

THERMOVAC Transmitter

TTR 91 R

Operating Manual 300710168_002_C1

**Part Number:
230049V01**

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0 Safety Information

0.1 Symbols used

The first two symbols identify other information in this manual that is essential or useful in achieving optimal performance from the transmitter. The last symbol below is used throughout this manual to further define the safety concerns associated with the product.



Critical

Failure to read message could result in damage to the equipment.



Attention

Calls attention to important procedures, practices or conditions.



Caution

Refer to manual. Failure to read message could result in personal injury or serious damage to the equipment or both.

0.2 Personnel Qualifications



Skilled personnel

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

0.3 General safety information

The safety instructions should always be followed during installation and operation of the transmitter. Pass safety information to all users.

- Adhere to the applicable regulations and take the necessary precautions for the process media used. Consider possible reactions between the materials and the process media. Consider possible reactions (e.g. explosion) of the process media due to the heat generated by the product.
- Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Safety Precautions:



Critical

Corrosive Environments. The transmitter is not intended for use in corrosive environments. If you need further support please contact Leybold.



Caution

Do not use the TTR 91 R to measure the pressure of explosive or flammable gases or mixtures. The gauge contains a heated filament which normally operates at around 100°C above ambient temperature. The temperature of the filament can be substantially higher under fault conditions.

 **Critical**



Service and Repair. Do not substitute parts or modify instrument. Do not install substituted parts or perform any unauthorized modification to the instrument. Return the instrument to a Leybold Calibration and Service Centre for service and repair to ensure all of the safety features are maintained.

 **Critical**



DANGER: contaminated parts

Contaminated parts can be detrimental to health and environment. Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

 **Critical**



DANGER: Overpressure in the vacuum system

KF flange connections with elastomer seals (e.g. O-rings) cannot withstand pressures >2,5bar. Process media can thus leak and possibly damage your health.

 **Attention**



Caution: vacuum component

Dirt and damages impair the function of the vacuum component. When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

 **Attention**



CE marking The transmitter complies with European standards for CE marking. Refer to Declaration of Conformity in chapter 10 of this manual.

 **Caution**



Caution: dirt sensitive area

Touching the product or parts thereof with one's bare hands increases the desorption rate. Always wear clean, lint-free gloves and use clean tools when working in this area.

0.4 Liability and Warranty

Leybold assumes no liability and the warranty becomes null and void if the end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the product documentation

The end-user assumes the responsibility in conjunction with the process media used. Transmitter failures due to contamination are not covered by the warranty.

This manual provides installation, operation and maintenance instructions for the Leybold TTR 91 R. You must use the TTR 91 R as specified in this manual.

Read this manual before you install and operate the TTR 91 R

1 Unpacking

Before unpacking your transmitter, check all surfaces of the packing material for shipping damage. Inspect for visible damage. If found, notify the carrier immediately. Retain all packing materials for inspection. Do not use the TTR 91 R if it is damaged. If the TTR 91 R is not to be used immediately, replace the protective covers. Store the TTR 91 R in suitable conditions as described in Technical Data section.

Please be sure that your transmitter package contains these items:

- 1 pcs. TTR 91 R
- 1 pcs. German short form manual (P/N: 300710168_001_C0)
- 1 pcs. English short form manual (P/N: 300710168_002_C0)

If any items are missing, please contact Leybold.

