

Temperature Transmitters

TIOL



Operating Instructions

English

T-MAN-E-TIOL-21-1

Version 21-1



1 Quick set-up

Information about the IO-Link communication and set-up steps may be found here ("At a glance: IO-Link system description"):

https://io-link.com/share/Downloads/At-a-glance/IO-Link_System_Description_eng_2018.pdf

Connect the temperature transmitter to a suitable IO-Link-Master.

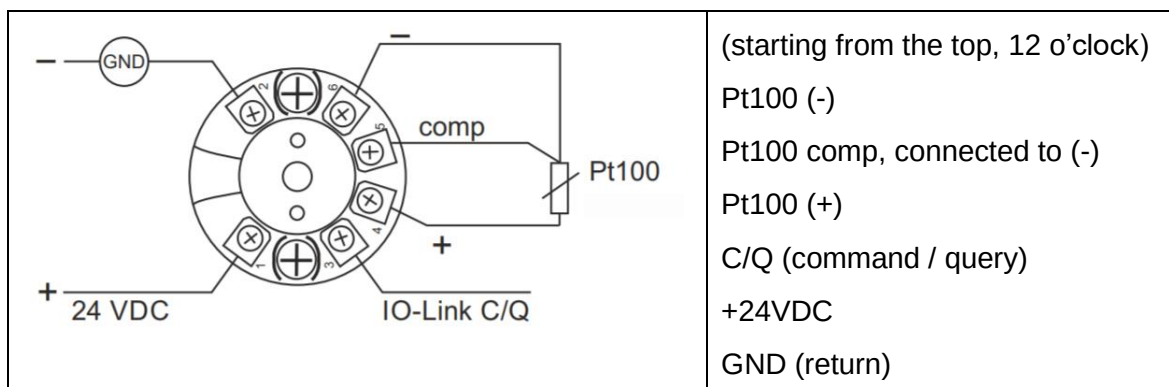
Install the device IODD. You may use the IO-Link-Master's search function or download the IODD here: <https://ioddfinder.io-link.com>

Once the IODD is installed, the device is ready to use.

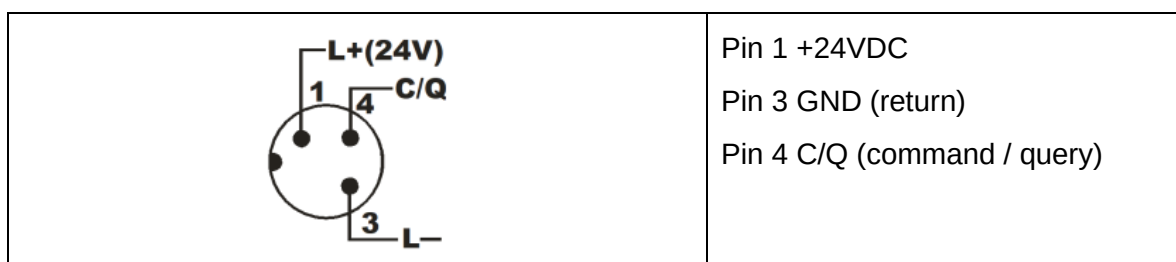
You may want to update the device location and/or TAG number before proceeding. Refer to chapter 2 for more detailed information.

1.1 Electrical connection / port class A

Connections of temperature transmitter inside the device head



M12 round plug pin connection



1.2 Additional information

1. Hengesbach vendor ID: 1508 (dec.), 0x05E4 (hex)
2. Device ID: 2008199



1.3 Easy exchange of devices

This device supports the IO-Link specification V1.1.

This specification allows for an intelligent exchange of devices, such that a specific device configuration is stored in the IO-Link master, and downloaded onto an exchange device. No further action is required.

To be able to use this feature, the IO-Link master has to be configured to „Backup/Restore“. Refer e.g. to chapter 3.3 in the above mentioned „At a glance...“ - document.

1.4 Further information

IO-Link communication overview and first set-up steps

https://io-link.com/share/Downloads/At-a-glance/IO-Link_System_Description_eng_2018.pdf

IO-Link related downloads (IODD Checker, ...)

