

Vacuum Pumps

Instrumentation

Fittings and Valves



LEYBOLD VACUUM

GA 09.210/ 7.02



**TR 211 KF, TR 211 NPT,
TR 212 KF, TR 216 KF**
THERMOVAC Gauge Head

Cat. No.
157 85, 896 33,
158 52, 157 87

Operating Instructions

GA 09.210/7.02 - 05/97

LEYBOLD-Service

If a gauge head is returned to LEYBOLD VACUUM GmbH, 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.

General Note

The right of alterations in the design and the technical data is reserved.

The illustrations are not binding.

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1 Description

1.1 General

These Operating Instructions contain important information on the functions, installation, start-up and troubleshooting of the THERMOVAC gauge head TR 211, TR 212 and TR 216.

Caution Indicates procedures that must strictly be observed to prevent damage to, or destruction of, the THERMOVAC gauge head.

The references to diagrams, e.g. (3/5), consist of the Fig. No. and the item No. in that order.

Unpack the THERMOVAC gauge head immediately after delivery, even if it is to be installed at a later date.

Note
Retain the packaging materials in the event of complaints about damage.

Carefully examine the visually. If any damage is discovered, report it immediately to the forwarding agent and insurer. If the gauge head has to be replaced, please get in touch with the orders department.

1.1.1 Purpose

The THERMOVAC gauge heads are vacuum gauge heads which are operated in connection with the operating units TM 20, TM 21, TM 22, PM 31, CM 31, CM 32, CM 33 as well as TM 2xx, IT 230, IT 230 DS and the CM 330.

The gauge head is used for the measurement of absolute pressures in the rough and fine vacuum range in accordance with the technical data of Section 1.2.

1.2 Technical data

THERMOVAC gauge head TR 211

| | |
|---------------------------------|--|
| Measurement range | 0.5·10 ⁻³ to 10 ³ mbar |
| Filament temperature | 110 °C |
| Permissible overload (absolute) | 3 bar |
| Measurement volume | 11 cm ³ |
| Connection flange | DN 16 KF or 1/8" NPT thread |
| Filament material | Tungsten |

Material in contact with the medium
aluminium, glass, Vacon, tungsten,
chrome-nickel 8020, steel nickel-plated,
Epoxy adhesive

Operating temperature 0 to 40 °C

Max. ambient temperature 80 °C

THERMOVAC gauge head TR 212

Measurement range 0.5·10⁻³ to 10³ mbar

Filament temperature 110 °C

Permissible overload (absolute) 10 bar

Measurement volume 10 cm³

Connection flange DN 16 KF

Filament material Tungsten

Material in contact with the medium
Stainless steel 1.4301, Tungsten,
chrome nickel 8020, ceramics Al₂O₃,
NiFe 42

Operating temperature 0 to 40 °C

Max. ambient temperature 80 °C

THERMOVAC gauge head TR 216

Measurement range 0.5·10⁻³ to 10³ mbar

Filament temperature 110 °C

Permissible overload (absolute) 10 bar

Measurement volume 10 cm³

Connection flange DN 16 KF

Filament material Platinum

Material in contact with the medium
Stainless steel 1.4301, platinum,
chrome nickel 8020, ceramics Al₂O₃,
NiFe 42

Operating temperature 0 to 40 °C

Max. ambient temperature 80 °C

1.3 Technical description

The actual pressure sensing element within the gauge head TR 211 is a tungsten filament.

The THERMOVAC gauge heads TR 212 and TR 216 are made of stainless steel with a welded ceramics feed-through. The sensing element within the TR 212 is a tungsten filament, whereas the TR 216 uses a platinum filament.

The gauge heads are supplied fully aligned. Any alignment or recalibration will - if at all necessary - be required only after a longer period of operation.

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

The measurement cells can be easily exchanged should this be required. After an exchange of the sensing cell a recalibration is required by adjusting two potentiometers within in the gauge head; see Section 2.2.

1.4 Equipment

1.4.1 Supplied equipment

| | | |
|--------------------------|----------|--------|
| Gauge head TR 211 KF or | Cat. No. | 157 85 |
| Gauge head TR 211 NPT or | | 896 33 |
| Gauge head TR 212 KF or | | 158 52 |
| Gauge head TR 216 KF | | 157 87 |

Securing bow for connection plug

Operating Instructions GA 09.210

1.4.2 Accessories

| | | |
|--|----------|--------|
| Replacement sensing cell TR 211 (DN 16 KF) | Cat. No. | 157 75 |
| Replacement sensing cell TR 211 (1/8" NPT) | | 896 34 |
| Replacement sensing cell TR 212 (DN 16 KF) | | 158 53 |

Replacement sensing cell TR 216 (DN 16 KF) 157 77

Small flange DN 16 KF with short tubulation, made of steel 183 06

Small flange DN 16 KF with short tubulation, made of stainless steel 868 41

Small flange DN 16 KF with long tubulation, made of stainless steel 868 51

Cat. No.