2 Description

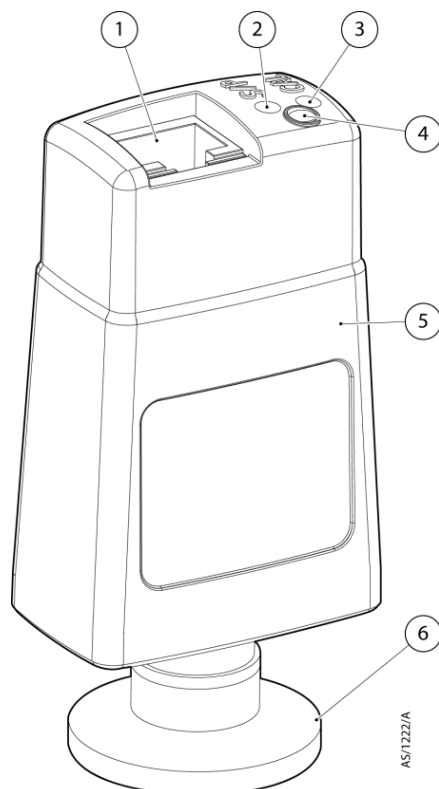
The TTR 91 R is a Pirani gauge which measures vacuum pressures in the range 5×10^{-4} mbar to 1000 mbar. It operates using the principle of thermal conductivity in which the rate of heat loss from a heated filament is dependent on the pressure of gas surrounding the filament.

The TTR 91 R THERMOVAC transmitters can be used in a variety of applications as standalone units or with Graphix controllers (P/N: 230680V01, 230681V01, 230682V01) and the Display controllers (P/N: 230001, 230024, 230025). All THERMOVAC transmitters are backward compatible with Graphix, Display and Center controllers.

A general view of the gauge is shown below. The gauge features a detachable tube which allows a replacement to be fitted in the event of contamination or failure of the filament. There are two push-button switches on the top of the gauge. The switch labelled "CAL" is used for atmosphere and vacuum calibration and the switch labelled "S/P" is used to adjust the set-point threshold.

The transmitters have one programmable set-point (transistor output) which can be used for process control, for example interlocking valves or pumps. The analogue voltage output can be interfaced to external analogue equipment for pressure readout or controlling.

General view of the TTR 91 R



- 1 Electrical connector
- 2 Set-point button
- 3 CAL button
- 4 Status LED
- 5 Electronics housing
- 6 Vacuum flange

2.1 Technical data

Mechanical data

Dimensions	Refer to the next page
Mass	85 g
Internal volume of tube	5 cm ³
Enclosure rating	IP40

Performance, operating and storage conditions

Displayed pressure range	5×10 ⁻⁴ to 1000 mbar
Accuracy	typically ± 15 % at < 100 mbar
Ambient temperature	
Operation	5 to 60 °C
Storage	-30 to +70 °C
Bakeout	150 °C (with electronics housing removed)
Humidity	80 % RH up to 31 °C decreasing linearly to 50 % RH at 40 °C and above
Maximum altitude	3000 m (indoor use only)
Maximum internal pressure	10 bar absolute (9 bar gauge)
Filament temperature	100 °C above ambient

