GESTRA®

Temperature Sensor

TRG 5-53
TRG 5-54
TRG 5-55
TRG 5-57

EN
English

Original Installation Instructions

810428-05

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Application

Usage for the intended purpose

The temperature sensors TRG 5-5..in conjunction with temperature switches TRS 5-6 and TRS 5-8 are used as temperature monitors or safety temperature monitors/limiters, for instance in steam boilers and hot-water plants.
Safety temperature monitors or limiters switch the heating off as soon as the max. admissible temperature in the superheater or the inlet line is reached.
A temperature monitor gives a signal when the preset MIN and MAX temperature limit is reached.

The temperature sensors TRG 5-53, TRG 5-54, TRG 5-55 and TRG 5-57 are designed to be used with temperature switches TRS 5-6 and TRS 5-8.

Function

A platinum resistance thermometer Pt 100 to EN 60751 is used as temperature sensor for the temperature switch TRS 5-6 and TRS 5-8. A three-wire configuration is used for the electrical connection.

The resistance thermometer is supplied with constant current and its voltage is a function of temperature. The changes in voltage are measured in the temperature switch and used for further processing.

To connect additional display units the temperature sensor TRG 5-54 is provided with two platinum resistance thermometers Pt 100.

Safety note

This device is an item of equipment with safety function (PED) and must only be installed, wired and commissioned by qualified and competent staff.

Retrofitting and maintenance work must only be performed by qualified staff who - through adequate training - have achieved a recognised level of competence.

Danger

When loosening the temperature sensor steam or hot water might escape!
This presents the risk of severe scalding all over the body!
It is therefore essential not to dismantle the temperature sensor unless the boiler pressure is verified to be 0 bar.

The temperature sensor becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the equipment is cold.

Attention

The name plate specifies the technical features of the equipment. Do not commission or operate any item of equipment that does not bear its specific name plate.

Directives and standards

EC Pressure Equipment Directive 97/23/EC

Safety temperature limiters/monitors are safety accessories as defined in the Pressure Equipment Directive (PED). The temperature switch TRS 5-6 in conjunction with temperature sensors TRG 5-5.. is EC type approved according to EN 12952/EN 12953. These Directives state, among other things, the requirements made on limiting systems and equipment for steam boiler plants and (pressurised) hot-water installations.

VdTÜV Bulletin “Temperature 100” / DIN EN 14597

The temperature switches TRS 5-6 and TRS 5-8 in conjunction with temperature sensors TRG 5-5.. are type approved according to VdTÜV Bulletin “Temperature 100” / DIN EN 14597.
The VdTÜV Bulletin “Temperature 100” and the DIN EN 14597 describe the requirements made on temperature limiters and monitors.

Approvals for Marine Applications

The temperature switch TRS 5-6 in conjunction with temperature sensors TRG 5-5.. is approved for marine applications.

LV (Low Voltage) Directive and EMC (Electromagnetic Compatibility)

In conjunction with the temperature switches TRS 5-6 and TRS 5-8 the temperature sensors TRG 5-5.. meet the requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC.

ATEX (Atmosphère Explosible)

The temperature sensors TRG 5-53, TRG 5-54, TRG 5-55 and TRG 5-57 are simple items of electrical equipment as specified in EN 60079-11 section 5.7. According to the European Directive 94/9/EC the equipment must be equipped with approved Zener barriers if used in potentially explosive areas.
Applicable in Ex zones 1, 2 (1999/92/EC).
The equipment does not bear an Ex marking. The suitability of the Zener barriers is certified in a separate wiring diagram provided by the manufacturer.

Note on the Declaration of Conformity / Declaration by the Manufacturer CE

For details on the conformity of our equipment according to the European Directives see our Declaration of Conformity or our Declaration of Manufacturer.
The current Declaration of Conformity / Declaration of Manufacturer are available in the Internet under www.gestra.com/documents or can be requested from us.

