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Vakuumtechnik

Vakuum-
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Meß- und
Analysentechnik

LEYBOLD AG

GA 09.203 / 7

# THERMOVAC
# TR 201, TR 205, TR 206

Meßröhren und Meßzellen

Gauge Tubes and Sensing Tubes

Capteurs et cellules

Kat.-Nr./ Cat. No./No. de Cat.
162 02, 162 31, 158 50,
896 72, 896 73

**Gebrauchsanleitung**

**Operating Instructions**

**Mode d'emploi**

**LEYBOLD-Service**

If a gauge head is returned to LEYBOLD, indicate whether the gauge head is free of substances damaging to health or whether it is contaminated. If it is contaminated also indicate the nature of hazard. LEYBOLD must return any gauge head without a declaration of contamination to the sender's address.

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# 1 Description

**Warning**



Indicates procedures that must be strictly observed to prevent hazards to persons.

**Caution**

Indicates procedures that must strictly be observed to prevent damage to, or destruction of the capacitance gauges.

**Note**

Indicates special technical requirements that the user must comply with.

The references to diagrams, e.g. (2/1), consist of the Fig. No. and the Item No. in that order.

## 1.1 Purpose

The gauge heads are intended for the measurement of absolute pressures according to the technical data.

## 1.2 Technical Data

| Type | | TR 201 KF TR 201 NPT | TR 205 CF | TR 206 KF TR 206 NPT |
|---|---|---|---|---|
| Measuring range | mbar | $10^{-3}$ - 1000 | $10^{-3}$ - 1000 | $10^{-3}$ - 1000 |
| Colour code | | yellow | yellow | yellow / red |
| Operating temperature (compensated) | °C | 0-40 | 0-40 | 0-40 |
| Max. permissible ambient temperature | °C | 65 | 65 | 65 |
| Filament temperature | °C | 110 | 110 | 110 |
| Permissible overload (absolute) | bar | 3 | - | 6*) |
| Bake-out temperature | °C | - | 400**) | - |
| Volume | $cm^3$ | 10 | - | 10 |
| Vacuum connection | DN | 10 KF 1/8" NPT | 16 CF | 10 KF 1/8" NPT |
| Sensing filament | | W | W | Ni |
| Materials subjected to the medium | | Mild steel nickel plated<br>Tungsten, Araldite, Glass<br>CrNi 8020 | Stainless steel 1.4301<br>CrNi 8020<br>$Al_2O_3$<br>Ni | Stainless steel 1.4301<br>Ni<br>CrNi 8020<br>$Al_2O_3$ |

*) TÜV tested, test pressure 10 bar
**) at the flange

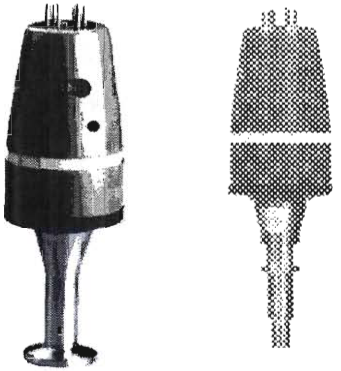


Fig. 1 Gauge tube TR 201 or TR 206 left; TR 201 NPT or TR 206 NPT right

**Key to Fig. 2**
1 Sensing tube
2 Hex head socket screws
3 Connection flange
4 Gauge head

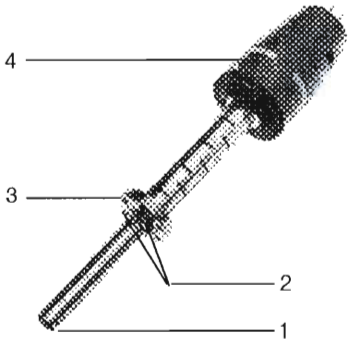



Fig. 2 Gauge tube TR 205

## 1.3 Description of the gauge tubes

(see Figs. 1 and 2)

The sensing filament of the gauge tube is made of tungsten wire 7,7 µ in diameter.

