Status of the sensor limits	BooleanT	2
● = contact output	BooleanT	1

Figure 19

7.4.2 Operating limits for the device

Every model has different measurement ranges and limits.
The data for each model are reported in the table below.

Models	Device ID	No Meas.(-)°C	Out of Range(-) °C	Lower Limits °C	Measurement range	Upper Limits °C	Out of Range(+)°C	No Meas.(+)°C
IOC/IOCM	1	<-206	-206<OR-<-203	-203<LL<-200	-200…800°C	800<UL<803	803<OR+<806	>806
IOTP	2	<-56	-56<OR-<-53	-53<LL<-50	-50…110°C	110<UL<113	113<OR+<116	>116
IOTM	3	<-56	-56<OR-<-53	-53<LL<-50	-50…120°C	120<UL<123	123<OR+<126	>126
IOI/IOD/IOF	4 / 5 / 6	<-56	-56<OR-<-53	-53<LL<-50	-50…350°C	350<UL<353	353<OR+<356	>356
Fixed special values (16 bit)		32764	-32760	-32000	OK	32000	32760	32764
Fixed special values (24 bit)		1223150	68150	72150	OK	1075150	1077150	1223150
State of OUT in the Event of Probe Fault		Set the Fault state		Output according to "function Output" parameter			Set the Fault state	
Sensor Limit status		Lower Limited			Not Limited	High Limited		

Table 4

"*Fixed special values*" is a measurement value assumed if the measurement is out of range (+) or (-).
For out of range measurements (Upper/lower range or Out of range + or -), the 2 - 1 bits (status of the sensor limits) are subsequently updated in the process data (process specific data).

8 Reading and writing of the device data

The IO-Link master can acyclically access the configuration data of the device through the ISDU communication channel.
The details of the variables are reported in the attachment "Evomini-IO-Link_Userparameters".

8.1 Input sensor

Only for IOC- and IOCM models without built-in sensors, the type of RTD input sensor (Index 69), the configuration of the wires (Index 68) and the wire compensation resistance can be set if a 2 wire RTD sensor (Index 70) is foreseen. The error at 0°C (R_0) can also be corrected for the RTD (Index 72): if the TRM or TRC series of Italcoppie thermometers is being used, this value is marked on the body of the connector:

Figure 20

8.1.1 Sensor error correction

The type of correction to make on the input sensor can be set through the "Select type of sensor correction" parameter (Index 71): no correction (0), correction with offset (1) or two point correction (2).
Correction with offset can be used to set a constant offset (positive or negative) over the sensor's full scale through the "Process Offset Correction" (Index 78) parameter.
Alternatively, a more accurate correction based on two reference points can be set.

Parameter Name	Index, Subindex	Description
Sensor correction Reference HIGH	79.1	Reference point high
Sensor correction measure HIGH	79.2	Measuring point high
Sensor correction Reference LOW	79.3	Reference point low
Sensor correction measure LOW	79.4	Measuring point low

Table 5

Let's suppose for example that we want to correct the measurement error in a process with reference points at 10°C (Sensor correction reference LOW) and 90°C (Sensor correction

reference HIGH) which correspond to a measurement of 5°C (Sensor correction measure LOW) and 80°C (Sensor correction measure HIGH).
The diagram below shows the correction of the curve generated by the adjustment on the two points:

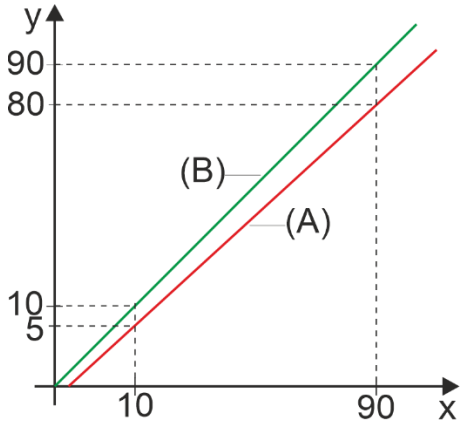


Figure 21

y: Measured value
x: Reference values
A: Characteristic line before the correction
B: Characteristic line after the correction

8.1.2 Maximum and minimum process temperature peaks

The Maximum and Minimum peak process value (Index 75 and 76) parameters record the maximum and minimum process temperature peaks. These peaks can be reset through System commands 160, 161 or 162.

8.2 Locator

The Locator function is used to quickly identify one device among the many installed in the system. By activating this mode through System command 126, the LED on the device begins flashing at a particular frequency and with the colour defined by the user through the "LED colour when Locator is active" (Index 74) parameters:

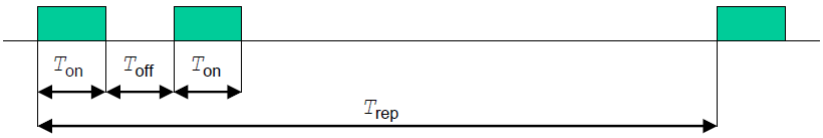


Figure 22

Trep = 1 second
Ton= 100 ms
Toff= 100 ms

The Locator function automatically deactivates after 10 minutes or through System command 127.

8.3 Alarm function (SIO mode)

When the device is powered up, it will go into SIO mode if no IO-Link master is connected. The output (configurable PNP or NPN) status changes to ON or OFF based on the type of alarm set.
The colour of the LED (Index 87) can be set in SIO mode; a different colour can also be defined when the alarm is active (ON) (Index 85).

