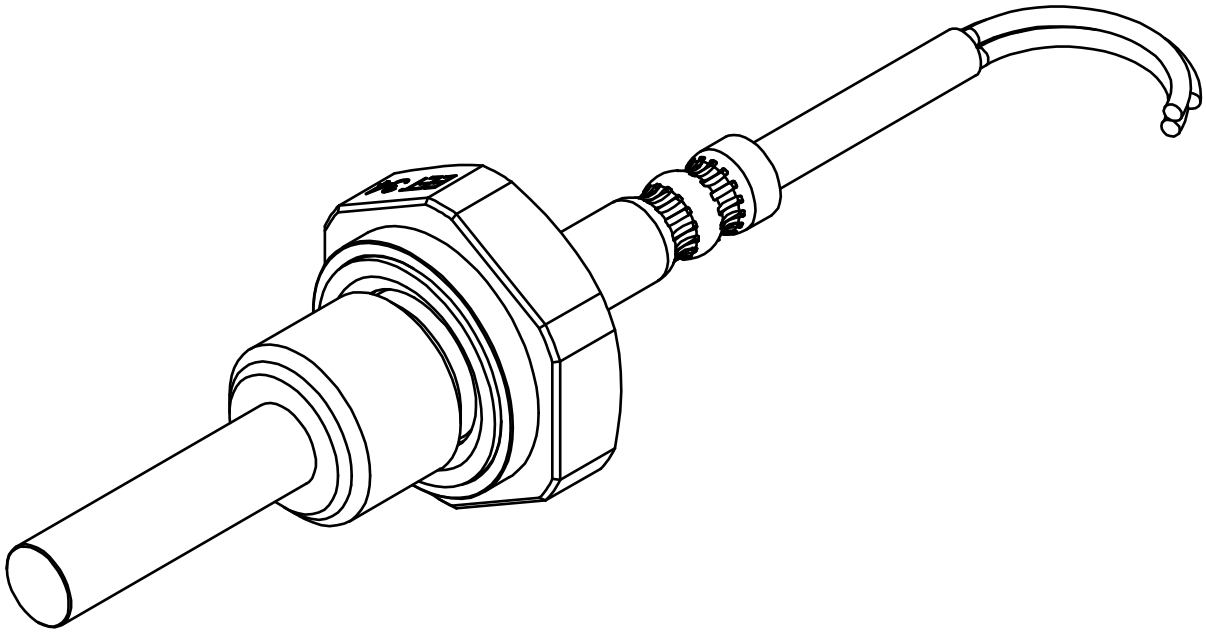
Operating instructions



KRAL Temperature Sensors

EET 32/EET 33/EET 34/EET 38

OII 08en-GB
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Original instructions

www.kral.at

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1 About this document

1.1 General information

These instructions form part of the product and must be kept for future reference. Furthermore please observe the associated documents.

1.2 Target groups

The instructions are intended for the following persons:

- ☐ Persons who work with the product
- ☐ Operator-owners who are responsible for the use of the product

Persons who work with the product must be qualified. The qualification ensures that possible dangers and damage to property that are connected to the activity are detected and avoided. These persons are qualified personnel who carry out the work properly due to their training, knowledge and experience and on the basis of the relevant provisions.

Information on the qualification of the personnel is provided separately at the beginning of the individual chapters in these instructions. The following table provides an overview.

Target group	Activity	Qualification
Fitter	Mounting, connection	Qualified personnel for mounting
Electrician	Electrical connection	Qualified personnel for electric installation
Trained personnel	Delegated task	Personnel trained by the operator-owner who know the task delegated to them and the possible dangers arising through improper behaviour.