Technical data

TRG 5-53, TRG 5-54, TRG 5-55, TRG 5-57

Service pressure
TRG 5-53, TRG 5-54:
Nominal length 100 mm, 160 mm, 250 mm
40 bar at 251 °C
36 bar at 400 °C
Nominal length 400 mm
18 bar at 400 °C

TRG 5-55, TRG 5-57:
160 bar at 345 °C
120 bar at 540 °C

End connection
TRG 5-53, TRG 5-54: Screwed G ½, ISO 228-1
TRG 5-55, TRG 5-57: Weld-in protection tube ∅ 18 mm

Temperature sensing element (3-wire connection)
TRG 5-53, TRG 5-55, TRG 5-57: 1x Pt 100 to EN 60751, removable
TRG 5-54: 2x Pt 100 to EN 60751, removable

Admissible flow velocity
TRG 5-53, TRG 5-54:

Air	25 m/s
Superheated steam	25 m/s
Water	3 m/s

TRG 5-55, TRG 5-57:

Air	60 m/s
Superheated steam	60 m/s
Water	5 m/s

Materials
TRG 5-53, TRG 5-54: Protection tube 1.4571, X6 CrNiMoTi 17 122
TRG 5-55, TRG 5-57: Protection tube 1.7335, 13 CrMo 4-5

Cable entry / electrical connection
Cable gland M 20x1.5

Protection
IP 66 to DIN EN 60529

Ambient temperature
Max. 70 °C

Weight
TRG 5-53, TRG 5-54: 1.3 kg
TRG 5-55, TRG 5-57: 1.5 kg

Approvals:

EC type approval	01 202 931-B-10-0002
TÜV approval, Type approval	VdTÜV Bulletin “Temperature 100”, DIN EN 14597 Registration number DIN STW(STB) 98507S, DIN TW 106807
Marine applications	GL 99251-96 HH

Technical data - continued -

Name plate/marking

TRG 5-...			CE
DIN STW (STB) 98507S GL 99 251-96 HH	L= 100 390477	40 bar / 251°C 36 bar / 400°C	
GESTRA AG, Münchener Str. 77, D-28215 Bremen			0525

Fig. 1

Scope of supply

TRG 5-53
1 Temperature sensor
1 Installation manual

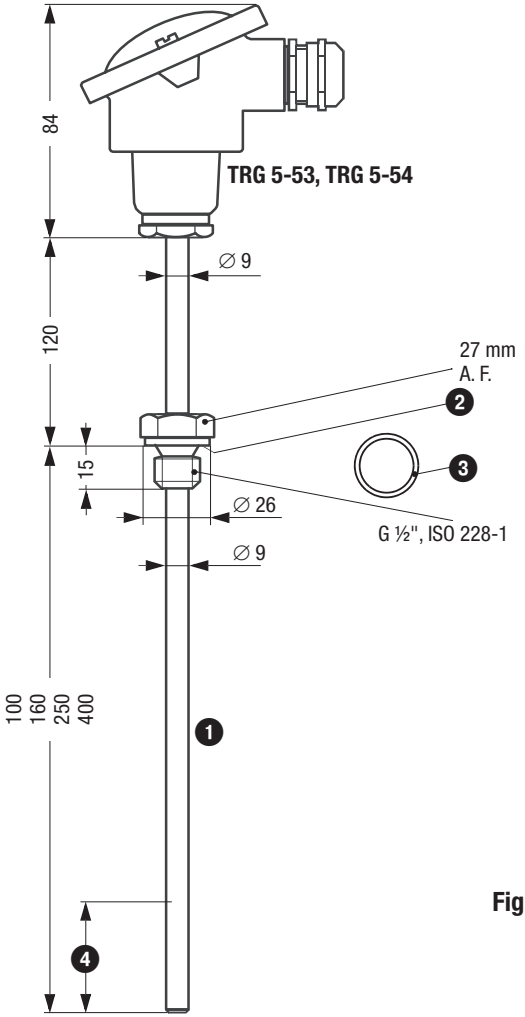
TRG 5-54
1 Temperature sensor
1 Installation manual