Centering ring DN 16 KF (Al) with NBR sealing ring 183 26

Centering ring DN 16 KF made of stainless steel with FPM sealing ring 883 46

DN 10/16 KF clamping ring 183 41

Adapter centering ring DN 16/10 KF (Al-NBR ring) 183 56

Adapter centering ring DN 16/10 KF (stainless steel-FPM ring) 883 56

Round sealing ring DN 16 KF,
NBR Ref. No. 239 50 510
FPM Ref. No. 239 70 176

For overpressure applications:

Clamping ring Cat. No. 882 75

Outer support ring, steel Ref. No. 431 31 228

2 Operation

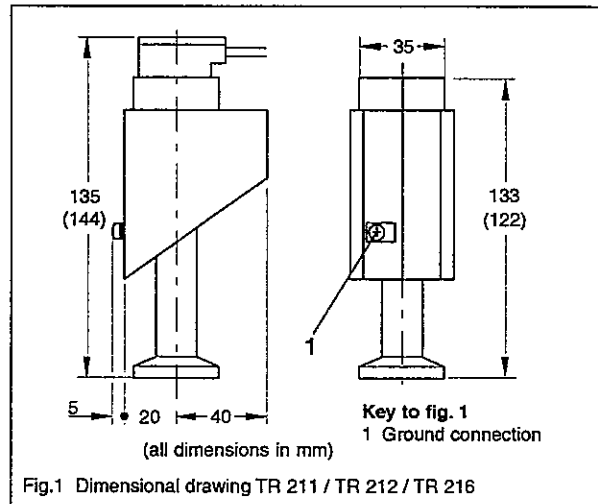
2.1 Connection of the gauge head

Important The gauge head must be installed in such a way, that when venting the vacuum system the admitted air may under no circumstances be directed straight at the gauge head. Otherwise the fine wire within the gauge head may be damaged.

Install the gauge head vertically, i.e. with the flange facing downwards. Dimensional drawing see Fig. 1. The dimensions given in brackets refer to the TR 212 and TR 216 THERMOVAC gauge head. Otherwise the dimensions are the same for both gauge heads.

The maximum permissible ambient temperature for the gauge head is 80 °C. However, at this temperature the accuracy specified for the gauge head is no longer ensured, as the temperature compensation is only effective up to 40 °C.

If the gauge head is subjected to strong thermal radiation, it has to be protected by a suitable thermal screen. In case that heat is transferred to the gauge head via the connection cable, a section of the connection cable may be cooled by a cooling spiral.



Any contamination of the sensing cell will impair the accuracy of the pressure readings obtained. Thus special care must be taken in the presence of substances which can not be removed by solvents.

Suitable orifice plates or bends may be employed to keep any possible sources of contamination away from the gauge head.

Bent lines should be laid in such a way that no condensate can collect and in particular so that the vacuum line

Key to fig. 2

- 1 100% potentiometer
- 2 „0“ potentiometer

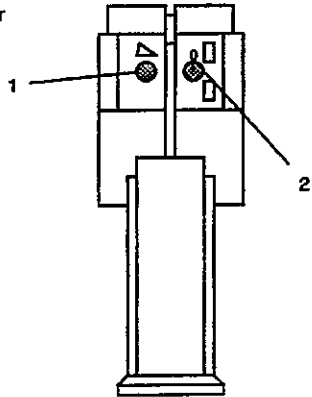


Fig. 2 Gauge head TR 211 / TR 212 / TR 216

is not blocked.

The gauge heads are connected to the operating unit via standard gauge head cables.

For the purpose of improved resistance to interference the gauge heads from Serial No. D 9611 3001 have been equipped with an additional ground connection (1/1) (screw terminal) at the housing which is directly linked to the metal housing of the sensing cell.

The ground lines which lead to the outside (black cable with lug) on the connectors of gauge head cables Cat. No. 162 26; 162 27 and 162 28, are used to provide a ground connection between the gauge head and the operating unit from the A-Series (ground terminal on the rear of the instrument).