Tab. 1: Target groups

1.3 Associated documents

- ☐ Declaration of conformity according to EU Directives 2011/65/EU and 2014/30/EU
- ☐ Corresponding flowmeter operating instructions
- ☐ Corresponding electronics operating instructions

1.4 Symbols

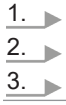
1.4.1 Danger levels

	Signal word	Danger level	Consequences of non-observance
	DANGER	Immediate threat of danger	Serious personal injury, death
	WARNING	Possible threat of danger	Serious personal injury, invalidity
	CAUTION	Potentially dangerous situation	Slight personal injury
	ATTENTION	Potentially dangerous situation	Material damage

1.4.2 Danger signs

	Meaning	Source and possible consequences of non-observance
	Electrical voltage	Electrical voltage causes serious physical injury or death.

1.4.3 Symbols in this document

	Meaning
	Warning personal injury
	Safety instruction
	Request for action
	Multi-step instructions for actions
⇨	Action result
	Cross-reference

2 Safety

2.1 Correct use

- ☐ Temperature sensors are designed for use with a KRAL flowmeter or for installation in the piping system.
- ☐ Use the temperature sensor only within the operating limits specified in the “Technical data” section. Deviating operating data can result in damage. If in doubt, contact the manufacturer.

2.2 Foreseeable misuse

- ☐ Any use that extends beyond the proper use or any other use is misuse.

2.3 Fundamental safety instructions

The following safety instructions must be observed strictly:

- ☐ Read and observe these operating instructions carefully.
- ☐ Observe the operating instructions for the flowmeter and the electronics.
- ☐ Have work only carried out by qualified/trained personnel.
- ☐ Wear personal protective equipment and work carefully.
- ☐ Depending on the operating conditions, the service life of the sensors is limited by vibrations, temperature influences or ageing. Regularly replace any parts that jeopardise safe operation.
- ☐ Shield the connecting lines of the sensor connections and lay them separately from the supply and measuring lines.
- ☐ Ensure that the power supply is correct.
- ☐ Always equip systems with greater danger potential with alarm equipment.
- ☐ Maintain and check protective/alarm equipment regularly.

3 Technical data

3.1 Operating limits

The following table shows the operating limits of the temperature sensors that must not be exceeded.

Parameter	Unit	Type			
		EET 32	EET 33	EET 34	EET 38
Max. operating pressure	[bar]	300			100
Medium temperature min. - max.	[°C]	-50 ... 260			

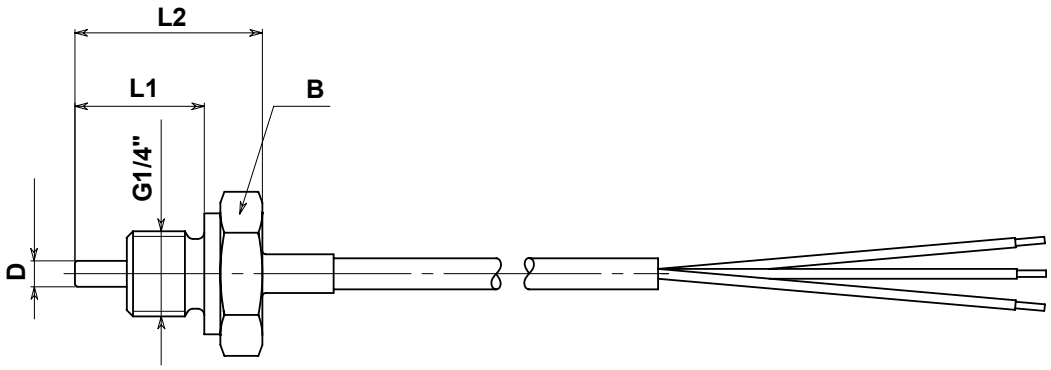
Tab. 2: Operating limits

In addition, the operating limits of the corresponding flowmeter and the additional sensors must be observed.