8.4 Hysteresis alarm

The hysteresis function is used to set a stable switching state around a setpoint that is independent of system-related temperature fluctuations. The switching range is defined by means of a switch point (SP, Index=80, Sub =1) and a release point (rSP, Index =80 Sub=2). The minimum hysteresis is 0.2 K. If the switch point is changed, the release point is automatically adjusted.
The normally open (Hno) or normally closed (Hnc) function can be set.

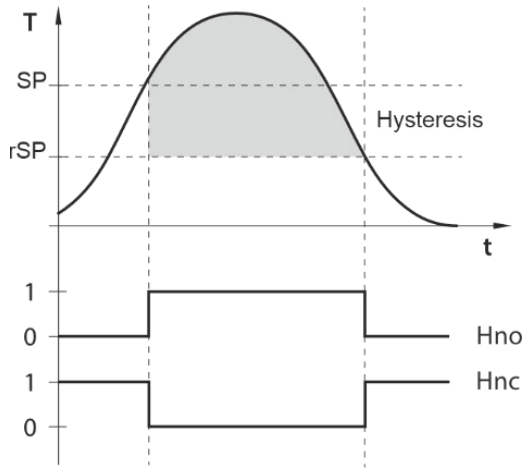


Figure 23

T = Measured value
t = time
SP = Switch point
rSP = Release point
Hno = Hysteresis contact normally open
Hnc = Hysteresis contact normally closed

8.4.1 Delay in activation or release

The ON delay "DSP" (Index 83) and the OFF delay "DrSP" (Index 84) can be set in order to prevent the output switching from being triggered by peaks in the measured values. If the measured value violates the switching range during this period, the delay time restarts from zero.
This function is excluded by setting these two parameters to 0.

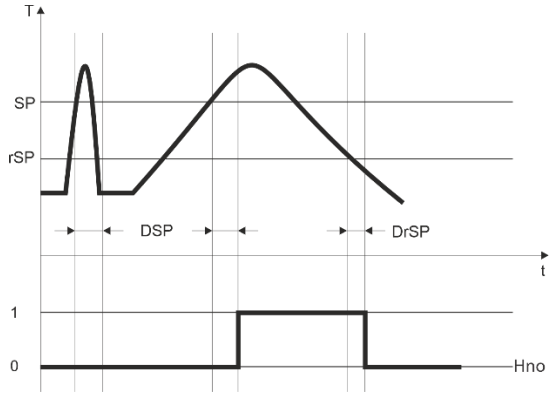


Figure 24

T = Measured value
t = time

SP = Switch point
rSP = Release point
Hno = Hysteresis contact normally open
DSP = ON delay
DrSP = OFF delay

8.5 Window alarm

The window function is used to set a switching range in which the switching output takes on a defined switching status. The switching range is defined by means of an upper (WH) and a lower limit (WL). The minimum distance between the limits is 0.2 K.

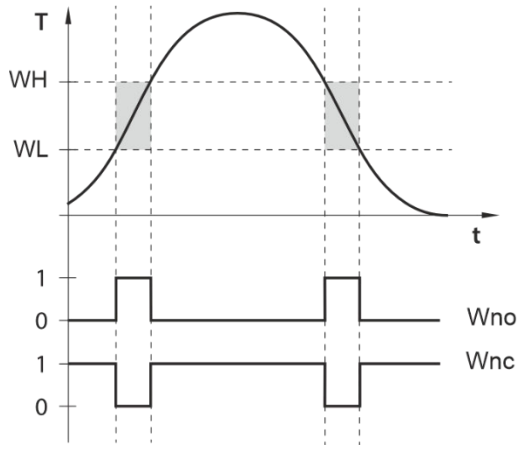


Figure 25

T = Measured value
t = time
WH = High switch point
WL = Low switch point
Wno = contact normally open
Wnc = contact normally closed

An input delay DH (Index 83) and an output delay of the DL window (Index 84) can also be set for this alarm.
This function is excluded by setting these two parameters to 0.

8.6 4…20 mA analog output

When the device in connected in analog mode, the process temperature is retransmitted between 4…20 mA based on the "Start point of the analog signal" (Index 90, subindex 1) and "End point of the analog signal" (Index 90, subindex 2) values defined in the table.
The minimum allowed retransmission span between the Start and End points is 20°C.

A full scale value between -200 and +800°C can be retransmitted for all models. It must however be taken into account that every model has an operating range that is based on its type of mechanical construction: if the device is used outside of this operating range, it will fail.
When programming the parameters through the IO-Link interface, the system will generate a warning event with code 0x8CA1 if a retransmission range is set outside the operating range.
For example: model IOTM has an operating range between -50 and +110°C; if the retransmission (Start-end of the analog signal) is outside of this range (i.e. -50…150°C) a 0x8CA1 warning event will be generated in the diagnosis channel.

8.6.1 Analog output setup

The parameter with Index 91, subindex 1 can be used to set the type of retransmission: direct 4…20 mA or reverse 20…4 mA.
The parameter with Index 91, subindex 2 defines the output status if the input sensor fails according to the NAMUR NE 43 scale (<3.6 mA or >21 mA)
The parameter with Index 91, subindex 3 defines the output status if the input sensor short circuits according to the NAMUR NE 43 scale (<3.6 mA or >21 mA)

A graph representing the progression of the output retransmitted in direct 4…20 mA mode is given below.