<https://io-link.com/de/Download/Download.php>

IODD-Finder

<https://ioddfinder.io-link.com/>

IO-Link master (arbitrary choice of vendors)

(TMG) <https://www.tmgte.de/produkte/io-link/tmg-usb-io-link-master-v2-emc.html>

(Balluff) https://www.balluff.com/local/de/productfinder/#/ca/A0009?cal_iolink&table_page=1

(Pepperl+Fuchs) https://www.pepperl-fuchs.com/germany/de/classid_6436.htm



Content

1	Quick set-up	2
1.1	Electrical connection / port class A	2
1.2	Additional information	2
1.3	Easy exchange of devices	3
1.4	Further information	3
2	IO-Link reference.....	5
2.1	Process data	5
2.2	Parameters (rw)	5
2.3	Commands.....	5
2.4	Information (r).....	6
2.5	Error events.....	7
3	Device life cycle	8
3.1	Intended use	8
3.2	Assembly, commissioning and operation of the device.....	8
3.3	Unpacking the device	9
3.4	Device identification	9
3.5	Assembly information	9
3.5.1	Mounting position	11
3.5.2	Welding notes	11
3.6	Electrical connection	12
3.6.1	Connection cable gland.....	12
3.6.2	Connection M12 round plug, 5pin.....	13
3.7	Servicing and cleaning	13
3.8	Storage	14
3.9	Disposal: Packaging material	14
3.10	Disposal: Obsolete devices	14
4	Warranty & device returns	15
5	Faults and Troubleshooting	15



2 IO-Link reference

Hengesbach vendor ID: 1508 (dec.), 0x05E4 (hex)

Device ID: 2008199

2.1 Process data

sub-index	display	bit offset	type	bit length	range	unit
2	temperature	24	integer	16	-3276,8..3276,7	°C
3	transmitter temperature	8	integer	16	-3276,8..3276,7	°C
4	switch-off temperature	0	boolean	1	0...1 / no...yes	n/a
7	transmitter temperature > 85°C	0	boolean	1	0...1 / no...yes	n/a

2.2 Parameters (rw)

Parameters may be both read or written by the user. They serve both information purposes as well as setting values & boundaries.

Identification	Funktionskennung (Function Tag) Ortskennung (Location Tag)
Typenschild / identification label	TAG-Nummer / Tag number Anlage / Plant Ort / Location Änderungsdatum (TTMMJJ) / Change date (ddmmyy) Abschaltemperatur / Switch-off temperatur 0% des Beobachtungsbereichs / 0% of observation window 100% des Beobachtungsbereichs / 100% of observation window

2.3 Commands

Commands may be executed by the user.



Typenschild / identification label	Tag, Anlage, Ort und Betriebs-Std. ins Archiv verschieben Move tag, plant, location and operation hours into the archive Temperatur-Beobachtung zurücksetzen / Reset temperature observation
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2.4 Information (r)

Information may be only read by the user.

Typenschild / identification label	Hersteller / Vendor Typ / Type Seriennummer / Serial number Baujahr / Production year
Archive / archive	Tag, Anlage, Ort und Betriebs-Std. / Tag, plant, location and operation hours
Produktkennung / product information	IO-Link Geräte-ID / Device-ID Produktname / Product name Produkt-ID / Product-ID Produkttext / Product description Seriennummer / Serial number Hardware-Revision / Hardware revision
Aktuelle AD-Werte / current AD values	Temperatur, Kopftemperatur, MCU Spannung, MCU Chiptemperatur / Temperature, transmitter temperature, MCU voltage, MCU chip temperature
Beobachtung / observation	Betriebsstunden / Hours of operation Betriebsstunden seit letzter Verschiebung Daten ins Archiv / Hours of operation after moving data to archive
Stunden über Grenze / hours of non-normal operation	Betriebsstunden seit Reset von „Beobachten“ / Hours of operation after moving data to archive Temperatur ... vom Beobachtungsbereich / Temperature... of observation window Kopftemperatur / Transmitter temperature < 60°C, 60-70°C, 70- 80°, >80°C