3.2 Selecting the temperature sensor

Flowmeter				Installation in pipeline
Size	Series			
	OME	OMG	OMP	
13	EET 32	EET 34/EET 38	–	Any temperature sensor possible
20	EET 32	EET 33	EET 33	
32	EET 32	EET 34/EET 38	EET 34/EET 38	
52	EET 33	EET 34/EET 38	EET 33	
68	–	EET 34/EET 38	–	
100	–	EET 34/EET 38	–	
140	–	–	–	

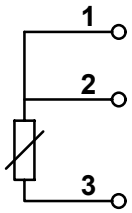
3.3 EET 32/EET 33/EET 34 data sheet



Specification	Unit	Data
Electrical specification		
☐ Sensor type		Pt100, EN IEC 60751 Class B, 3-wire
☐ Linearity		±0.1 % of final value
Mechanical specification		
☐ Range of application		
☐ Medium 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 sheath		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	Unit	EET 32	EET 33	EET 34
☐ D	[mm]	4	6	6
☐ L1	[mm]	20	25	35
☐ L2	[mm]	29	34	44
☐ B	SW	22		
The temperature sensor type/version is indicated on the hexagon.				

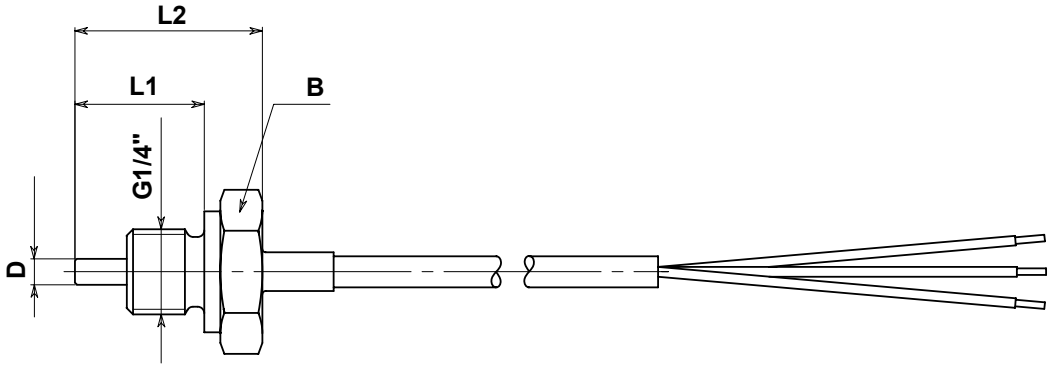
Tab. 3: Temperature sensor dimensions and marking



1	Red
2	Red
3	White

Fig. 1: Connection diagram

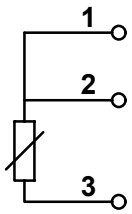
3.4 EET 38 data sheet



Specification	Unit	Data
Electrical specification		
☐ Sensor type		Pt100, EN IEC 60751 Class B, 3-wire
☐ Linearity		±0.1 % of final value
Mechanical specification		
☐ Range of application		
☐ Medium 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 sheath		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 potentially explosive atmospheres		According to 2014/34/EU (ATEX)
☐ Ex marking		II 2G Ex ia IIC T1...T6 Gb

Dimensions	Unit	EET 38
☐ D	[mm]	6
☐ L1	[mm]	35
☐ L2	[mm]	44
☐ B	SW	22
The temperature sensor type/version is indicated on the hexagon.		

Tab. 4: Temperature sensor dimensions and marking

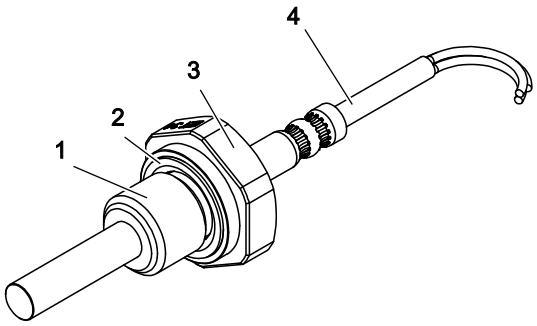


1	Red
2	Red
3	White

Fig. 2: Connection diagram

4 Function description

4.1 Structure



1	Thread
2	Seal
3	Hexagon
4	Sensor cable

Fig. 3: Temperature sensor structure

4.2 Functional principle

Temperature sensors of the EET series are equipped with Pt100 elements. The measurements are based on the change in resistance of platinum under the influence of temperature. Due to the three-wire circuit of the sensor, long connection cables can also be used without falsifying the measurement result.

