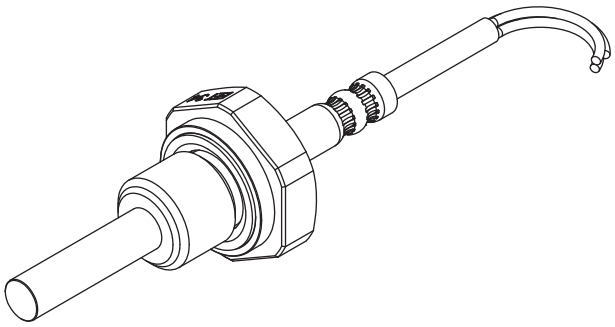
Operating Instructions



KRAL Temperature sensors.

Series EET 32/EET 33/EET 34/EET 38

OII 08en
Edition 09/2015
Original instructions

Table of contents

General information

The operating instructions form part of the sensor and must be kept for future reference.

Target groups

Target group	Tasks
Operator-owner	☐ Keep these instructions available at the installation site for future reference. ☐ Ensure that employees read and observe these instructions and the associated documents, in particular the safety instructions and warnings. ☐ Observe additional system-specific directives and regulations.
Specialist personnel, fitters	☐ Read, observe and follow these instructions and the associated documents, in particular the safety instructions and warnings.

Symbols

Symbol	Meaning
	Warning personal injury
	Notice
	Procedures mechanical installation
	Procedures electrical installation
	Check or fault table
▶	Request for action

Danger levels

	Warning	Danger level	Consequences of non-observances
	**Danger**	Immediate threat of danger	Serious personal injury, death
	**Warning**	Possible threat of danger	Serious personal injury, invalidity
	**Caution**	Potentially dangerous situation	Material damage, slight personal injury
	Caution	Potentially dangerous situation	Material damage

Further applicable documents

Manufacturer’s declaration as per EU Directive 2011/65/EC (RoHS)
Corresponding operating instructions for volumeter
Corresponding operating instructions for electronic equipment

Proper use

- ☐ Sensors of the EET series are designed for use with KRAL Volumeter® or for installation in pipings.
- ☐ The sensors may not be used outside the operational limits described within the chapter "Technical Data". Operating data that deviates from the values can lead to damage. If there is any doubt whether deviating operating data can cause damage, contact the manufacturer.

General safety instructions

The following general safety instructions must be observed:
☐ No liability is accepted for damage arising through non-observance of the operating instructions. ▪ Read the operating instructions carefully and observe them. ▪ The operator-owner is responsible for the observance of the operating instructions. ▪ Installation, removal and installation work may only be carried out by specialist personnel.
☐ Do not use the temperature sensors outside the operational limits specified in the "Technical data" section. In the case of operating data that does not agree with the specifications in the "Technical data" section, please contact the manufacturer.
☐ Depending on operating conditions, the service life of the sensors is limited due to vibrations, temperature influences or deterioration. The operator-owner is responsible for regular inspection. ▪ All parts which jeopardize safe operation must be replaced regularly. ▪ Abnormal operating mode or visible damage prohibits further use.
☐ In order for the warranty to remain valid, corrective maintenance carried out during the warranty period requires the express permission of the manufacturer.
☐ Observe the general regulations for the prevention of accidents as well as the local safety and operating instructions.
☐ Observe the valid national and international standards and specifications of the installation location.
☐ Implement all the supply lines without faults.
☐ The temperature sensor may not be located in the area of strong, high-frequency electromagnetic fields, such as those emitted e.g. from power lines, electric motors, frequency converters, etc. This can lead to erroneous measurements or the destruction of the temperature sensor.
☐ In case of systems with an increased potential of danger to humans and/or machines the failure of a sensor may not lead to injuries or damage to property. ▪ Always equip systems with an increased potential of danger with alarm equipment. ▪ Maintain and check the protective/alarm equipment regularly.
☐ The pumped liquids can be dangerous (e.g. hot, dangerous to health, poisonous, combustible). Observe the safety regulations for handling dangerous materials.
☐ Pumped liquids can be subject to high pressure and can cause damage and/or personal injury should leaks occur.