Höchste Werte / maximum values	Maximale Temperatur / Maximum temperature Maximale Kopftemperatur / Maximum transmitter temperature
Diagnose / status	Error Count Device Status Detailed Device Status (1-8)

2.5 Error events

If the IODD is used in custom software, error events must be handled as such. It is not possible to read these conditions.

index	parameter	type	bit / chars
6200	Below 0% observation window	boolean	1
6201	Above 100% observation window	boolean	1
6202	Above max. temperature (85°C) of transmitter	boolean	1
6203	Device switch-off	boolean	1
6204	Service required	boolean	1
6205	User calibration required	boolean	1



3 Device life cycle

3.1 Intended use

The temperature transmitters of the TIOL series are designed for measuring the process temperature of aggressive and non-aggressive gases, vapors, and fluids.

Please read these operating instructions carefully before commissioning the devices. If you have questions, please contact the manufacturer.

The manufacturer cannot assume any liability for damage due to any other kind of use or the incorrect use of the devices. If in doubt, please contact the manufacturer.



The device is not approved for use in explosion-proof (ATEX, Ex) or safety-relevant (SIL) areas.

The address of the manufacturer is:

	Schimmelbuschstr. 17 40699 Erkrath, Germany Tel.: +49 (0)2104 3032 – 0 Fax: +49 (0)2104 3032 – 22 info@hengesbach.com www.hengesbach.com
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3.2 Assembly, commissioning and operation of the device

The device has been manufactured according to state-of-the-art technical knowledge and complies with all relevant guidelines for it to be safely operated.

The assembly, connection, commissioning, operation, and service of the device should always be carried out by qualified personnel. Personnel who are carrying out the above tasks must have been authorized by the plant operator.

This document must be kept in a location where it is easily accessible for the relevant personnel. Please contact us for another copy if required or download another copy from the manufacturer's homepage.



3.3 Unpacking the device

To avoid damage to the device, please observe the following notes before unpacking the device.

	Carefully cut the packaging open as sharp objects may destroy parts of the device inside the packaging.
	Depending on the measuring cell, a cover protects the measurement membrane. Please only remove this cover immediately before installing the device. The measuring cell must under no circumstances be touched. Any damage to the membrane will result in the malfunction of the device.
	Please protect the contents of the shipment until its final installation and when all connections are checked for moisture-proof installation.

Please check that the goods are of the correct type and complete, and that they're undamaged.

If you detect any discrepancies, please contact the manufacturer immediately.

3.4 Device identification

TIOL_6050M
WITH type: TP60/T500, 118mm
sensor/range: Pt100, 3w / -50...+200°C
output: IO-Link
supply: 24V DC
serial-no.: 2100000.01.001
Made in Germany
Hengesbach GmbH & Co. KG · Schimmelbuschstr. 17 · 40699 Erkrath · Germany · Tel +49 (0) 2104 / 3032 - 0

Hengesbach
Prozessmesstechnik

L+(24V)
1 4 C/Q
10
3 L-
9
Tamb: -40...+85°C

- 1: Device designation
- 2: Thermometer type
- 3: Sensor inset length
- 4: Sensor type
- 5: Max. measuring range
- 6: Output signal
- 7: Supply voltage
- 8: Serial number
- 9: Ambient temperature
- 10: Electrical connection
- 11: Manufacturing location

3.5 Assembly information

Please observe the following assembly notes. These notes are intended to ensure your own safety as well as ensuring the smooth, low-maintenance and reliable operation of the device.