The gauge tube TR 206 is made of stainless steel with ceramic-sealed current leadthrough and has an electrode system of nickel.

The gauge tube TR 205 is mounted on UHV flange DN 16 CF. The appertaining head is thermally insulated by an air-cooled extension of 80 mm length.

The gauge tubes (gauge head and sensing tube) are supplied preset and are fully interchangeable. Adjustment or recalibrating is required only after lengthy use, if at all.

The gauge tubes are temperature compensated for the range 0 to 40 °C.

The sensing tube of a gauge head can be easily exchanged. When a new sensing tube is fitted, the gauge head must be recalibrated by adjusting the potentiometers in the gauge head (see section 2.2).

## 1.4 Equipment

### 1.4.1 Standard Specification

| | Ref No. |
|---|---|
| Gauge tube | |
| Hexagon socket key | |
| Size 0.9 (only for TR 205) | 281 11 20 |
| Operating Instructions | GA 09.203 |

### 1.4.2 Accessories

| | Cat. No. |
|---|---|
| Gauge tube TR 201 | 162 02 |
| Replacement sensing tube TR 201 | 162 09 |
| Gauge tube TR 201 NPT | 896 72 |
| Replacement sensing tube TR 201 NPT | 896 76 |
| Gauge tube TR 206 | 162 31 |
| Replacement sensing tube TR 206 | 162 32 |
| Gauge tube TR 205 | 158 50 |
| Replacement sensing tube TR 205 | 158 51 |
| Gauge tube TR 206 NPT | 896 73 |
| Replacement sensing tube TR 206 NPT | 896 77 |
| **Fittings for connection:** | |
| DN 10 KF small flange, steel, with short tubulation | 183 01 |
| DN 10 KF small flange, stainless steel, with short tubulation | 868 40 |
| dto. with long tubulation | 868 50 |
| Centering ring DN 10 KF (Al) with NBR O-ring | 183 21 |
| Stainless steel centering ring DN 10 KF with FPM O-ring | 883 21 |
| Clamping ring DN 10/16 KF | 183 41 |
| UHV-sealing disk for DN 10/16 KF | 883 15 |
| Clamping ring for UHV sealing disk DN 10/16 KF | 882 75 |
| Flange with tubulation DN 16 CF | 835 51 |
| dto., rotary | 835 71 |
| Copper gasket DN 16 CF (set of ten) | 839 41 |
| Bolts, nuts and washers[1] DN 16 CF | 839 00 |
| Small flange DN 10 KF of steel with ground cone NS 19/26 | 184 91 |
| Adapter centering ring DN 16/10 KF (Al-NBR ring) | 183 56 |
| dto. (stainless steel-FPM) | 883 56 |
| LITHELEN | 176 44 |
| **O-rings for connecting the gauge heads** | |
| O-ring DN 10 KF NBR | 239 50 193 |
| O-ring DN 10 KF FPM | 239 70 123 |
| O-ring DN 16 KF NBR | 239 50 510 |
| O-ring DN 16 KF FPM | 239 70 176 |

1) 1 set contains 25 bolts and nuts as well as 50 washers

# 2 Start-up

## 2.1 Connecting the gauge tubes to the vacuum system

**Attention**



By no means should the gauge tubes be connected so that when venting the plant the admitted air is streaming rectilinearly into the gauge tube, as this might damage the fine wire in the sensing element.

We recommend that the gauge tubes TR 201 and TR 206 be mounted vertically, with connection flange downward.

The maximum admissible ambient temperature for the gauge tubes TR 201/TR 206 (with gauge head) is 65 °C. But at this temperature the measuring accuracy stated for THERMOVAC gauge tubes is not maintained, as the temperature compensation is effective up to 40 °C only.

If the gauge tube is subjected to severe thermal radiation, it should be protected by a suitable radiation shield. If conduction of heat through the interconnecting pipework should occur, a length of the pipework should be watercooled by a suitable cooling coil.