The temperature sensor is screwed into the hole provided in the flow meter or into the piping.

5 Transportation, storage

5.1 Unpacking and checking the state of delivery

Personnel qualification:	☐ Trained personnel

1. ▶ Upon delivery check the product 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.

5.2 Storing the sensor

▶ Store the sensor in its original packaging in a cool and dry location.

6 Installation, removal and connection

6.1 Dangers during installation, removal and connection

The following safety instructions must be observed strictly:

- ☐ All work must only be carried out by electricians.
- ☐ Do not operate the sensor in the vicinity of strong high-frequency electromagnetic fields. These can lead to incorrect measurement or destruction of the sensor.
- ☐ Shield the connecting lines of the sensor connections and lay them separately from the supply and measuring lines.
- ☐ Ensure that the power supply is correct.
- ☐ Switch off and depressurise the system before installing or removing the sensor.
- ☐ Make sure that the cable is loosely twisted when installing or removing the sensor.

6.2 Installing the EET in OME

Personnel qualification:	☐ Electrician
Personal protective equipment:	☐ Work clothing
Aids:	☐ Torque wrench

⚠ WARNING

Risk of injury through escaping medium.

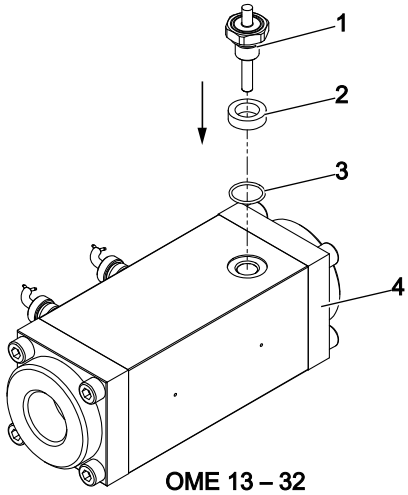
Media can be hot, poisonous, combustible and caustic.

- ► Before installing the sensor, switch off the system and depressurise it.
- ► Wear personal protective equipment at all times during operation. Pay attention to face protection.
- ► Collect any escaping medium safely and dispose of it in an environmentally compatible manner in accordance with the applicable local regulations.

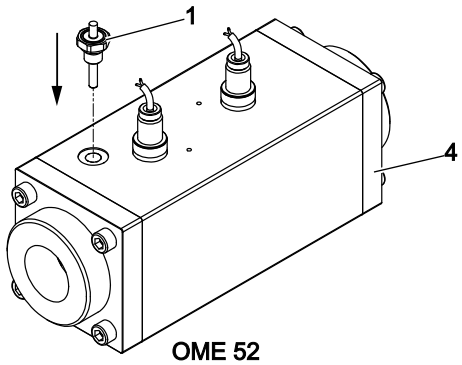
ATTENTION

Incorrect installation destroys the sensor

- ► Select a suitable temperature sensor and insert the support disc with O-ring into the sensor bore.



OME 13 – 32



OME 52

1. Remove the screw plug, support washer **2** and O-ring **3**.
2. Clean the sensor bore. No foreign bodies should penetrate the flowmeter **4** or piping system.
3. Place support disc **2** with inserted O-ring **3** in the sensor bore.
4. Select suitable sensor **1**, ↳ Technical data, Page 5.
5. Screw the sensor into the sensor bore as far as it will go, maximum tightening torque 30 Nm.
6. Connect the sensor cable, observing the connection diagram. ↳ Technical data, Page 5.

6.3 Installing the EET in OMG

Personnel qualification:	☐ Electrician
Personal protective equipment:	☐ Work clothing
Aids:	☐ Torque wrench

⚠ WARNING

Risk of injury through escaping medium.