Description

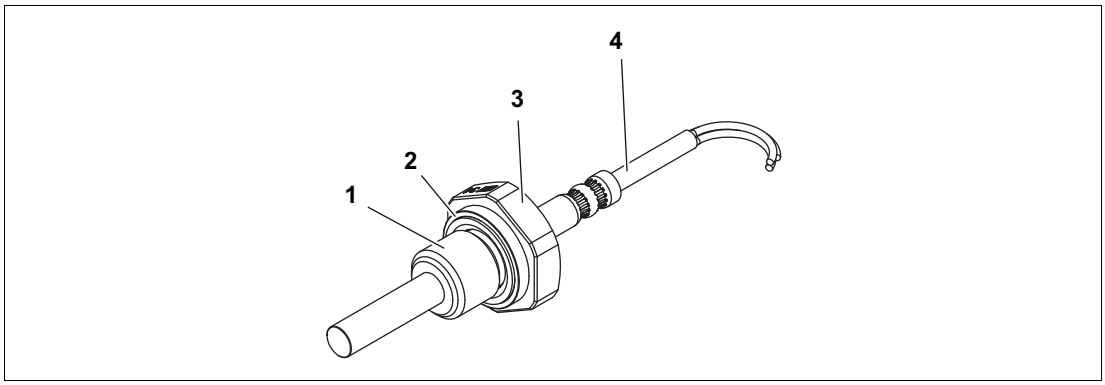


Fig. 1 EET 3x design

1	Thread	**3**	Hexagon
2	Seal	**4**	Sensor cable

Functional principle

Temperature sensors of the EET series are equipped with Pt100 elements. The measurements are based on the change in the resistance of platinum under temperature influence. Thanks to the three-wire circuit of the sensor long connecting cables can also be used without the measured result being corrupted.
The temperature sensor is screwed into the provided hole of the volumeter or into the piping.

Operational limits

The following table indicates the operational limits of the sensors which may not be exceeded.

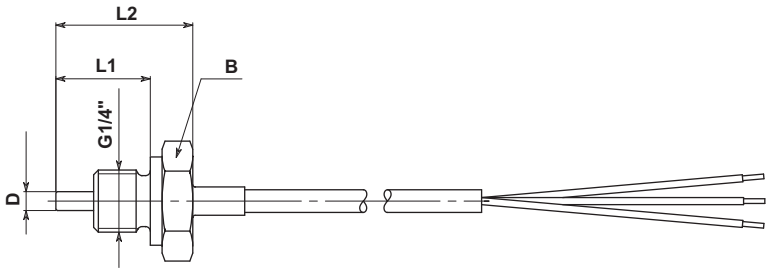
	Unit	EET 32	EET 33	EET 34	EET 38
☐ **Pressure max.**	[bar]	300			100
☐ **Temperature** Min. – max.	[°C]	-50...+260			

In addition, the operational limits of the corresponding volumeter and of the sensors additionally used are to be observed.

Selecting the temperature sensor

Volumeter Size	Series OME	OMG	OMC	OMP	For installing in a piping
13	EET 32	EET 34/EET 38	EET 34/EET 38	–	Every temperature sensor possible
20	EET 32	EET 33	EET 33	EET 33	
32	EET 32	EET 34/EET 38	EET 34/EET 38	EET 34/EET 38	
52	EET 33	EET 34/EET 38	EET 34/EET 38	EET 33	
68	–	EET 34/EET 38	–	–	
100	–	EET 34/EET 38	–	–	
140	–	–	–	–	