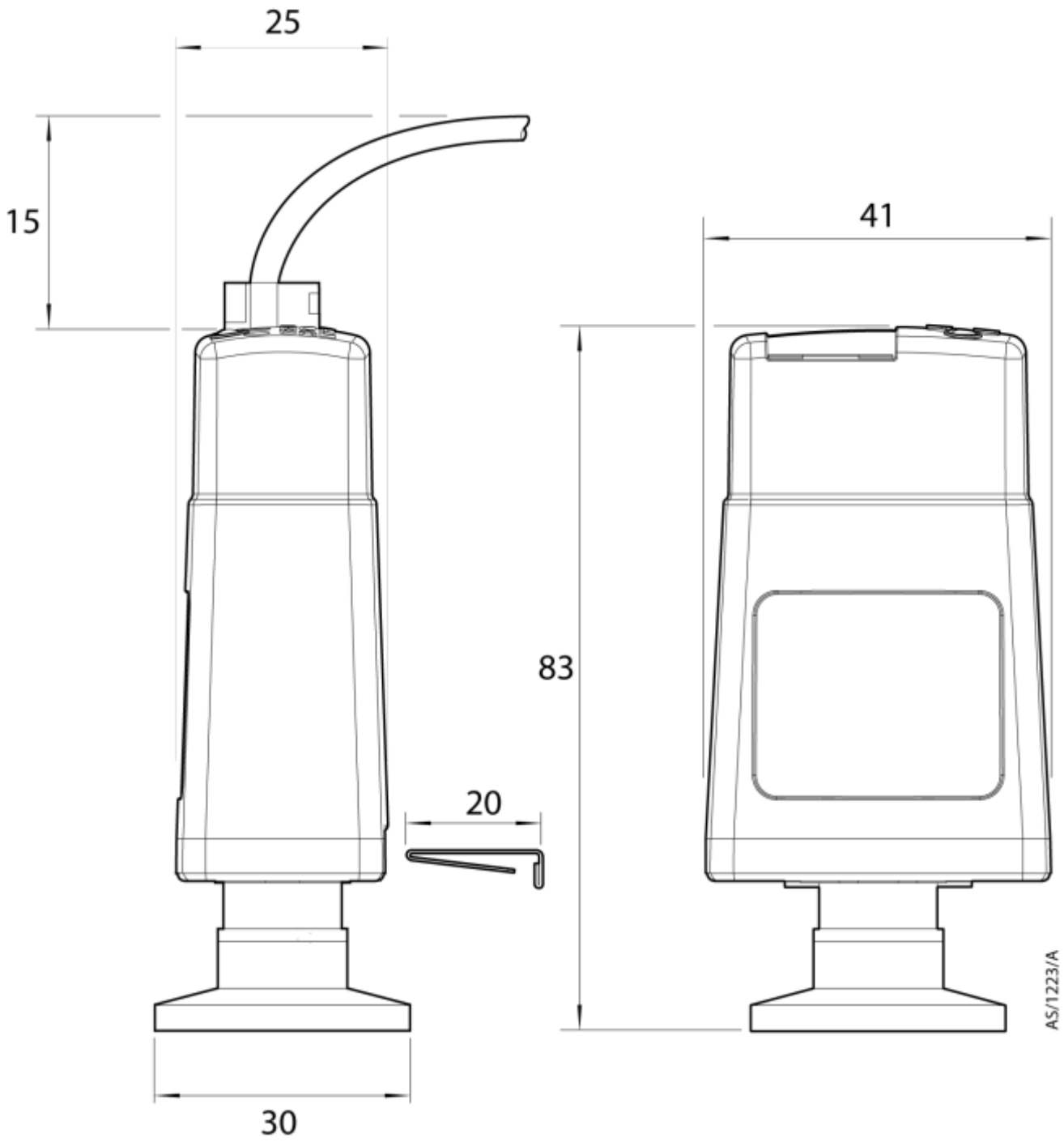
Materials exposed to vacuum

Filament	Tungsten / Rhenium
Tube	Stainless Steel 316L & 304L
Filter	Stainless Steel
Other	Glass, Ni, NiFe, Stainless Steel

Electrical data

Supply voltage	
nominal	15 to 30 V d.c.
minimum	13.5 V
maximum	32 V
Maximum power consumption	1 W
Max inrush current	150 mA
Electrical connector	FCC68 / RJ45 8-way
Pressure output	
Sensor output	1.9 to 10.0 V
Sensor fail	0.5 V
Min load impedance	10 kΩ
Max output current	1 mA
Set-point	
Adjustment range	1.4 to 10.0 V
Hysteresis	500 mV
Max external load rating	30 V d.c., 100 mA
Gauge identification resistance	27 kΩ

Dimensions (mm)



AS/1223/A

2.2 Accessories and replacement part numbers

Part	Part no.
TTR 91 R DN16 KF	230049V01
Replacement tube	
TTR 91 R DN16 KF	E02601801
Operating Units	
Display One	230001
Display Two	230024
Display Three	230025
Graphix One	230680V01
Graphix Two	230681V01
Graphix Three	230682V01
Cables	
Cables Type A 5 Meter	12426
Cables Type A 10 Meter	230012
Cables Type A 15 Meter	12427
Cables Type A 20 Meter	12428
Cables Type A 30 Meter	12429
Cables Type A 50 Meter	12431
Cables Type A 75 Meter	12432
Cables Type A 100 Meter	12433
Accessories	
Centering Rings (Stainless Steel 1.4305) with O-Ring, DN16 KF	88346
Centering Rings (Stainless Steel) with Sintered Metal Filter, DN16 KF	88351
Clamping Rings (Aluminum), DN16 KF	18341
Centering Ring with fine filter DN 16 ISO-KF	88396

2.3 Calibration service

A calibration service is available for all Leybold gauges. Calibration is by comparison with reference gauges, traceable to National Standards. Contact Leybold for details.