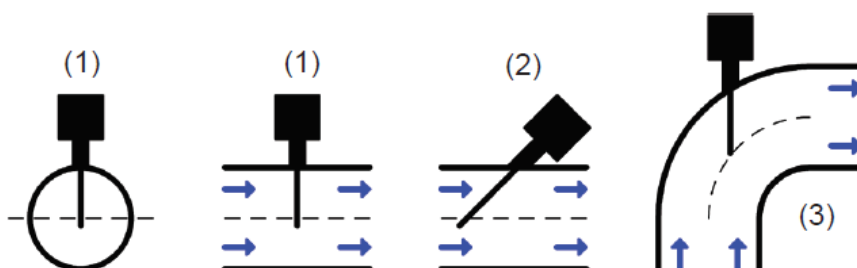
	You must make sure that any affected structures at the plant are depressurized and free of any medium before installing the device.
	You must make sure that personnel can safely work at the plant while the device is installed. Be aware of the danger of burns due to heat or cold and protect yourself against any contact with aggressive media.
	Make sure that the potential equalization between device and plant is facilitated. In this respect, please also read the section regarding the electrical connections of the device.
	The device manufacturer recommends that any device openings (ventilation) point downwards. Thus, any obstruction by e.g. highly viscose media will be avoided.
	The device should be installed in a low-vibration location and with some distance to larger machines and strong electrical fields.
	Make sure that the process connection to the plant fits tightly. Use a seal which is suited for your specific process and pay special attention to its suitability for the process temperature.
	Tighten the device with the torque that is suitable for your process connection. If in doubt, please contact the manufacturer.
	If a reference cable is used, please observe a minimum bending radius of 120 mm. Protect the cable against the ingress of moisture by making sure that it ends inside a dry environment.



3.5.1 Mounting position

The protection sleeve ending should always be at the pipe's center. The movement speed is highest there, thus any temperature change will first of all be present there.

The following overview shows the optimum mounting positions in pipes.



The protection sleeve ending should always be a bit below the pipe center (1).

For small pipe diameters, the protection sleeve may be welded in an inclined position (2).

If mounting in bends, the protection sleeve should always be facing the incoming current (3).

3.5.2 Welding notes

The device's protection sleeves are welded using the WIG procedure. To protect the seam root, forming gas should be used.

Competent personnel must perform the preparations and the welding itself. The EHEDG guidelines Doc. 9 (Welding stainless steel to meet hygienic requirements) and Doc. 35 (Hygienic welding of stainless steel tubing in the food processing industry) may serve as further instructions.

During welding, the device must not be present in the sleeve.

Avoid mechanical damages (scratches, dents) to any of the welding parts, and avoid corrosion (see "Installation notes" also).

To avoid welding distortion Hengesbach recommends:

- use a state-of-the-art cooling procedure
- tack the adaptor to multiple, opposing points which are roughly the same distance apart
- weld opposing segments segmentally between the tack points
- after welding opposing segments allow all parts to cool down before proceeding

The welding seam must be cohesive and its surface must be flat, regular and free of welding defects. The first welding seam should be from the process product side (inside). As a rule, a post-treatment of the welding seam (e.g. polishing) is necessary to attain the required surface finish.

Before inserting the device, all welded parts must be allowed to cool down completely.



3.6 Electrical connection



The operating voltage of the device is 24 VDC (+/- 10%). The device must under NO circumstances be operated with ANY other supply voltage.

3.6.1 Connection cable gland

The cable gland may be used for cables with an outer diameter between 5mm and 9mm.
Use wires with a minimum cross section of 0,33mm² (AWG 22).

Without wire-end sleeve (only rigid wires)	0,33 to 1,5 mm ² (AWG 22 to AWG 16)
With wire-end sleeve (flexible and rigid wires)	0,33 to 0,5 mm ² (AWG 22 to AWG 20)



Earth yourself and the device before installing the connections to minimise unnecessary loads due to static electricity.

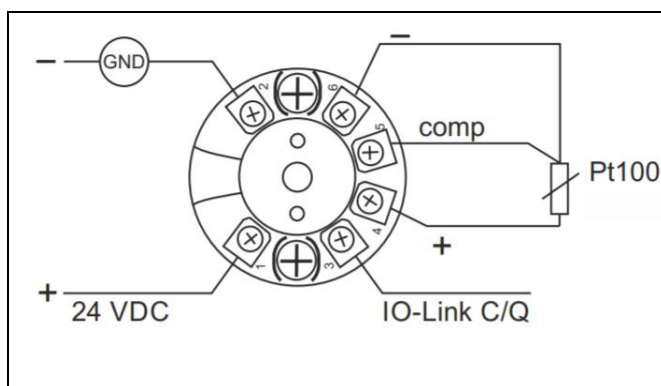


When connecting, ensure that the connection lines are reliably fixed. The manufacturer recommends the use of wire-end sleeves.