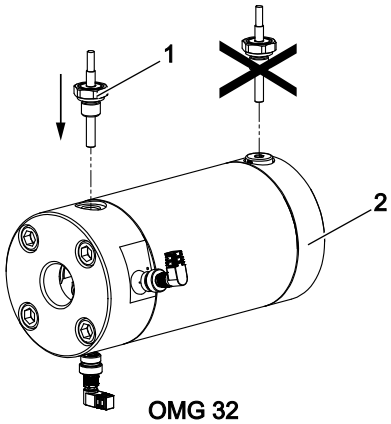
Media can be hot, poisonous, combustible and caustic.

- ► Before installing the sensor, switch off the system and depressurise it.
- ► Wear personal protective equipment at all times during operation. Pay attention to face protection.
- ► Collect any escaping medium safely and dispose of it in an environmentally compatible manner in accordance with the applicable local regulations.

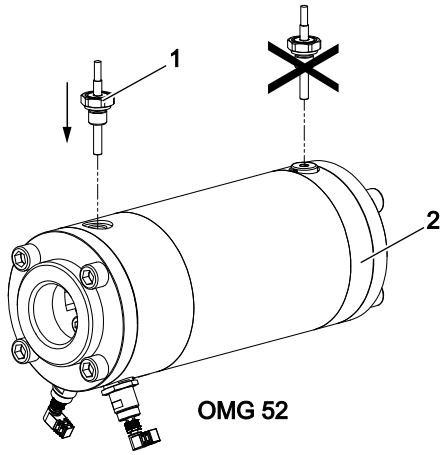
ATTENTION

Incorrect installation destroys the sensor

- ► Select the correct installation location.



OMG 32



OMG 52

1. ▶ Select the correct bore and remove the screw plug from the sensor bore.
2. ▶ Clean the sensor bore. No foreign bodies should penetrate the flowmeter **2** or piping system.
3. ▶ Select suitable sensor **1**, ↳ Technical data, Page 5.
4. ▶ Screw the sensor into the sensor bore as far as it will go, maximum tightening torque 30 Nm.
5. ▶ Connect the sensor cable, observing the connection diagram. ↳ Technical data, Page 5.

6.4 Installing the EET in OMP

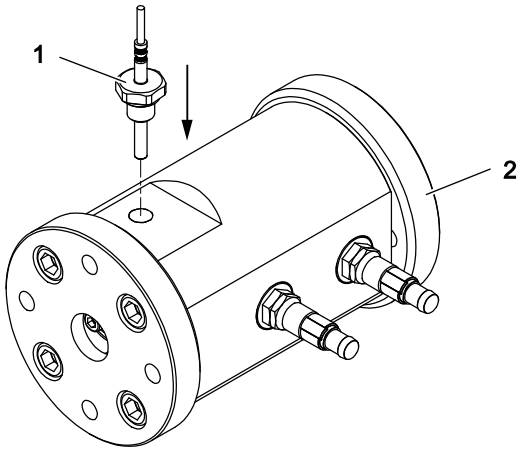
Personnel qualification:	☐ Electrician
Personal protective equipment:	☐ Work clothing
Aids:	☐ Torque wrench

⚠ WARNING

Risk of injury through escaping medium.

Media can be hot, poisonous, combustible and caustic.

- ► Before installing the sensor, switch off the system and depressurise it.
- ► Wear personal protective equipment at all times during operation. Pay attention to face protection.
- ► Collect any escaping medium safely and dispose of it in an environmentally compatible manner in accordance with the applicable local regulations.



1. Remove the screw plug from the sensor bore.
2. Clean the sensor bore. No foreign bodies should penetrate the flowmeter **2** or piping system.
3. Select suitable sensor **1**, Technical data, Page 5.
4. Screw the sensor into the sensor bore as far as it will go, maximum tightening torque 30 Nm.
5. Connect the sensor cable, observing the connection diagram. Technical data, Page 5.