TRG 5-55
1 Temperature sensor
1 Installation manual

TRG 5-57
1 Temperature sensor
1 Installation manual

Installation

Dimensions TRG 5-53, TRG 5-54, TRG 5-55, TRG 5-57



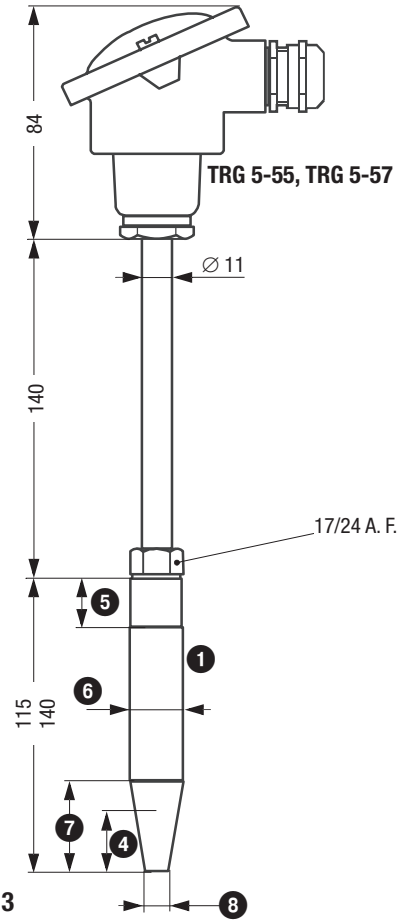


Fig. 3

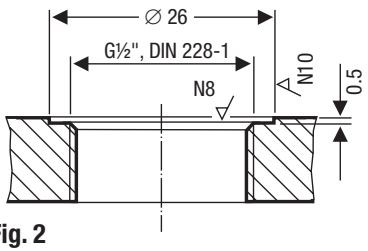


Fig. 2

	❹ [mm]	❺ [mm]	❻ [mm]	❼ [mm]	❽ [mm]
TRG 5-53	40				
TRG 5-54	40				
TRG 5-55	30	25	18	40	9
TRG 5-57	30	25	24	65	12.5

Installation - continued -

Component parts of TRG 5-53, TRG 5-54, TRG 5-55, TRG 5-57

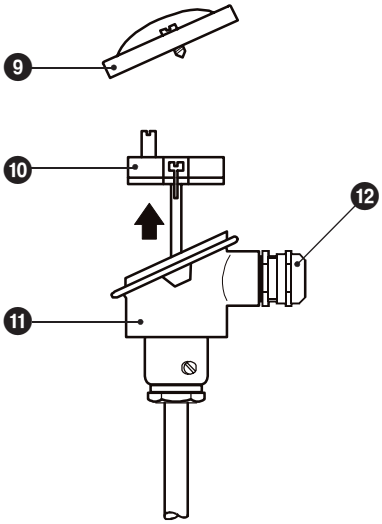


Fig. 4

Key

1. Protection tube / welding sleeve
2. Seating surface
3. Joint ring ∅ 13 x 26
4. Temperature-sensitive length
5. Threaded area
6. Diameter of welding sleeve
7. Cone-shaped part
8. Tip of cone-shaped part
9. Top
10. Temperature sensing element (removable)
11. Terminal box
12. Cable gland M20 x 1.5