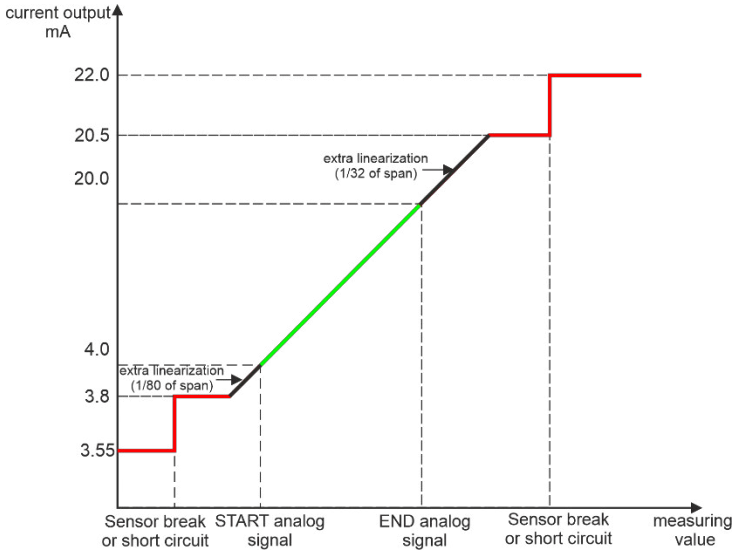


Figure 26

Start analog signal (Index 90, subindex 1)
End analog signal (Index 90, subindex 2)

Example:
Start analog signal: -50°C
End analog signal: 150°C
Span = (End analog signal - Start analog signal) = 200°C
Extra linearization high (1/32 span) = 6.25°C
Extra linearization low (1/80 span) = 2.5°C
Output linearization from -52.5°C (3.8 mA) to 156.25°C (20.5 mA)

A graph representing the progression of the output retransmitted in reverse 20…4 mA mode is given below.

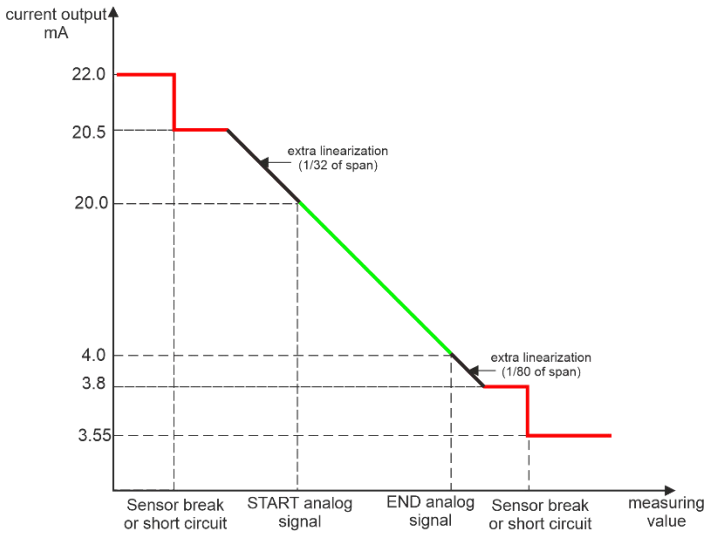


Figure 27

8.6.2 Safe mode if the device overheats

If the device is working in an environment with temperatures outside the allowed range of -40…80°C, it will put itself in safe mode, retransmitting a constant output signal of 3.5 mA. If the ambient temperature returns within the allowed limit, the device will restore the normal operating conditions.

8.7 Digital filter on the input signal

Up to 9 values can be set through the Index 92 parameter for the constant of the second-order filter implemented on the device. This can eliminate any input signal fluctuations (temperature), but however causes a slower response time.
The value represented in seconds is the time (excluding the sensor response time) the electronics needs to get to 90% of the signal after a step variation set on the input sensor.

8.8 Maintenance parameters

Operating hours (Index 100): indicates the work hours of the device; this parameter cannot be reset.
Switching counter (Index 101): indicates the number of switches implemented on the output; this parameter cannot be reset.
Operating hours maintenance (Index 102): when the number of operating hours is equal to or greater than this parameter, the 0x8CA5 warning event is generated.
Switching counter maintenance (Index 103): when the switching counter number is equal to or greater than this parameter, the 0x8CA6 warning event is generated
Hours since last start up (Index 104): indicates the number of hours that have elapsed since the last device restart. This parameter resets at every start-up.
Maximum device temperature (Index 105): this is the maximum temperature reached by the device. The maximum allowed temperature is 80°C for models IOCM/IOTM/IOD-/IOF- or 70°C for models IOC-/IOTP/IOI-; temperatures above this value will lead to malfunctions or failure of the device.
Minimum device temperature (Index 106): this is the minimum temperature reached by the device. The minimum allowed temperature is -40°C; temperatures below this value will lead to malfunctions or failure of the device.