Data sheet EET 32/EET 33/EET 34



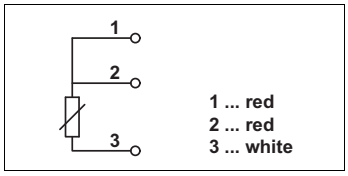
Specification	Unit	Data
Electrical specification		
☐ Sensor type		Pt100, EN IEC 60751 Class B, 3-wire
☐ Linearity		±0.1% of end value
Mechanical specification		
☐ Range of application		
▪ Liquid temperature	[°C]	-50...+260
▪ Ambient temperature	[°C]	-40...+150
☐ Pressure	[bar]	300
☐ Housing material		1.4571
☐ Seal		FPM
☐ Connection type		Cable with wire ends
☐ Cable jacket		Teflon (PTFE)
☐ Wire cross-section	[mm^2]	3 x 0.34
☐ Cable diameter	[mm]	3.3
☐ Cable length	[m]	3
☐ Weight	[g]	110
☐ Degree of protection		IP 65
☐ Tightening torque	[Nm]	30

Dimensions and identification of the temperature sensors

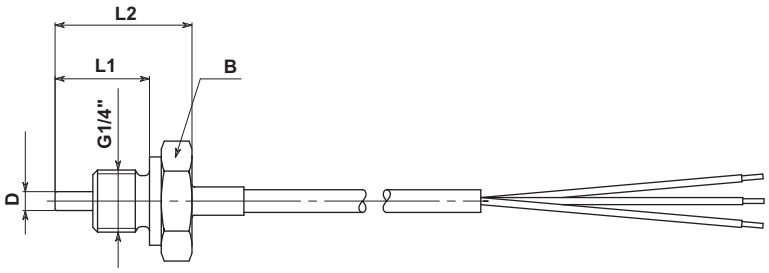
Dimensions	Unit	EET 32	EET 33	EET 34
☐ D	[mm]	4	6	6
☐ L1	[mm]	20	25	35
☐ L2	[mm]	29	34	44
☐ B	AF	22		

The temperature sensor type is marked on the hexagon.

Wiring diagram



Data sheet EET 38



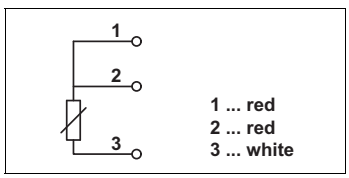
Specification	Unit	Data
Electrical specification		
☐ Sensor type		Pt100, EN IEC 60751 Class B, 3-wire
☐ Linearity		±0.1% of end value
Mechanical specification		
☐ Range of application		
▪ Liquid temperature	[°C]	-50...+260
▪ Ambient temperature	[°C]	-40...+150
☐ Pressure	[bar]	100
☐ Housing material		1.4571
☐ Seal		FPM
☐ Connection type		Cable with wire ends
☐ Cable jacket		Teflon (PTFE)
☐ Wire cross-section	[mm^2]	3 x 0.34
☐ Cable diameter	[mm]	3.3
☐ Cable length	[m]	3
☐ Weight	[g]	110
☐ Degree of protection		IP 65
☐ Tightening torque	[Nm]	30
General information		
Use in areas where there is an explosion hazard		Acc. 94/9/EC (ATEX)
☐ Ex marking		Ex II 2G Ex ia IIC T6

Dimensions and identification of the temperature sensors

Dimensions	Unit	EET 38
☐ D	[mm]	6
☐ L1	[mm]	35
☐ L2	[mm]	44
☐ B	AF	22

The temperature sensor type is marked on the hexagon.

Wiring diagram



Unpacking and checking the state of delivery

1. On delivery unpack the temperature sensor and check for damage during transportation.
2. Report damage during transportation immediately to the manufacturer.
3. Dispose of packing material in accordance with the locally applicable regulations.

Transportation

1. If possible, transport the temperature sensor in the original packaging.
2. Do not kink the cable.

Storage

► If possible, store the temperature sensor in original packaging in a cool and dry place.

Disposal

Safety instruction for disposal

Note the following on disposal:
☐ Observe the local regulations on disposal.

Disposing of the sensor

► Dispose of the temperature sensor as electronic waste.