Installation - continued -

Examples of installation

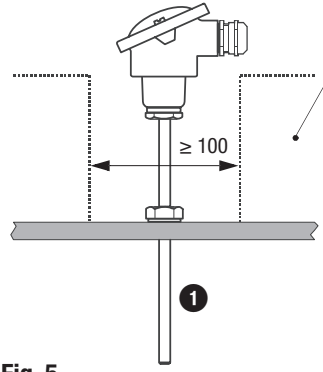


Fig. 5

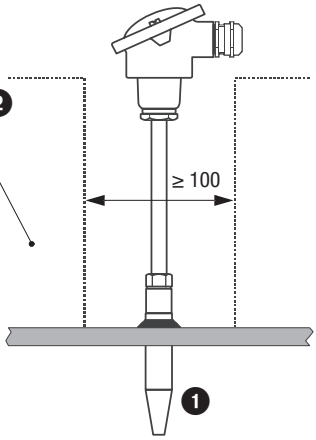


Fig. 6

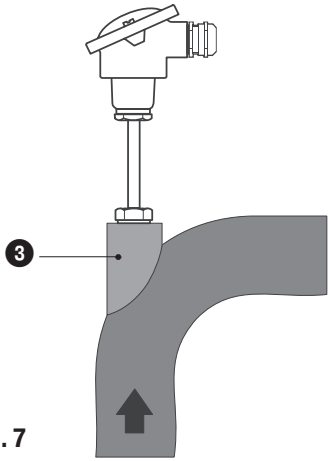


Fig. 7

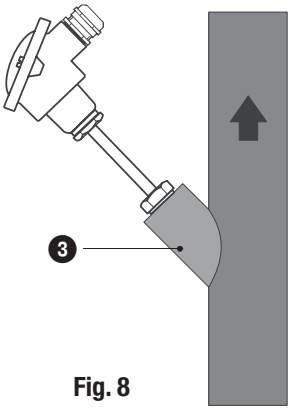


Fig. 8

Key

1. Protection tube / welding sleeve
2. Thermal insulation
3. Elbow

Installation - continued -

TRG 5-53, TRG 5-54

1. Check seating surface **Fig. 2**.
2. Put the supplied joint ring onto the sealing surface **Fig. 2** ❸.
3. Screw in the temperature sensor and fasten it with an open-end spanner 27 mm A. F. The torque required for tightening when cold is 150 Nm.

TRG 5-55, TRG 5-57

1. Provide a penetration for the socket-weld end on site.
2. Unscrew the upper part of the temperature sensor from the welding sleeve ❶.
3. Weld welding sleeve ❶ in place. Arc-weld the equipment only manually in place, applying welding process 111 and 141 in accordance with ISO 4063).
4. Put copper ring onto welding sleeve ❶ and screw the upper part of the temperature sensor into the welding sleeve ❶. Fasten the upper part of the temperature sensor when cold with an open-end spanner (17 or 24 mm A. F.).

Attention

Only qualified welders certified according to EN 287-1 may weld welding sleeves into lines or vessels.

Note

- When installing the electrode in pipes, weld the elbow onto the pipe, ensuring that the temperature sensitive part ❹ of the temperature sensor is exposed to the fluid against the flow direction. **Fig. 7, Fig. 8**
- Make sure that the measuring tip of the temperature sensitive part ❹ of the temperature sensor is always in contact with the fluid.
- Do not completely insulate the temperature sensors. See examples of installation **Fig. 5, Fig. 6**.

Tools

- Open-end spanner 17 mm A. F.
- Open-end spanner 24 mm A. F.
- Open-end spanner 27 mm A. F.

Electrical connection

TRG 5-53, TRG 5-54, TRG 5-55, TRG 5-57

To connect the temperature sensor use screened multi-core control cable with a min. conductor size 0.5 mm ^{2}, e. g. LiYCY 4 x 0.5 mm^2. Max. cable length between temperature sensor and temperature switch TRS 5-6, TRS 5-8: 100 m.

Connecting the measuring element

1. Take the cover ❾ off the terminal box ⓫. **Fig. 4**
2. Unscrew cable gland ⓬.
3. Pull cable through cable gland ⓬, ring, joint ring and terminal box ⓫.
4. Wire the connecting terminals of the temperature sensing element ❿ in accordance with the wiring diagram **Fig. 9, Fig. 10.**
5. You can also connect other equipment, e. g. display units, to the terminals marked in yellow and black of the TRG 5-54. **Fig. 10**
6. Fasten the cable gland ⓬.
7. Put cover ❾ back on and secure it with screws.

Wiring diagram

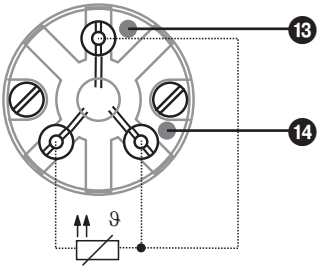


Fig. 9

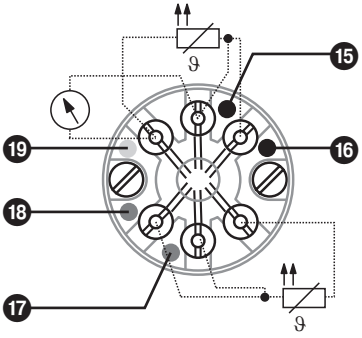


Fig. 10

Tools

- Screwdriver for slotted screws, size 2,5, completely insulated according to DIN VDE 0680-01
- Screwdriver for slotted screws, size 8

Key

⓭ Terminal, red
⓮ Terminal, red
⓯ Terminal, black
⓰ Terminal, black
⓱ Terminal, red
⓲ Terminal, red
⓳ Terminal, yellow

Commissioning procedure

Checking electrical connection

Make sure that the TRG 5-5... is wired to the associated control unit TRS 5-6 or TRS 5-8 according to the wiring diagram. **Fig. 9, Fig. 10**

Switching on supply voltage

Apply supply voltage to temperature switch TRS 5-6 or TRS 5-8.