9 Event Codes

A communication channel that manages events is available in IO-Link mode: these can be "Warning", "Error" or "Notification" type events.
The main event codes are predefined and are included in IO-Link mode (see the document "IO-Link interface and system" which can be downloaded from the website www.io-link.com), while the "Vendor specific" codes from 0x8CA0 to 0x8DFF are specific for the device. These codes are described below:

Event code (hex)	Type	Definition	Description
0x8CA1	Warning	Parameter set out of specification	One or both of the Analog End / Start parameters has been set outside of the device's operating limits
0x8CA2	Error	Input sensor short circuit	Short circuit of the input sensor
0x8CA3	Error	Input sensor open circuit	Failure of the input sensor
0x8CA5	Warning	Configured operating hours exceed	The number of hours set in the "Operating hours maintenance" parameter exceeds the "Operating hours" parameter
0x8CA6	Warning	Configured switching cycles exceed	The number set in the "Switching counter maintenance" parameter exceeds the number recorded in the "Switching counter"
0x8CA7	Warning	Process value overlimit	The process temperature is outside the maximum allowed operating range
0x8CA8	Warning	Process value underlimit	The process temperature is outside the minimum allowed operating range
0x8CA9	Error	CRC parameter NVM Error	Writing error in the device's non-volatile memory. Try to rewrite. Contact technical service if the error continues.
0x8CAB	Error	Test Event A	This event appears when entering the value 252 in Index 2 and disappears when entering the value 253
0x8CAC	Error	Test Event B	This event appears when entering the value 254 in Index 2 and disappears when entering the value 255
0x8CAE	Error	NVM data corrupted (peaks)	Error when resetting the process peaks. Try resetting again. Contact technical service if the error continues.
0x8CAF	Error	NVM data corrupted (user parameter)	Error when entering a user parameter. Retry entering the data. Contact technical service if the error continues.
0x8CB0	Error	NVM data corrupted (factory parameter)	Irreversible error. Replace the device.
0x8CB1	Notification	Command end OK	Notification that the command just performed was successful
0x8CB2	Notification	Command end KO	Notification that the command just performed was NOT successful.

Table 6

10 System command codes

The address for the System command is Index 2

Command Name	Code (dec)	Description
Locator Start	126	Starts the Locator (see section 8.2)
Locator Stop	127	Stops the Locator (see section 8.2)
Application Reset	129	Resets the application software
Back-to-Box	131	Restores the initial factory parameter settings. After the command is performed, the device must be disconnected and then reconnected to the power supply
Reset Max value memory	160	Reset the maximum temperature peak for the recorded process
Reset Min value memory	161	Reset the minimum temperature peak for the recorded process
Reset Min/Max values memory	162	Reset the minimum and maximum temperature peaks for the recorded process
Test Event appear A	252	Appearance test event A
Test Event disappear A	253	Disappearance test event A
Test Event appear B	254	Appearance test event B
Test Event disappear B	255	Disappearance test event B

Table 7

11 Firmware update

The Evomini IO-Link series devices have the BLOB (Binary Large Object) function incorporated in the stack which allows the firmware to be updated with any IO-Link 1.1 master.
The firmware is divided into two parts: Bootloader (protected section) and application (section that can be updated).
When the IO-Link master requests the updating of the application, the device goes into Boot mode, with a blue LED turning on to signal this event.

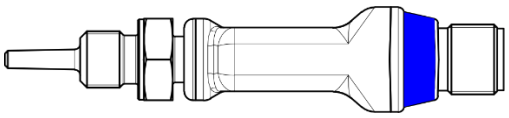


Figure 28

The LED remains blue throughout the updating of the application; upon completion, the device will automatically restart in IO-Link mode with the new version of the application.

11.1 System errors in IO-Link operating mode

If the device does not connect to the IO-Link master unit at start-up (green flashing LED) and the LED is blue in colour, this indicates that a valid application is not present in the memory. Load a valid application; if the problems occurs again, contact technical service.
If the device does not connect to the IO-Link master unit at start-up (green flashing LED) and the LED is orange,

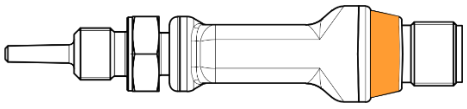


Figure 29

this indicates that the application in the memory is corrupt. Restart the device; if the problem persists, reload the application or contact technical service.

11.2 System errors in 4…20 mA operating mode

If the device is connected in 4…20 mA mode and the red LED turns on,

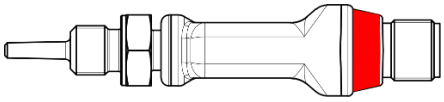


Figure 30

this means that there is no valid application in the memory or the memory is corrupt. Connect the device to a IO-Link master unit and update the application. Contact technical service if the problem continues.