Safety instructions on installation, removal and connection

Observe the following safety instructions:
☐ All installation and removal work may only be carried out by qualified personnel.
☐ The following qualifications are required for the electrical connection: ▪ Practical electrotechnical training ▪ Knowledge of the safety guidelines at the workplace ▪ Knowledge of the electrotechnical safety guidelines
☐ The temperature sensor may not be located in the area of strong, high-frequency electromagnetic fields. This could lead to erroneous measurements or even to the destruction of the temperature sensor.
► The connecting lines of the temperature sensors are to be shielded and laid separately from the supply and measuring lines.
► Ensure that the supply voltage is correct.
☐ The installation site of the temperature sensor may not be under pressure during installation and removal.
► Before installing or removing the sensor, switch off and depressurize the system.
☐ The cable may not be damaged when the temperature sensor is installed and removed because the sensor can otherwise be damaged.
► Ensure that the cable is turned with loosely.

Installation, removal and connection EET

Installing the EET in the OME 13 – 32

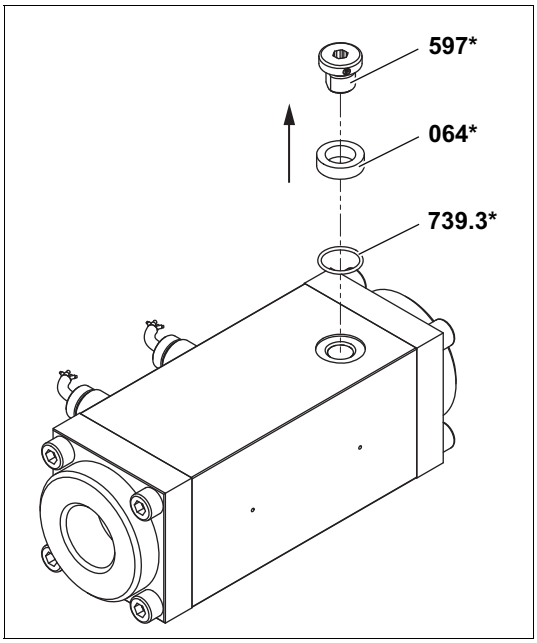


Fig. 1 Removing the screw plug

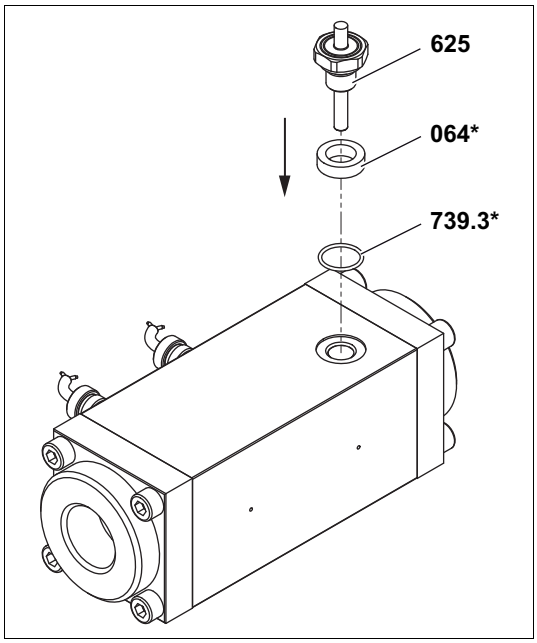


Fig. 2 Mounting the EET in the OME 13 – 32

064* Supporting ring
597* Screw plug
625 Temperature sensor
739.3* O-Ring

* Part of OME

Figures 1 and 2 show OME 32 as an example.

CAUTION
Incorrect installation destroys the sensor.

► Select the correct temperature sensor and place supporting ring and o-ring in the hole.

WARNING
Risk of injury through emitted liquid.