3 Installation (mechanical)



Caution

Do not use the TTR 91 R for safety critical applications. The TTR 91 R is not intended to be fail-safe

The TTR 91 R can be mounted in any orientation however the gauge tubes are individually factory calibrated whilst vertical. For correct pressure indication in your chosen gauge orientation, the gauge should be recalibrated at atmospheric pressure. Leybold recommends mounting the gauge tube vertical in order to minimise the build up of process particulates and condensable vapours within the gauge.

For optimum accuracy it is recommended that both the atmosphere and vacuum adjustment is carried out before use. Refer to the Maintenance section.

To connect the TTR91R to your vacuum system use an 'O' ring / centring-ring to connect a TTR91R with a DN16 ISO-KF flange to a similar flange on the vacuum system.

To connect to a Leybold controller use a shielded cable which is terminated in suitable RJ45 connectors. These cables are available from Leybold (Cable Type A).

The TTR91R is compatible with the GRAPHIX and DISPLAY controllers from Leybold. The controllers will automatically recognize the gauge and display the measured pressure.

4 Installation (Electrical)

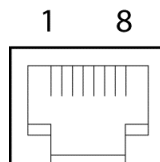


Attention

Do not make any connection to the gauge identification pin (pin 4) as this may cause the gauge to malfunction.

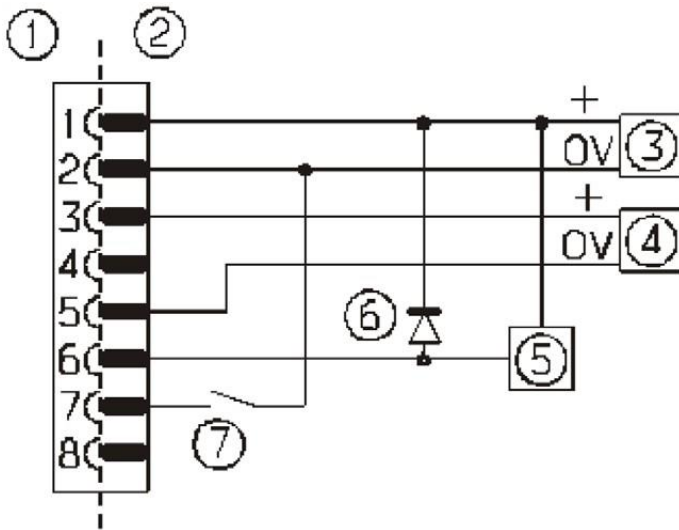
A schematic diagram of the recommended electrical connections to the TTR 91 R is shown below. The pins on the electrical connector are used as shown in the below table. Refer to the Technical Data section for more detailed specifications.

Pins on the TTR 91 R electrical connector



Pin number	Use
1	Electrical supply positive
2	Electrical supply ground (0 V)
3	Pressure measurement output signal
4	Gauge identification
5	Signal ground
6	Set-point output signal
7	Remote calibration input
8	Not connected

4.1 Recommended electrical connections



- 1 TTR 91 R electrical connector socket
- 2 Cable electrical connector plug
- 3 Electrical supply
- 4 Voltmeter
- 5 d.c. relay (optional)
- 6 Back EMF suppression diode (optional)
- 7 Remote calibration switch (optional)

Do not connect the electrical supply ground (pin 2) to the signal ground (pin 5). If you do, the TTR 91 R output signal will be inaccurate.

When using the TTR 91 R in an electrically noisy environment you should ensure that your measuring equipment is adequately immune to interference. All Leybold controllers have adequate immunity.

The set-point output on pin 6 is an active low open-collector transistor suitable for driving a d.c. relay or control logic. If you connect a relay you must use a suppression diode, to protect the gauge from transient voltages generated when the relay is switched off.