12 Technical Data

Common data for all models	
Operating humidity	0…100%
Operating voltage	IO-Link / SIO: 18…30 Vdc 4…20 mA: 8…32 Vdc Reverse polarity protection
Consumption	IO-Link: 0.65 W SIO: 0.8 W 4…20 mA: max 0.55 W
Input/Output insulation	None
Output signal type	Configurable between: analog signal 4…20 mA, IO-Link, PNP or NPN (SIO) output
Sensor input signal filter *(time to reach 90% of the signal)*	Can be set from 0.1 second to 3.7 seconds
Sensor failure indication for 4…20 mA mode	According to NAMUR NE 43, selectable between: Upper scale (≥ 21 mA) Lower scale (≤ 3.6 mA)
Communication interfaces	IO-Link version 1.1 COM2 (38.4 KBaud) Class A port M12x1 connector ¤ 4 pos. A coded
IO-Link Smart Sensor Profile (2nd ed.)	In accordance with SSP type 3.1
Output in SIO mode	NO/NC programmable, PNP/NPN Overload and short circuit protection Hysteresis or window function Maximum current: 150 mA Programmable output activation/deactivation delay RGB LED for reporting output status (can be configured differently for the ON and OFF state)
Display elements	Green LED (IO-Link mode) Configurable RGB LED (Locator mode) Configurable RGB LED (SIO mode)
Temperature influence *(deviation from 20°C)*	4…20 mA mode: Maximum value between ±0.3°C/25°C and ±0.3°C of the full scale/25°C IO-Link/SIO mode: ±0.3°C/25°C up to 350°C
Permitted load in 4…20 mA mode *(See the permitted load diagram Figure 31)*	727 Ω @ 24 Vdc Rload(Ω)=(Vpower supply – 8) / 0.022
Long-term stability	Maximum ± 0.1% of full scale per year
Linearity error	Negligible
Sensor error compensation	Offset or on 2 points
EMC	In accordance to EN 61326-1:2013 (CE) In accordance to BS EN 61326-1:2013 (UKCA)
Connector type	male 4-pin connector with M12x1 metal screw lock (in accordance with IEC 61076-2-101 standards)
Ingress protection code	IP67 (in accordance with IEC 60529)
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Unit: °C Process value mapping: 16 bit Type of sensor correction: no correction Switch points: SP = 80°C, Release point = 70°C Function output: Hysteresis normally open State of OUT in the event of probe fault: OFF Delay Out: 0 sec. Switching output mode: PNP Function output LED: RGB (255,0,0,) red LED colour when in SIO mode: RGB (0,0,0) off Current output setup: 4…20 mA Sensor break: >21 mA Sensor short circuit: <3.6 mA Digital filter: 4 (0.7 s) Operating hours maintenance: 1000000 Switching counter maintenance: 1000000000

Table 8

12.1 Output load diagram

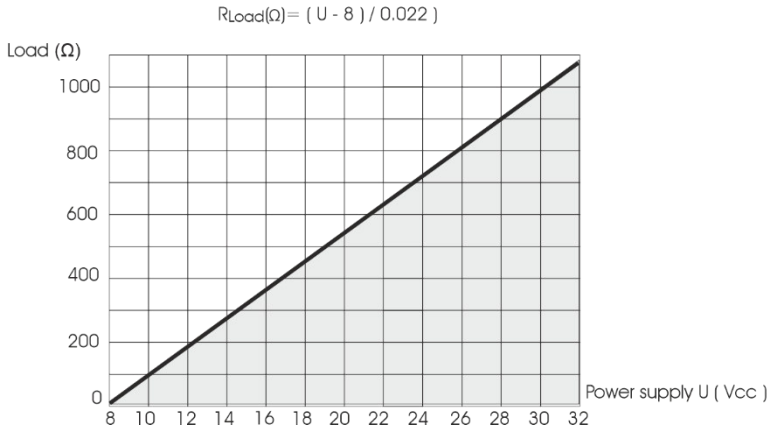


Figure 31

12.2 Detailed technical data for each model

	IOC- 	IOCM 
Ambient and storage temperature	IOC-: -40…70°C / IOCM: -40…80°C	
Input sensor range Pt100 (IEC 60751, α = 0.00385) Pt1000 (IEC 60751, α = 0.00385)	-200…800°C	
Sensor excitation current	~100 uA	
Sensor wire maximum resistance	20Ω / wire	
Effect of sensor wire	2 wires: loop compensation settable 0…40 Ω 3 wires: negligible with wires of equal resistance 4 wires: negligible	
Accuracy @25°C	*4…20 mA:* maximum value between ±0.15 K and ±0.15% of the set full span *IO-Link / SIO:* ±0.1 K in range -200…400°C and ±0.2 K >400°C	
Connection body material	Thermoplastic for IOC- AISI316L stainless steel for IOCM	
Input sensor connector type	female 4-pin connector with M12x1 metal screw lock (in accordance with IEC 61076-2-101 standards)	
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Type of RTD sensor: Pt100 Number of RTD wire: 4 W Cable resistance compensation: 0 Ω Resistance R0: 100 Ω Start point of analog signal: 0°C End point of analog signal: 150°C	
Order code IOC- X IOCM X		

Table 9

IOTP

Ambient and storage temperature	-40…70°C
Operating range	-50…110°C
Sensor Type	RTD Pt100, 4W Class A
Accuracy @25°C *(Add the Pt100 Class A error according to IEC 60751 to the value: ±(0.15 + 0.002 x |t|) where |t| is the process temperature in absolute value)*	*4…20 mA:* maximum value between ±0.15 K and ±0.15% of the set full span. *IO-Link / SIO:* ±0.1 K
Housing material	Thermoplastic
Response time *(test in water in accordance with IEC 751. Time taken to reach 63.2% of temperature step)*	< 3.5 sec.
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Start point of analog signal: 0°C End point of analog signal: 100°C

Order code

IOTP		X

Process connection

1/8" GAS CYL. Ø3 L= 13mm	**01**
1/8" GAS CYL. Ø3 L= 24mm	**02**
1/8" NPT Ø3 L= 13mm	**05**
1/8" NPT Ø3 L= 24mm	**06**
1/4" GAS CYL. Ø3 L= 13mm	**0D**
1/4" GAS CYL. Ø3 L= 24mm	**0E**
1/4" NPT Ø3 L= 13mm	**0B**
1/4" NPT Ø3 L= 24mm	**0C**