► Before installing the sensor, switch off and depressurize the system.
► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Remove the screw plug **597***, see Fig. 1, page 12.
2. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
3. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8.
4. If supporting ring and o-ring has been removed before: Lay the supporting ring **064*** with inserted o-ring **739.3*** into the sensor hole, see Fig. 2, page 12.
5. Screw the sensor into the sensor hole until it stops, maximum tightening torque 30 Nm.
6. Connect the sensor cable, while observing the wiring diagram, see "Wiring diagram", page 8.

Installing the EET in the OME 52

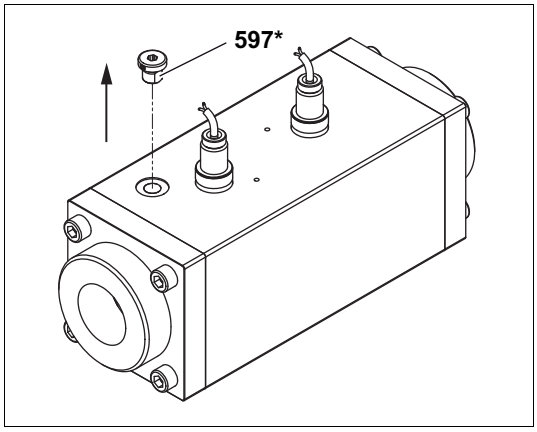


Fig. 3 Removing the screw plug

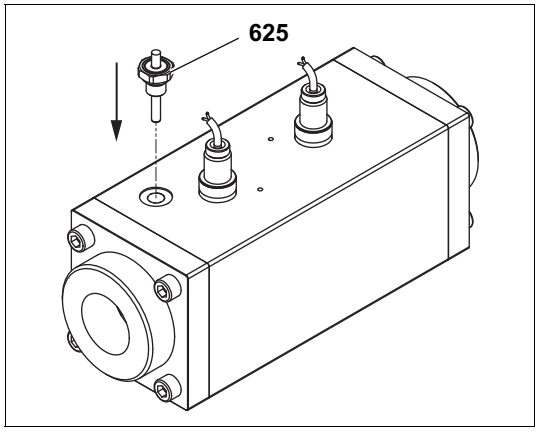


Fig. 4 Mounting the EET in the OME 52

597* Screw plug
625 Temperature sensor

* Part of OME

WARNING
Risk of injury through emitted liquid.

- ► Before installing the sensor, switch off and depressurize the system.
- ► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Remove the screw plug **597***, see Fig. 3, page 13.
2. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
3. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8.
4. Screw the sensor into the sensor hole until it stops, see Fig. 4, page 13, maximum tightening torque 30 Nm.
5. Connect the senor cable, while observing the wiring diagram, see "Wiring diagram", page 8.

Installing the EET in the OMG

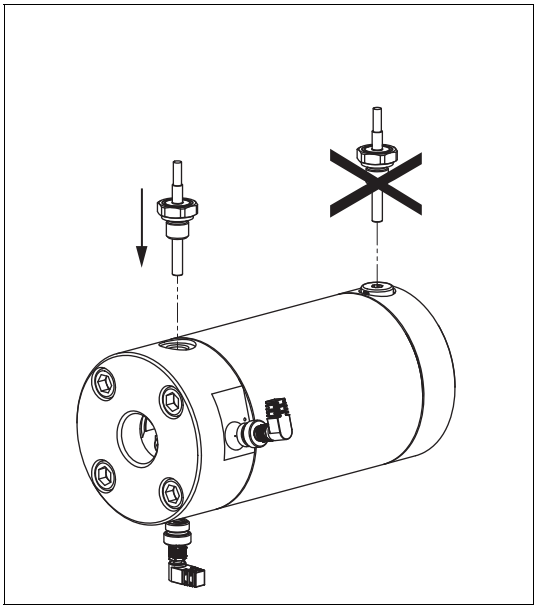


Fig. 5 EET installation site (e.g. OMG 32)