6.5 Installing the EET in the piping

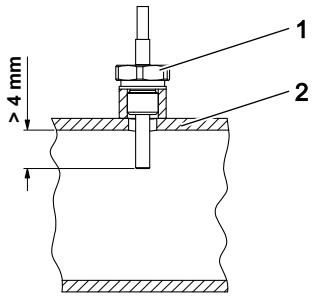
Personnel qualification:	☐ Electrician
Personal protective equipment:	☐ Work clothing
Aids:	☐ Torque wrench

⚠ WARNING

Risk of injury through escaping medium.

Media can be hot, poisonous, combustible and caustic.

- ► Before installing the sensor, switch off the system and depressurise it.
- ► Wear personal protective equipment at all times during operation. Pay attention to face protection.
- ► Collect any escaping medium safely and dispose of it in an environmentally compatible manner in accordance with the applicable local regulations.



1. Clean the sensor bore. No foreign bodies should penetrate the flowmeter or piping system **2**.
2. Select a suitable sensor **1** Technical data, Page 5.
3. Screw the sensor into the sensor bore as far as it will go, maximum tightening torque 30 Nm.
4. Connect the sensor cable, observing the connection diagram. Technical data, Page 5.

6.6 Connecting the extension cable

Personnel qualification:	☐ Electrician

Normally the cable length does not affect the functionality of the sensor. Nevertheless the manufacturer recommends that the sensor connecting cables be extended to a maximum length of 100 m. Extension cables as well cable connectors and cable box are available as accessories from the manufacturer.

Note If a different extension cable is used, the plug contacts should be gold-plated. Only use cables with uniform cross-sections, otherwise temperature measurement errors may occur.

Requirement:
- ✓ Shielded cable used
- ✓ Minimum conductor cross-section 3 x 0.25 mm^2
- ✓ Cable laid separately from supply line and measuring lines

1. ▶ Solder the cable connector onto the sensor cable.
2. ▶ Solder the cable box to the extension cable,
3. ▶ Connect the sensor cable and extension cable.
4. ▶ Connect the extension cable, observing the connection diagram. ↳ Technical data, Page 5.

6.7 Expanding the EET

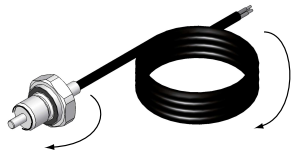
Personnel qualification:	☐ Electrician

⚠ WARNING

Risk of injury through escaping medium.

Media can be hot, poisonous, combustible and caustic.

- ► Before installing the sensor, switch off the system and depressurise it.
- ► Wear personal protective equipment at all times during operation. Pay attention to face protection.
- ► Collect any escaping medium safely and dispose of it in an environmentally compatible manner in accordance with the applicable local regulations.



1. ▶ Disconnect the sensor cable.
   - or -
   Ensure that the sensor cable can be turned loosely, otherwise the temperature sensor will be damaged,
2. ▶ Unscrew the sensor from the flowmeter or the piping.

7 Disposal

7.1 Temperature sensor disposal

ATTENTION

Environmental damage through improper disposal.

- ► Dispose of all the components in an environmentally friendly manner in accordance with the applicable local regulations.

▶ As electronic waste the temperature sensor unit must be disposed of correctly.

8 Troubleshooting

8.1 Possible faults

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

In the event of a fault please contact the manufacturer at services@kral.at.

ID	Fault
1	No signal
2	Faulty signal

8.2 Troubleshooting

Fault identification					Cause	Remedy
1	–	–	–	–	Connection faulty	
						→ Check connections.
1	–	–	–	–	Flowmeter does not work	
						→ Check the flowmeter and start it up, see corresponding flowmeter operating instructions.
1	2	–	–	–	Contacts corroded	
						→ Check and clean contacts.
–	2	–	–	–	External interference	
						→ Follow instructions for routing the cables, ↳ Installation, removal and connection, Page 9.

Tab. 5: Fault table

9 Accessories

9.1 Junction box

The junction box facilitates the electrical connection of the various sensors. Up to three sensors can be connected. The sensor cables are combined into a multi-core connection cable, which can be supplied as an option if required. The detailed assignment plan can be found on the inside of the cover of the junction box.

Details can be found in the corresponding flowmeter operating instructions.

KRAL

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