Using the UHV sealing disk, the sensing tube TR 206 can be baked up to 200 °C. But then the gauge head must be removed.

The gauge tube TR 205 is suitable for use on systems being baked-out up to 400 °C. If the tube is fitted in horizontal position, the tube head must not be removed from the sensing tube during bake-out, thanks to its thermal insulation, and also the standard gauge head cable may remain connected.

Contamination of the gauge heads will influence the precision of measurement. Special care must be taken when the gauge head comes into contact with substances which cannot be dissolved by normal solvents. We recommend including a suitable baffle in the tubulation to prevent contamination, or to fit a pipe bend ensuring that the bend does not produce a syphon effect.

## 2.2 Readjustment

For readjustment proceed in the following sequence:

Vent vacuum system and set 100 % potentiometer so that the pointer of the control unit meter shows full-scale deflection, i. e. it should point to 100 on the linear scale.

Pump down vacuum system to a pressure below $10^{-3}$ mbar and set „0“ potentiometer so that the pointer is on 0 of the meter scale.

Vent vacuum system and recheck the 100 % adjustment. Correct deviation, if any, by means of potentiometer.

If a correction of the 100 % adjustment was necessary the zero adjustment must be repeated in any case.

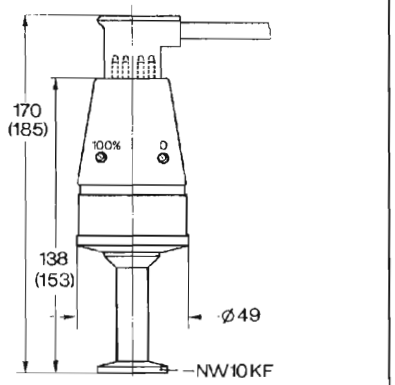


Fig. 3 Dimensional drawing TR 201/206

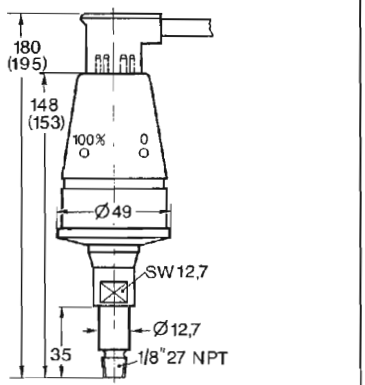


Fig. 4 Dimensional drawing TR 201/206 NPT

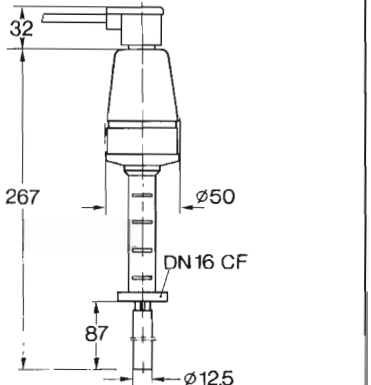


Fig. 5 Dimensional drawing TR 205

# 3 Cleaning and exchanging the sensing tube

(see Figs. 2 and 6)

The sensing tube can be cleaned by the use of suitable organic solvents (benzine, ether, etc.).

**Note**
The detergent $CCl_4$ is not suited for the cleaning of the gauge tube TR 201 pasted in gauge heads. The adhesive binding at the gauge head is not resistent to longer reaction of $CCl_4$.

Mechanical cleaning methods such as brushing the inside of the sensing tube, must not be used, as the sensing filament would be destroyed. The sensing tube should be carefully filled, using a syringe, with the solvent and then left for a short time. Then drain off the solvent. Do not shake the sensing tube!! Repeat this proedure one or two times. When the sensing tube is first used after cleaning, it will tend to give too high a reading in the range $<10^{-2}$ mbar for a short time.