Table 10

IOTM

Ambient and storage temperature	-40…80°C
Operating range	-50…120°C
Sensor Type	RTD Pt100, 4W Class A
Accuracy @25°C *(Add the Pt100 Class A error according to IEC 60751 to the value: ±(0.15 + 0.002 x |t|) where |t| is the process temperature in absolute value)*	*4…20 mA:* maximum value between ±0.15 K and ±0.15% of the set full span. *IO-Link / SIO:* ±0.1 K
Housing material	AISI 316L stainless steel
Response time *(test in water in accordance with IEC 751. Time taken to reach 63.2% of temperature step)*	< 3.5 sec.
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Start point of analog signal: 0°C End point of analog signal: 100°C

Order code

IOTM		X

Process connection

1/8" GAS CYL. Ø3 L= 13mm	**01**
1/8" GAS CYL. Ø3 L= 24mm	**02**
1/8" NPT Ø3 L= 13mm	**05**
1/8" NPT Ø3 L= 24mm	**06**
1/4" GAS CYL. Ø3 L= 13mm	**0D**
1/4" GAS CYL. Ø3 L= 24mm	**0E**
1/4" NPT Ø3 L= 13mm	**0B**
1/4" NPT Ø3 L= 24mm	**0C**

Table 11

IOI-

Ambient and storage temperature	-40…70°C
Operating range	-50…350°C
Sensor Type	RTD Pt100, 4W class A* (*Class A up to 300°C in accordance with IEC 60751)
Accuracy @25°C *(Add the Pt100 Class A error according to IEC 60751 to the value: ±(0.15 + 0.002 x |t|) where |t| is the process temperature in absolute value)*	*4…20 mA:* maximum value between ±0.15 K and ±0.15% of the set full span. *IO-Link / SIO:* ±0.1 K in the range -200…400°C and ±0.2 K if >400°C
Housing material	Thermoplastic
Response time *(test in water in accordance with IEC 751. Time taken to reach 63.2% of temperature step)*	<3.5 sec. for diameter of 3 mm <13 sec. for diameter of 6 mm
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Start point of analog signal: 0°C End point of analog signal: 150°C

Order code

IOI-			X

Diameter d (mm)	
Ø3	30
Ø3.17	32
Ø6	60
Ø6.35	63

Lenght L (mm)	
100	100
150	150
250	250
350	350
500	500
750	750

Other lengths on request

Table 12

IOF-

Ambient and storage temperature	-40…80°C
Operating range	-50…350°C
Sensor Type	RTD Pt100, 4W class A* (*Class A up to 300°C in accordance with IEC 60751)
Accuracy @25°C *(Add the Pt100 Class A error according to IEC 60751 to the value: ±(0.15 + 0.002 x |t|) where |t| is the process temperature in absolute value)*	*4…20 mA:* maximum value between ±0.15K and ±0.15% of the set full span. *IO-Link / SIO:* ±0.1 K in the range -200…400°C and ±0.2 K if >400°C
Housing material	AISI 316L stainless steel
Response time *(test in water in accordance with IEC 751. Time taken to reach 63.2% of temperature step)*	<5 sec. (4 mm tapered version)
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Start point of analog signal: 0°C End point of analog signal: 150°C

Order code

IOF-				X

Stem diameter (mm)	
Tube Ø6 mm tapered to Ø4,4 mm	C
Tube Ø6 mm	6

Lenght (mm)	
100	100
150	150
250	250
350	350
500	500
750	750

Other lengths on request

Process connection	
1/4" GAS CYL	D
1/4" NPT	F
1/2" GAS CYL	L
1/2" NPT	N
CLAMP 3/4"	1
CLAMP 1 ½	2
DIN11851 DN25	3
NONE	X

Immersion l (mm)	
NONE	000
100	100

Other immersion depths on request

Table 13

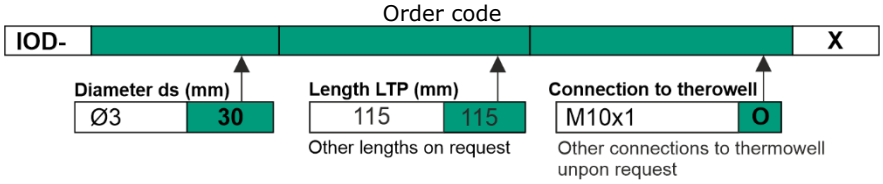
IOD-	
	
Ambient and storage temperature	-40…80°C
Operating range	-50…350°C
Sensor Type	RTD Pt100, 4W class A* (*Class A up to 300°C in accordance with IEC 60751)
Accuracy @25°C *(Add the Pt100 Class A error according to IEC 60751 to the value: ±(0.15 + 0.002 x |t|) where |t| is the process temperature in absolute value)*	*4…20 mA:* maximum value between ±0.15K and ±0.15% of the set full span. *IO-Link / SIO:* ±0.1 K in the range -200…400°C and ±0.2 K if >400°C
Housing material	AISI 316L stainless steel
Factory default configuration *(See the Evomini IO-link user parameters attachment)*	Start point of analog signal: 0°C End point of analog signal: 150°C
Order code  	