Use connection cables adhering to the IO-Link standard.

Connections of temperature transmitter inside the device head



(starting from the top, 12 o'clock)
Pt100 (-)
Pt100 comp, connected to (-)
Pt100 (+)
C/Q (command / query)
+24VDC
0VDC (return)



3.6.2 Connection M12 round plug, 5pin

If the device is fitted with an M12 device plug (male), the following connection scheme applies

	Pin 1 +24VDC Pin 3 0VDC (return) Pin 4 C/Q (command / query)
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3.7 Servicing and cleaning

The device does not contain parts that can be serviced by the user.

	Any changes that are made to the inside of the device will automatically result in the loss of warranty. The manufacturer reserves the right to reject any repair request for such devices - this does not apply to the opening of the device lid for the purpose of wiring.
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We recommend that the following items be checked at least twice in a year:

- process connection o-ring- or profile sealing (if applicable, replace if necessary)
- tight connection of the device to the protection sleeve
- tight connection of the braids to the screw terminals
- tight connection of the cable to the cable gland (if applicable)
- tight connection of the M12 plug (if applicable)
- tight connection of the device lid
- device head is free from any media and does not show coloring and/or corrosion

	Observe the maximum permitted temperatures when cleaning. Sustained overtemperature can destroy both the electronics and attachments at the housing.
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The housing of the device can be cleaned with all common cleaning agents and methods.

Please contact the manufacturer if you consider using special types of cleaning agents and processes.

When using high-pressure equipment for cleaning, please make sure that you do not directly aim at the openings of the device, such as the pressure compensation element.



3.8 Storage

Storage should be clean, dry, cool, and protected against vibration.

	The measurement inset must be protected against all mechanical stress.
	Do not let the stainless steel parts of the device come into contact with any other metallic material, especially black or raw steel. This carries the risk of severe corrosion.

3.9 Disposal: Packaging material

A certain packaging effort is required to protect the device against damage during transport. Please recycle the packaging materials correctly or reuse them for packing other items.

3.10 Disposal: Obsolete devices

The devices consist of several different materials, all of which need to be specifically disposed of. Therefore, please dispose of the devices via a suitable recycling specialist or return them to the manufacturer for the purpose of disposal.

	The device is not subject to the WEEE directive 2002/96/EC and its associated laws and regulations. Therefore, obsolete devices are not designed for disposal in municipal recycling centers.
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4 Warranty & device returns

If a device seems to show malfunctions, please start by examining possible faults (see chapter 0). You may also contact the manufacturer to discuss further actions.

If you intend to return a defective device:

1. Include a completed RMA return procedure & decontamination form. It is available for download at www.hengesbach.com, tab downloads.
2. Secure the measurement inset against all forms of mechanical stress and use transport-proof outer packaging.

	Devices which do not carry a completed decontamination form may be rejected by the manufacturer.
	Faults which are due to incorrect handling, incorrect installation or other improper handling of the product will not be regarded as warranty cases.

The return address of the manufacturer is:

	Schimmelbuschstr. 17 40699 Erkrath, Germany Tel.: +49 (0)2104 3032 – 0 Fax: +49 (0)2104 3032 – 22 info@hengesbach.com www.hengesbach.com
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5 Faults and Troubleshooting

In the event of a fault or malfunction, please check the following items to exclude possible error sources before beginning with the actual troubleshooting.

If your problem is not described here, contact the manufacturer to discuss further actions.



Fault	Possible causes	Check / correction
The device does not start OR The device does not display values OR The device fails to display values at some point.	The IO-Link-Master is defective. The cable connecting the IO-Link master and the device is damaged. A switch-off event has happened (e.g., the transmitter head temperature is too high)	Replace IO-Link-Master Replace cable Return the device to a suitable ambient and measurement condition
The output signal does not react promptly to pressure changes.	The damping value is set to a very high integration time	Set the damping value down to the minimum required time