Make a connection to pin 7 if you require remote calibration. Momentarily (>50ms) connect pin 7 to pin 2 (ground) to automatically adjust the atmosphere or vacuum reading. Refer to the Maintenance section for the correct procedure

5 Operation

5.1 Pressure measurement

When the TTR 91 R is connected to a power supply the status LED will turn amber for approximately 2 seconds. The status LED will then turn green if the gauge is operating correctly or red if an error is detected. Refer to the fault finding guide.

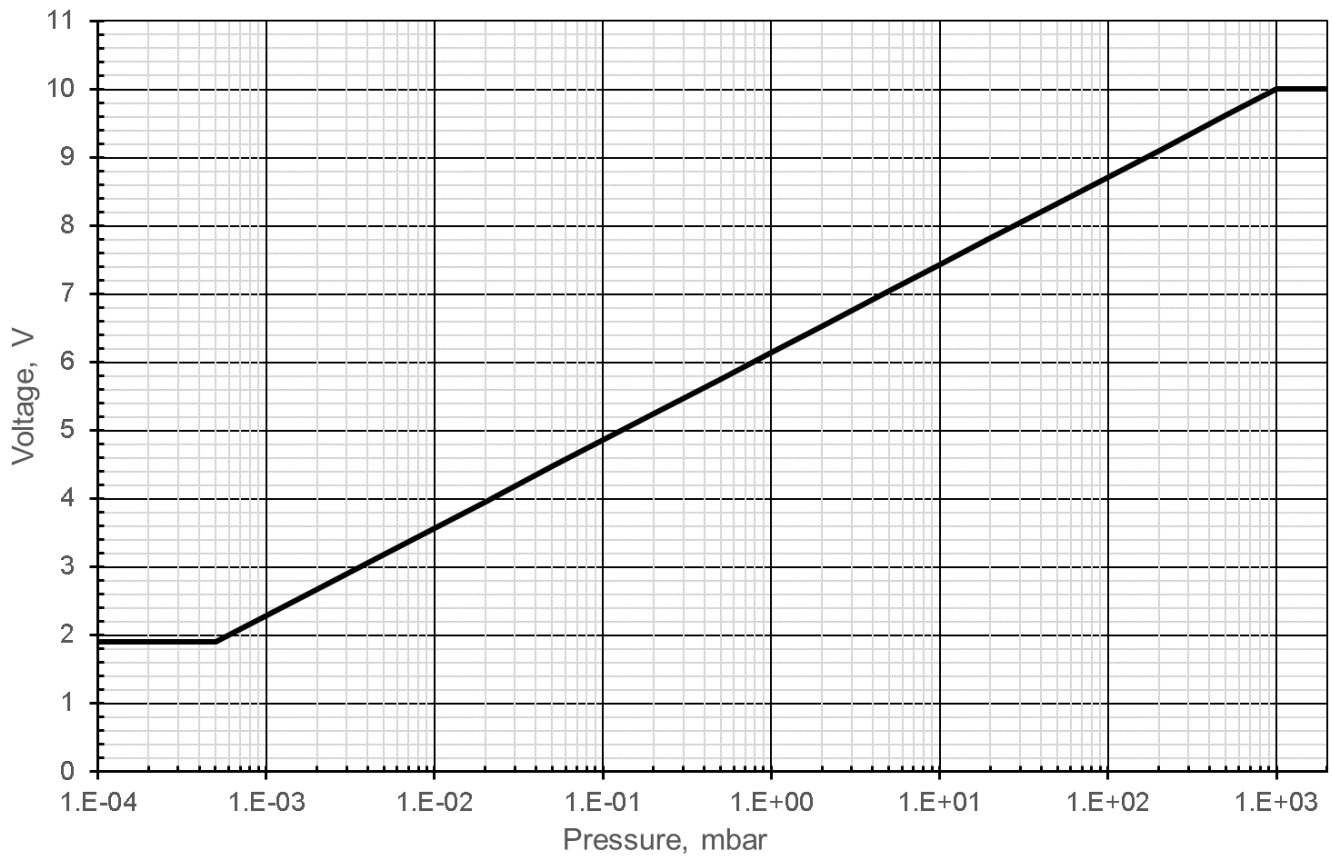
If the gauge is connected to a Leybold controller the display will indicate the measured pressure.