Caution The ground wire may only be connected if potential equalization between the flange of the vacuum apparatus and the operating unit is ensured. If necessary install the gauge head so that it is electrically isolated from the vacuum apparatus.

Note

- When operating the THERMOVAC gauge head TR 216 in connection with an operating unit from the A series (THERMOVAC TM 21, TM 22 or COMBIVAC CM 31, CM 32 or CM 33) running on a software version up to version V 2.13 you must select for the filament „FIL 1“ on parameter page 7 for the THERMOVAC channel. **If this is not observed you will have to expect a greater degree of inaccuracy in the measurements.**
- From software version V 2.14 upwards the „FIL pt“ setting applies when connecting a TR 216 THERMOVAC gauge head as also described in the corresponding Operating Instructions.

The connecting plug can be safely attached to the gauge via the securing bow. To do so, push the bow over the connecting pug and let them snap in the provided holes which are in the shell.

2.2 Alignment

2.2.1 Alignment of the gauge head in connection with THERMOVAC operating units with analogue displays

Alignment is performed as follows:

Remove the caps covering the potentiometers on the gauge head.

Vent vacuum system and set 100 % potentiometer (2/1) 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 (2/2) 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.

After having completed the alignment fit the caps to cover the potentiometers.

2.2.2 Alignment of the gauge head in connection with operating units TM 20, TM 21, TM 22, CM 31, CM 32 and CM 33

For this refer to the alignment instructions given in the corresponding operating instructions.

3 Maintenance

3.1 Exchanging the sensing cell

Note

One half of the housing (3/1) is fitted with plastic catches (3/2) which must properly engage in the slots (3/8) provided in the other half of the housing (3/7) so as to firmly connect the two halves of the housing (3/1) and (3/7).

Apply a screwdriver to the upper slit on the longer front so as to disengage the plastic catch (3/2) by pushing it backwards. At the same time pull both halves of the shell (3/1) and (3/7) apart a little.

Next apply a screwdriver to the lower slit on the longer front so as to disengage the plastic catch by pushing it backwards. At the same time pull both halves of the shell apart a little more.

Repeat this for the shorter front.

Detach shell (3/1).

Remove the contact spring (3/4) by loosening the fixing screw (3/3)

Remove the sensing cell (3/11) together with the pcb. and plug (3/6) from the remaining shell.

Carefully separate the sensing cell (3/11) from the pcb. (3/6).

Remove the insulating plate (3/5) from the measurement cell.

Exchange the sensing cell.

Note

- Insert insulating plate (3/5) between printed circuit board and measurement cell.

- When installing a new sensing cell on the pcb. it is not required to maintain a particular polarity between the pins on the sensing cell and the mating connector.

- During assembly of the gauge head make sure that the holder (3/10) has been placed in the housing shell and that the temperature sensor is pressed against the sensing cell.

The gauge head is reassembled in the reverse order.