Table 14

EVOMINI IO-LINK USER PARAMETERS												
Name	***Index***	***Sub***	***Bitoffset***	***Datatype***	***Value Ranges***	***Value Displayed***	***Single Values***	***AR***	***Default value***	***M***	***D***	***E***
System Command	2	0	0	UIntegerT_8	126 to 255		Locator Start (126), Locator Stop (127), Application Reset (129), Back-to-box (131), Reset Maximum Value Memory (160), Reset Minimum Value Memory (161), Reset Minimum and Maximum Value Memory (162), Test Event A appear (252), Test Event A disappear (253), Test Event B appear (254), Test Event B disappear (255)			X		
Vendor Name	16	0		StringT [64]				ro	Italcoppie sensori			
Vendor Text	17	0		StringT [64]				ro	Italcoppie sensori -> WE SENSE			
Product Name	18	0		StringT [64]				ro	(see identity in IODD specifications sheet)			
Product ID	19	0		StringT [40]				ro				
Product Text	20	0		StringT [64]				ro	Smart temperature sensor			
Serial Number	21	0		StringT [64]				ro				
Hardware Revision	22	0		StringT [16]				ro				
Firmware Revision	23	0		StringT [16]				ro				
Application-specific Tag	24	0		StringT [32]				rw	***			
Function Tag	25	0		StringT [32]				rw	***			
Location Tag	26	0		StringT [32]				rw	***			
Device Status	36	0		UIntegerT_8			Device is OK (0), Maintenance required (1), Out of specification (2), Functional check (3), Failure (4)	ro			X	
Detailed Device Status	37	0		ArrayT				ro			X	
Detailed Device Status [1]		1	264	OctetStringT [3]								
Detailed Device Status [2]		2	240	OctetStringT [3]								
Detailed Device Status [3]		3	216	OctetStringT [3]								
Detailed Device Status [4]		4	192	OctetStringT [3]								
Detailed Device Status [5]		5	168	OctetStringT [3]								
Detailed Device Status [6]		6	144	OctetStringT [3]								
Detailed Device Status [7]		7	120	OctetStringT [3]								
Detailed Device Status [8]		8	96	OctetStringT [3]								
Detailed Device Status [9]		9	72	OctetStringT [3]								
Detailed Device Status [10]		10	48	OctetStringT [3]								
Detailed Device Status [11]		11	24	OctetStringT [3]								
Detailed Device Status [12]		12	0	OctetStringT [3]								
Temperature Process Value	40	0		UIntegerT_32				ro			X	
MDC descriptor	16512							ro				
Lower value		1	56	IntegerT_32								
Upper value		2	24	IntegerT_32								
Unit code		3	8	UIntegerT_16								
Scale		4	0	IntegerT_8								

DEVICE SPECIFIC

Number of RTD Wire	68	0	0	UIntegerT_8	0 to 2		4W (0), 3W(1), 2W(2)	rw	0			
Type of RTD sensor	69	0	0	UIntegerT_8	0 to 1		Pt100 (0), Pt1000(1)	rw	0			
Cable resistance compensation (only 2W configuration)	70	0	0	UIntegerT_16	0 to 40000 mΩ	0 to 40.000 Ω		rw	0			
Select type of sensor correction	71	0	0	UIntegerT_8	0 to 2		No Process correction (0) / Process Offset correction (1) / Process two points linearization correction(2)	rw	0 (No error correction)	X		
Resistance R0 for Pt100 or Pt1000	72	0		UIntegerT_32	Pt100: 99000 to 101000 Pt1000: 990000 to 1010000	Pt100: 99.00 to 101.00 Ω Pt1000: 990.0 to 1010.0 Ω		rw	Pt100: 100.00Ω Pt1000:1000.0Ω			
Unit	73	0		UIntegerT_8	0 to 2		°C (0), °F (1), K (2)	rw	0	X		
Led color when Locator is active	74	0		RecordT				rw				
Red		1	16	UIntegerT_8	0 to 255				35			
Green		2	8	UIntegerT_8	0 to 255				151			
Blue		3	0	UIntegerT_8	0 to 255				121			
Maximum peak process value	75	0		IntegerT_16	according to model (mK/100)	See Models&meas.range		ro			X	
Minimum peak process value	76	0		IntegerT_16	according to model (mK/100)	See Models&meas.range		ro			X	