The TTR 91 R provides a voltage output which is a function of pressure. The output voltage scales with 1.296V dc / decade.

Conversion formulae:

$$P_{mbar} = 10^{(V-6.143)/1.286} \qquad V = \log_{10}(P_{mbar}) \times 1.286 + 6.143$$

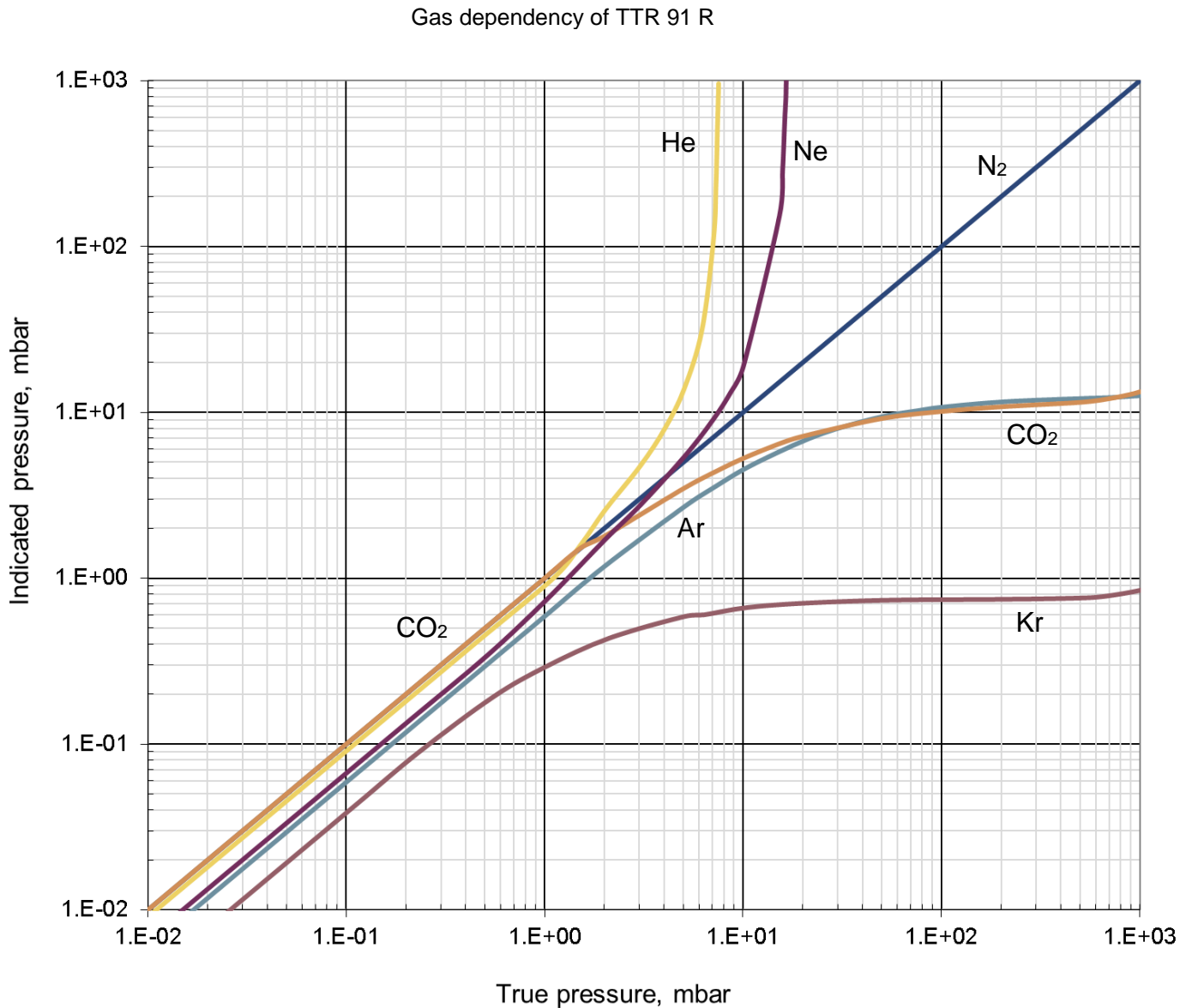
Voltage pressure conversion for TTR 91 R