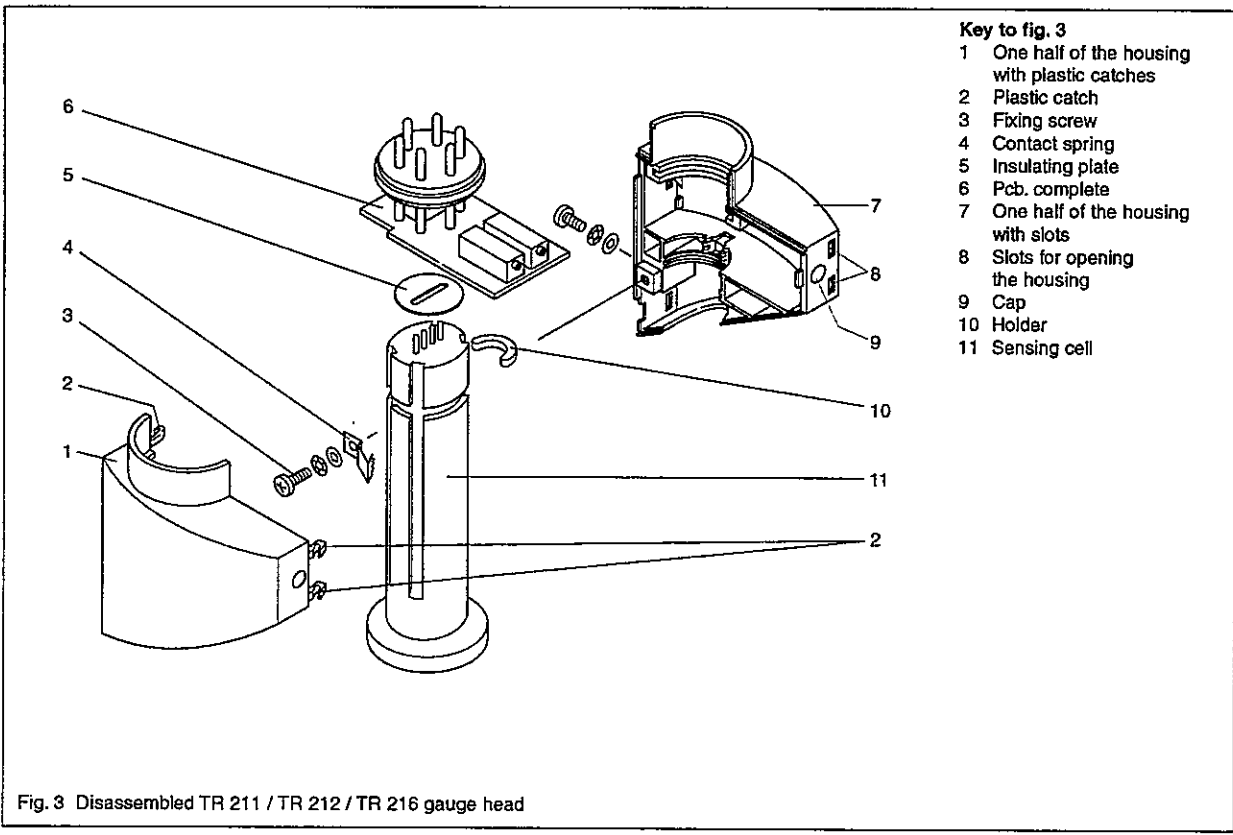


Fig. 3 Disassembled TR 211 / TR 212 / TR 216 gauge head

3.2 Service at LEYBOLD's

If you send a gauge head 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. To do so, you must use a preprinted form which we shall send to you upon request.

A copy of this form is printed at the end of the Operating Instructions: „Declaration of Contamination of Vacuum Equipment and Components“.

Either fasten this form at the gauge head or simply enclose it to the gauge head.

This declaration of contamination is necessary to comply with legal requirements and to protect our staff.

LEYBOLD must return any gauge head without a declaration of contamination to the sender's address.

4 Spare parts list

| | Cat. No. |
|--|----------|
| Replacement sensing cell TR 211 (DN 16 KF) | 157 75 |
| Replacement sensing cell TR 211 (1/8" NPT) | 896 34 |
| Replacement sensing cell TR 212 (DN 16 KF) | 158 53 |
| Replacement sensing cell TR 216 (DN 16 KF) | 157 77 |



Declaration of Contamination of Vacuum Equipment and Components

The repair and/or service of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer could refuse to accept any equipment without a declaration. This declaration can only be completed and signed by authorized and qualified staff.

1. Description of Vacuum Equipment and Components

• Equipment type/model: _____
• Code No.: _____
• Serial No.: _____
• Invoice No.: _____
• Delivery date: _____

2. Reason for Return

3. Condition of the Vacuum Equipment and Components

• Has the equipment been used?
yes no
• What type of pump oil/liquid was used?
- Is the equipment free from potentially harmful substances?
yes no (Go to Section 5)
no (Go to Section 5)

4. Process related Contamination of Vacuum Equipment and Components:

• toxic
• corrosive
• explosive *)
• biological hazard *)
• radioactive *)
• other harmful substances
yes no
yes no
yes no
yes no
yes no
yes no

*) Vacuum equipment and components which have been contaminated by biological explosive or radioactive substances, will not accept any further written evidence of decontamination!

Please list all substances, gases and by-products which may have come into contact with the equipment:

| Trade name Product name Manufacturer | Chemical name (or Symbol) | Dangerous material class | Measures if spillage | Fits all in case of human contact |
|--|------------------------------|-----------------------------|-------------------------|--------------------------------------|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

5. Legally Binding Declaration

I hereby declare that the information supplied on this form is complete and accurate. The despatch of the contaminated vacuum equipment and components will be in accordance with the appropriate regulations covering Packaging, Transportation and Labelling of Dangerous Substances.

Name of organisation or company: _____

Address: _____

Tel.: _____

Fax: _____

Name: _____

Job title: _____

Date: _____

Post code: _____

Company stamp: _____

Legally binding signature: _____

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