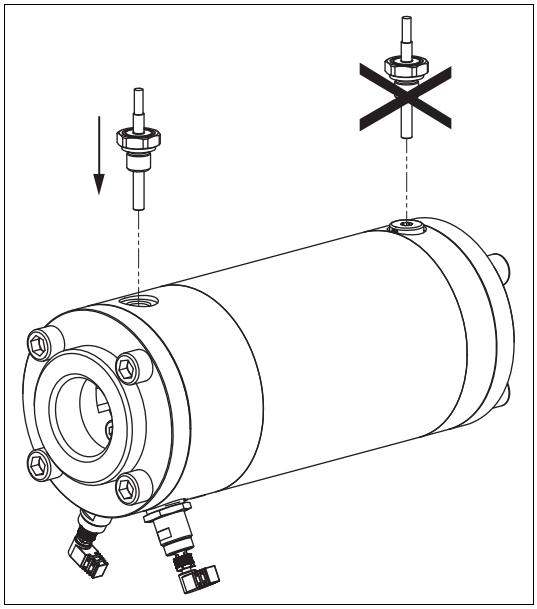


Fig. 6 EET installation site (e.g. OMG 52)

CAUTION
Incorrect installation destroys the sensor.

► Select the correct installation site, see Fig. 5, page 14 and see Fig. 6, page 14.

WARNING
Risk of injury through emitted liquid.

► Before installing the sensor, switch off and depressurize the system.
► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Select the correct hole and remove the screw plug of the sensor hole.
2. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
3. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8, or see "Dimensions and identification of the temperature sensors", page 9.
4. Screw the sensor into the sensor hole until it stops, maximum tightening torque 30 Nm.
5. Connect the sensor cable, while observing the wiring diagram, see "Wiring diagram", page 8, or see "Wiring diagram", page 9.

Installing the EET in the OMC

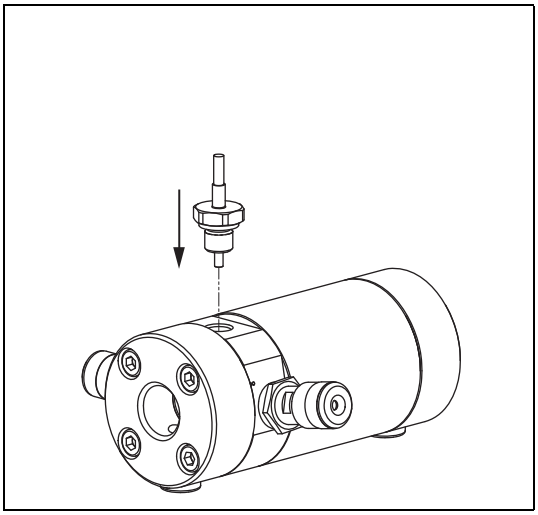


Fig. 7 EET installation site (e.g. OMC 32)

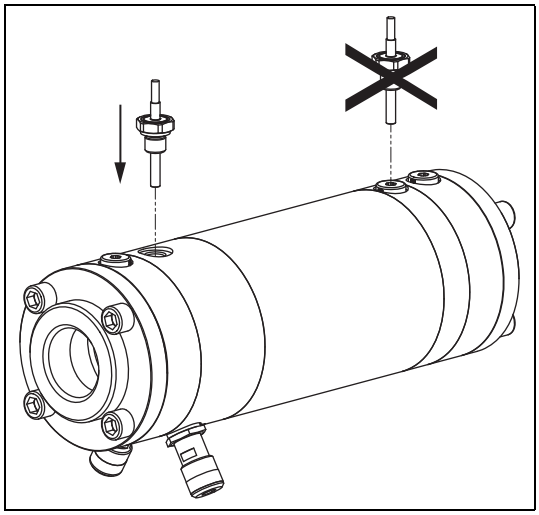


Fig. 8 EET installation site (e.g. OMC 52)

CAUTION
Incorrect installation destroys the sensor.

► Select the correct installation site, see Fig. 7, page 15 and see Fig. 8, page 15.

WARNING
Risk of injury through emitted liquid.