Measuring fluid temperature

Use table **Fig. 11** to ascertain the current temperature of the fluid via the resistance value of the Pt 100.

1. Take the cover ❾ off the terminal box ⓫. **Fig. 4**
2. Attach the test line directly to the temperature sensing element ❿.
3. Use an ohmmeter for measuring the resistance value.
4. Look up the corresponding resistance value in the table, interpolate if necessary and read off the temperature.
5. Put cover ❾ back on and secure it with screws.

°C	0	10	20	30	40	50	60	70	80	90	100	Ω/deg
0	100.00	103.90	107.79	111.67	115.54	119.40	123.24	127.07	130.89	134.70	138.50	0.385
100	138.50	142.28	146.06	149.82	153.57	157.32	161.04	164.76	168.47	172.16	175.84	0.373
200	175.84	179.51	183.17	186.82	190.46	194.08	197.70	201.30	204.88	208.46	212.03	0.361
300	212.03	215.58	219.13	222.66	226.18	229.69	233.19	236.67	240.15	243.61	247.06	0.350
400	247.06	250.50	253.93	257.34	260.75	264.14	267.52	270.89	274.25	277.60	280.93	0.338
500	280.93	284.26	287.57	290.87	294.16	297.43	300.70	303.95	307.20	310.43	313.65	0.327
600	313.65	316.86	320.05	323.24	326.41	329.57	332.72	335.86	338.99	342.10	345.21	0.315
700	345.21	384.30	351.38	354.45	357.51	360.55	363.59	366.61	369.62	372.62	375.61	0.304
800	375.61	378.59	381.55	384.50	387.45	390.38						0.295

Basic values of the measuring resistors according to IEC 751 for Pt100.

Fig. 11

Attention

Please replace the measuring element if the temperature measured by the temperature sensor deviates from the plant temperature.

The temperature sensor element must also be replaced by a new one if a malfunction occurred and the rated pressure/temperature limits of 251°C / 400°C or 345°C / 540°C are exceeded. See Technical Data, service pressure, on page 6.

Troubleshooting

For troubleshooting please refer to the installation manuals for the temperature switches TRS 5-6 and TRS 5-8.

Maintenance

Spare Parts

Resistance thermometer type	Designation	Item	Stock code #
TRG 5-53 Dimension ❶ = 160 mm see **Fig. 2**	Temperature sensing element 1x Pt 100	❿	052260
TRG 5-54 Dimension ❶ = 160 mm see **Fig. 2**	Temperature sensing element 2x Pt 100	❿	052264
TRG 5-55	Temperature sensing element 1x Pt 100	❿	052386
TRG 5-57	Temperature sensing element 1x Pt 100	❿	052388

Replacing the temperature sensing element

The temperature sensing element ❿ can be replaced during operation if necessary.

1. Take the cover ❾ off the terminal box ⓫. **Fig. 4**
2. Detach temperature sensing element ❿.
3. Slacken fixing screws for temperature sensing element ❿. Pull out temperature sensing element.
4. Insert new temperature sensing element and fasten fixing screws.
5. Attach temperature sensing element ❿.
6. Put cover ❾ back on and secure it with screws.

Decommissioning

Danger

When loosening the temperature sensor steam or hot water might escape!
This presents the risk of severe scalding all over the body!
It is therefore essential not to dismantle the temperature sensor unless the boiler pressure is verified to be 0 bar.

The temperature sensor becomes hot during operation.
Risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the equipment is cold.

Removing and disposing of temperature sensor TRG 5-53, TRG 5-54

1. Take the cover ❾ off the terminal box ⓫. **Fig. 4**
2. Unscrew cable gland ⓬.
3. Detach temperature sensing element ❿.
3. Pull cable out of the cable gland ⓬, ring, joint ring and terminal box ⓫.
4. Before removing the temperature sensor make sure that is is neither hot nor under pressure. For the disposal of the equipment observe the pertinent legal regulations concerning waste disposal.

Note

When ordering spare parts or replacement equipment please state the material number indicated on the name plate.

If faults occur that are not listed above or cannot be corrected, please contact our service centre or authorized agency in your country.

Agencies all over the world: **www.gestra.de**

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