Process value mapping	77	0		UIntegerT_8	0 to 1		Process Data Input 16 bit (0), Process Data Input 24 bit mK (1)	rw		X		
Process Offset Correction	78	0	0	IntegerT_16	-10000…10000 mK	See Models&meas.range		rw	0°C	X		
	79	0										
Sensor correction Reference HIGH		1		IntegerT_32	according to model (mK)	See Models&meas.range		rw				
Sensor correction measure HIGH		2		IntegerT_32	according to model (mK)	See Models&meas.range		rw				
Sensor correction Reference LOW		3		IntegerT_32	according to model (mK)	See Models&meas.range		rw				
Sensor correction measure LOW		4		IntegerT_32	according to model (mK)	See Models&meas.range		rw				
BINARY DATA CHANNEL: ALARM												
Swiching points	80	0		RecordT				rw				
Setpoint (SP) / Window High (WH)		1	32	UIntegerT_32	according to model (mK)	See Models&meas.range			70.0°C			
Releasepoint (rSP) / Window Low (WL)		2	0	UIntegerT_32	according to model (mK)	See Models&meas.range			80.0°C			
Function Output	81	0		UIntegerT_8	0 to 3		Hysteresis Function, Normally Open (0), Hysteresis Function, Normally Closed (1), Window Function, Normally Open (2), Window Function, Normally Closed (3)	rw	0			
State of OUT in the Event of Probe Fault	82	0		BooleanT			off (False), on (True)	rw	0			
Delay OUT (Setpoint-DSP / Window entrance-DH)	83	0		UIntegerT_16	0 to 600	0 to 60.0 sec.		rw	0			
Delay OUT (Releasepoint-DrSP / Window Exit-DL)	84	0		UIntegerT_16	0 to 600	0 to 60.0 sec.		rw	0			
Function output LED color	85	0		RecordT				rw				
Red		1	24	UIntegerT_8	0 to 255				255			
Green		2	16	UIntegerT_8	0 to 255				0			
Blue		3	8	UIntegerT_8	0 to 255				0			
Blink during delay		4	0	UIntegerT_8	0 to 1		No Blink (0), Blink (1)		0			
Switching Output Mode	86	0		UIntegerT_8	0 t0 1		PNP (0), NPN (1)	rw	False			
Led color when in SIO mode	87	0		RecordT				rw				
Red		1	16	UIntegerT_8	0 to 255				0			
Green		2	8	UIntegerT_8	0 to 255				0			
Blue		3	0	UIntegerT_8	0 to 255				0			
ANALOG OUTPUT												
Start/end point of the analog signal	90	0		RecordT				rw				
Start point of the analog signal		1	32	IntegerT_32	according to model (mK)	See Models&meas.range			0.0°C			
End point of the analog signal		2	0	IntegerT_32	according to model (mK)	See Models&meas.range			150.0°C			
Current output setup	91	0		ArrayT								
Current Output Mode		1	2	UIntegerT_8			4..20mA (0), 20…4mA (1)	rw	4..20mA (False)			
Sensor break		2	1	UIntegerT_8			0 (<3.6mA), 1 (>21mA)		1 (>21mA)			
Sensor short circuit		3	0	UIntegerT_8			0 (<3.6mA), 1 (>21mA)		0 (<3.6mA)			
Digital filter	92	0	0	Uinteger_8	1 to 9		0.1s (1), 0.3s (2), 0.4s (3), 0.7s (4), 0.9s (5), 1.4s (6), 1.8s (7), 2.9s (8), 3.7s (9)	rw	4			
MAINTENANCE												
Operating Hours	100	0		UIntegerT_32				ro			X	
Switching Counter	101	0		UIntegerT_32				ro			X	
Operating Hours Maintenance	102	0		UIntegerT_32				rw	1000000			
Switching Counter Maintenance	103	0		UIntegerT_32				rw	1000000000			
Hours since last start up	104	0		UIntegerT_32				ro			X	
Maximum device temperature	105	0		IntegerT_16	-400 … 850	See Models&meas.range		ro			X	
Minimum device temperature	106	0		IntegerT_16	-400 … 850	See Models&meas.range		ro			X	
LED DIAGNOSTIC												
Test LED colors	130	0		RecordT								
enable / disable diagnostic		1	40	Uinteger_8	0 to 1		Diagnostic disabled (0), Diagnostic enabled (1)	rw	0		X	
Red		2	32	Uinteger_8	0 to 255		0 (color OFF) ÷ 255 (color max intensity)		0			
Green		3	24	Uinteger_8	0 to 255		0 (color OFF) ÷ 255 (color max intensity)		0			
Blue		4	16	Uinteger_8	0 to 255		0 (color OFF) ÷ 255 (color max intensity)		0			
RGB intensity variation		5	8	Uinteger_8	0 to 4		0 (intensity variation OFF), 1 (Red intensity variation), 2(Green intensity variation), 3 (Blue intensity variation), 4 (color wheel)		0			
Locator LED Color	131	0	0	UIntegerT_8	0 to 16		Manually Set (0), Aqua (1), Black (2), Blue (3), Fuchsia(4), Gray(5), Green(6),Lime (7), Maroon (8), Navy(9),Olive(10), Purple(11), Red (12),Silver(13), Teal(14), White(15), Yellow(16)	rw	7	X		X

Alarm LED Color	132	0	0	UIntegerT_8	0 to 16		Manually Set (0), Aqua (1), Black (2), Blue (3), Fuchsia(4), Gray(5), Green(6),Lime (7), Maroon (8), Navy(9),Olive(10), Purple(11), Red (12),Silver(13), Teal(14), White(15), Yellow(16)	rw	7	X		X
SIO mode LED Color	133	0	0	UIntegerT_8	0 to 16		Manually Set (0), Aqua (1), Black (2), Blue (3), Fuchsia(4), Gray(5), Green(6),Lime (7), Maroon (8), Navy(9),Olive(10), Purple(11), Red (12),Silver(13), Teal(14), White(15), Yellow(16)	rw	7	X		X

M D E

M=Modifies other variables
D=Dynamic
E=Excluded from Data Storage

Models	Device ID	Measurement range °C	Measurement range °F	Measurement range mK	Default 4-20mA retransmission
IOC/IOCM	1	-200...800°C	-328...1472	73150...1073150	0..150°C
IOTP	2	-50...110°C	-58...230	223150...383150	0...100°C
IOTM	3	-50...120°C	-58...248	223150...393150	0..100°C
IOI/IOD/IOF	4	-50...350°C	-58...662	223150...623150	0..150°C

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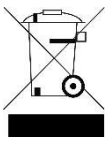
Warranty Conditions: Devices are guaranteed against manufacturing defects for 1 year after installation. The warranty does not cover defects caused by uses other than those described in this user manual.

Returns: devices may not be returned without the prior authorisation of ITALCOPPIE SENSORI srl.

This product must be disposed of in accordance with the European WEEE [Waste Electrical and Electronic Equipment] regulations.



Engineered and manufactured in Italy
Made in Italy
Pensato, progettato e prodotto in Italia