► Before installing the sensor, switch off and depressurize the system.
► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Select the correct hole and remove the screw plug of the sensor hole.
2. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
3. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8, or see "Dimensions and identification of the temperature sensors", page 9.
4. Screw the sensor into the sensor hole until it stops, maximum tightening torque 30 Nm.
5. Connect the sensor cable, while observing the wiring diagram, see "Wiring diagram", page 8, or see "Wiring diagram", page 9.

Installing the EET in the OMP

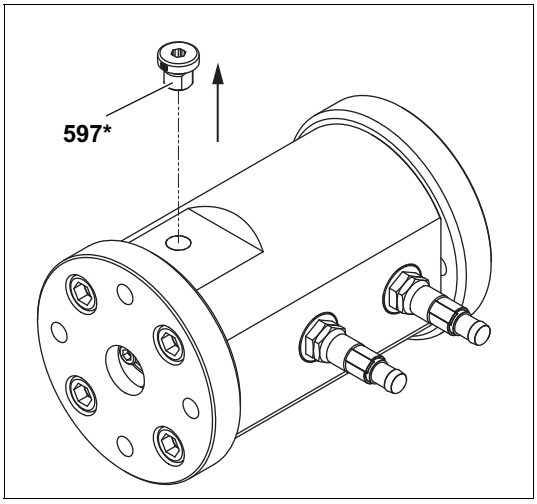


Fig. 9 Removing the screw plug

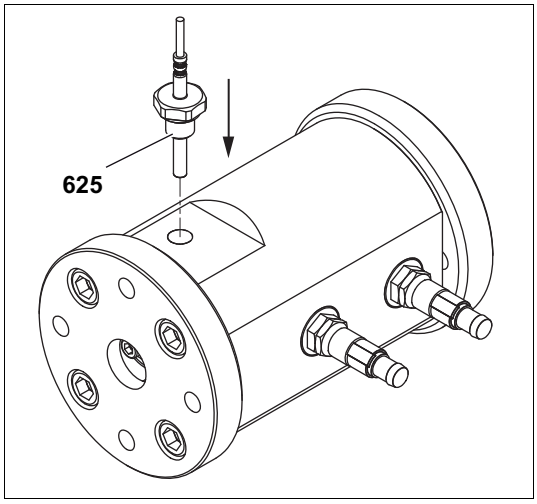


Fig. 10 Mounting the EET in the OMP

597* Screw plug
625 Temperature sensor

Figures 9 and 10 show OMP 32 as an example.

* Part of OMP

WARNING
Risk of injury through emitted liquid.

- ► Before installing the sensor, switch off and depressurize the system.
- ► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Remove the screw plug **597***, see Fig. 9, page 16.
2. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
3. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8, or see "Dimensions and identification of the temperature sensors", page 9.
4. Screw the sensor into the sensor hole until it stops, maximum tightening torque 30 Nm.
5. Connect the sensor cable, while observing the wiring diagram, see "Wiring diagram", page 8, or see "Wiring diagram", page 9.

Installing the EET in a piping

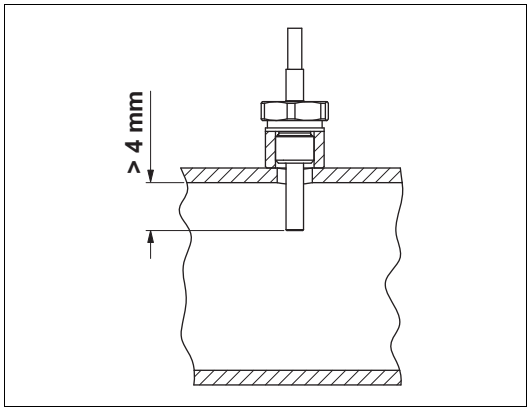


Fig. 11 Mounting the EET in the piping

WARNING
Risk of injury through emitted liquid.