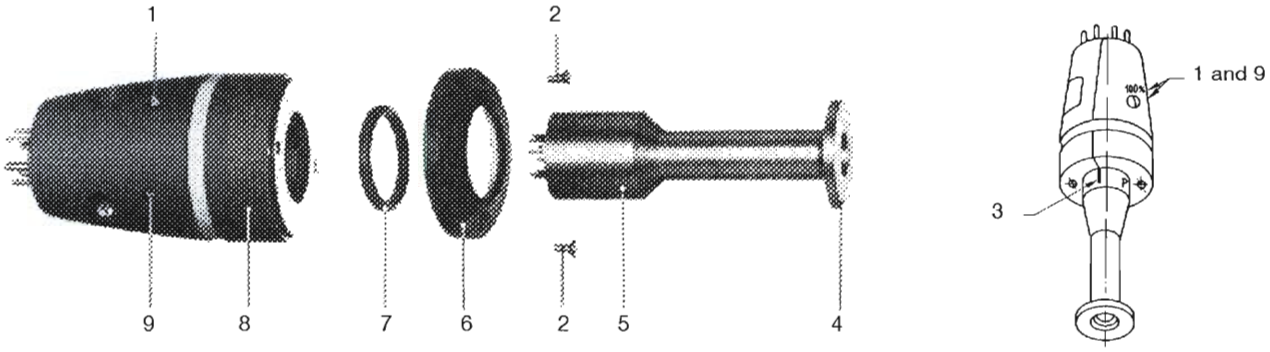
After cleaning and subsequent drying, the sensing tube should be evacuated to a pressure $<10^{-3}$ mbar. The pressure indicated on the control unit meter should then read 0 on the black scale. If this is not the case, the sensing tube and its gauge head must be recalibrated (see section 2.2).

The old sensing tube must be replaced by a new tube, if after following the above procedure the gauge tube cannot be recalibrated.

To replace the sensing tube of gauge tubes TR 201 and TR 206 remove the screws (6/2) and unplug the old sensing tube (6/5) from its base in the gauge head (6/8). The new sensing tube is then plugged in and the screws replaced.

When reassembling the gauge tube TR 206 after having replaced the sensing tube make sure that the mark (6/3) is exactly in alignment with the partition line of the gauge head, the letter P being on the potentiometer side (6/1) and (6/9).

To replace the sensing tube TR 205, loosen the hex head socket screws (22) and pull out the sensing tube. Plug in the new sensing tube and retighten screws.




**Key to Fig. 6**

1 Potentiometer for zero adjustment
2 Fixing screw for the clamping ring
3 Mark
4 Gauge tube connection
5 Sensing tube
6 Clamping ring
7 Rubber gasket
8 Gauge head
9 Potentiometer for full deflection adjustment

Fig. 6 Exploded view of TR 201 gauge tube (left); TR 206 gauge tube (right)

# 4 Spare Parts List

| Type | TR 201 KF | TR 201 NPT | TR 205 CF | TR 206 KF | TR 206 NPT |
|---|---|---|---|---|---|
| Sensing tube (6/5) | 162 09 | 896 76 | 158 51 | 162 32 | 896 77 |
| Countersunk screw M3 x 8 (6/2) | 201 80 321 | 201 80 321 | 201 80 321 | 201 80 321 | 201 80 321 |
| Clip ring (6/6) | 238 88 101 | 238 88 101 | 238 88 101 | 238 88 101 | 238 88 101 |
| O-ring 23 x 4 (6/7) | 239 50 191 | 239 50 191 | 239 50 191 | 239 50 191 | 239 50 191 |
| Gauge head incl. bridge (6/8) | 530 43 127 | 530 43 127 | 530 43 127 | 530 43 128 | 530 43 128 |
| 1/2 housing | 548 74 105 | 548 74 105 | 548 74 105 | 548 74 105 | 548 74 105 |
| Cross head screw M 3 x 12 | 201 80 160 | 201 80 160 | 201 80 160 | 201 80 160 | 201 80 160 |
| Hexagon socket screws M 2 x 2.5 (2/2) | - | - | 201 23 102 | - | - |
| Terminals | - | - | 271 54 138 | - | - |

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