- ► Before installing the sensor, switch off and depressurize the system.
- ► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Clean sensor hole. No foreign bodies may enter in the volumeter or in the piping system.
2. Select the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8, or see "Dimensions and identification of the temperature sensors", page 9.
3. Screw the sensor into the sensor hole until it stops, maximum tightening torque 30 Nm.
4. Connect the sensor cable, while observing the wiring diagram, see "Wiring diagram", page 8, or see "Wiring diagram", page 9.

Connecting the extension cable

Normally the line length does not influence the functional efficiency of the sensor. However, the manufacturer recommends not extending the connection cable of the sensor beyond a maximum length of 100 m. Extension cable as well as cable plug and cable box are available as accessories from the manufacturer.

Notice:
If a different extension cable is used, the plug contacts should be gold-plated. Use only cables with uniform cross-sections, otherwise errors in the temperature measurement can occur.

Pay attention to the following when connecting the extension cable:

- ► Use only a shielded cable.
- ► The wire cross-section must be at least 3 x 0.25 mm^2 .
- ► Lay the cable separately from the supply and measuring lines, see "Safety instructions on installation, removal and connection", page 11.

1. Solder cable plug to the sensor cable.
2. Solder cable box to the extension cable
3. Connect sensor cable and extension cable.
4. Connect the extension cable in accordance with the terminal diagram, see "Wiring diagram", page 8.

Removing the EET

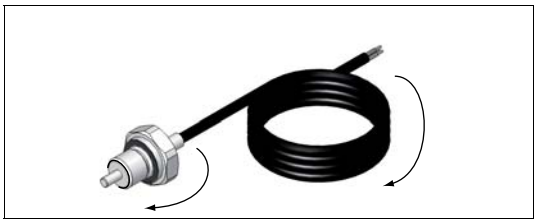


Fig. 12 Turn the cable with loosely

WARNING
Risk of injury through emitted liquid.

- ► Before removing the sensor, switch off and depressurize the system.
- ► Collect the leaking liquid safely and dispose of it in accordance with the locally applicable regulations.

1. Disconnect the sensor cable.
   - or -
   - ► If the cable is not disconnected, ensure that it turns loosely with, since the temperature sensor can otherwise be damaged, see Fig. 12, page 18.
2. Turn out the sensor.

Information about faults

Faults can have different causes. The following tables list the symptoms of a fault, the possible causes and measures for elimination.

Fault	Cause/Remedy
☐ No signal	1, 2, 3, 4, 5, 7, 8, 9
☐ Incorrect signal	1, 2, 5, 6

Troubleshooting

No.	Cause	Remedy
1	Temperature sensor defective	► Screw out and replace the sensor .
2	Temperature sensor mounted incorrectly	► Select the correct installation site, see "Installation, removal and connection", page 11.
3	Incorrect connection	► Check connections.
4	Volumeter does not work	► Check and actuate the volumeter, see the corresponding volumeter operating instructions.
5	Corroded contacts	► Check and clean contacts.
6	Interference from outside	► Lay cables accordingly, see "Safety instructions on installation, removal and connection", page 11.
7	Incorrect temperature sensor installed (is not immersed into the flow cross-section)	► Install the correct sensor, see "Selecting the temperature sensor", page 7 and see "Dimensions and identification of the temperature sensors", page 8, or see "Dimensions and identification of the temperature sensors", page 9.
8	Sensor mounted without supporting ring, volumeter blocked	► Insert the supporting ring, check the volumeter.
9	Cable defective	► Replace sensor. Ensure that the cable is not under tension when installed (rotating and strain relief).

Tab. 1 Fault table

Accessories

Junction box

The junction box simplifies the electrical connection of the various sensors. Up to three sensors can be connected. The sensor cables are combined to form a multi-strand connecting cable which can be supplied as well optionally if required. The wiring diagram can be found on the inside of the junction box lid.

Details are available in the corresponding volumeter operating instructions.

Notes

Notes

KRAL

KRAL GmbH, 6890 Lustenau, Austria, Tel.: +43/5577/86644-0, E-Mail: kral@kral.at

www.kral.at