P (mbar)	Voltage (V)	P (mbar)	Voltage (V)	P (mbar)	Voltage (V)
5.00E-04	1.898	7.00E-02	4.658	9.00E+00	7.370
6.00E-04	2.000	8.00E-02	4.732	1.00E+01	7.429
7.00E-04	2.086	9.00E-02	4.798	1.50E+01	7.655
8.00E-04	2.160	1.00E-01	4.857	2.00E+01	7.816
9.00E-04	2.226	1.50E-01	5.083	3.00E+01	8.043
1.00E-03	2.285	2.00E-01	5.244	4.00E+01	8.203
1.50E-03	2.511	3.00E-01	5.471	5.00E+01	8.328
2.00E-03	2.672	4.00E-01	5.631	6.00E+01	8.430
3.00E-03	2.899	5.00E-01	5.756	7.00E+01	8.516
4.00E-03	3.059	6.00E-01	5.858	8.00E+01	8.590
5.00E-03	3.184	7.00E-01	5.944	9.00E+01	8.656
6.00E-03	3.286	8.00E-01	6.018	1.00E+02	8.715
7.00E-03	3.372	9.00E-01	6.084	1.50E+02	8.941
8.00E-03	3.446	1.00E+00	6.143	2.00E+02	9.102
9.00E-03	3.512	1.50E+00	6.369	3.00E+02	9.329
1.00E-02	3.571	2.00E+00	6.530	4.00E+02	9.489
1.50E-02	3.797	3.00E+00	6.757	5.00E+02	9.614
2.00E-02	3.958	4.00E+00	6.917	6.00E+02	9.716
3.00E-02	4.185	5.00E+00	7.042	7.00E+02	9.802
4.00E-02	4.345	6.00E+00	7.144	8.00E+02	9.876
5.00E-02	4.470	7.00E+00	7.230	9.00E+02	9.942
6.00E-02	4.572	8.00E+00	7.304	1.00E+03	10.000

5.2 Gas dependency

The TTR 91 R is calibrated for use in nitrogen, and will read correctly with dry air, oxygen and carbon monoxide. For any other gas type a conversion is required in order to obtain the correct pressure reading. The graph below shows the conversion for 6 common gases: nitrogen, argon, carbon dioxide, helium, krypton and neon.



For pressures below 1 mbar a simple calibration factor can be used to correct for different gas types. Gas Calibration Factors (GCFs) for common gases are shown below.

True pressure = GCF x indicated pressure

Gas calibration factors below 1 mbar

Gas	GCF
He	1.1
Ne	1.5
N ₂	1.0
Ar	1.7
CO ₂	1.0
Kr	2.6

5.3 Set-point adjustment



Attention

When the 'S/P' button is pushed the gauge output will change. Do not push the 'S/P' button to adjust the set- point if the change in output could cause a malfunction of your system.

Note: If you use a Leybold Controller the TTR 91 R set-point is not used.

To read the pressure at which the set-point output turns on, push the "S/P" button with an appropriate tool. The signal output of the gauge will change to indicate the set-point threshold for three seconds after which the output will return to normal.

The set-point has a fixed hysteresis of 500 mV. When the measured pressure falls below the set-point pressure the transistor output changes to ON (closed). The transistor output will turn OFF when the measured pressure rises to 500 mV above the set-point pressure. An external relay connected as shown in section 4 will turn on when the pressure falls below the set-point and turn off when the pressure rises to 500 mV above the set-point.

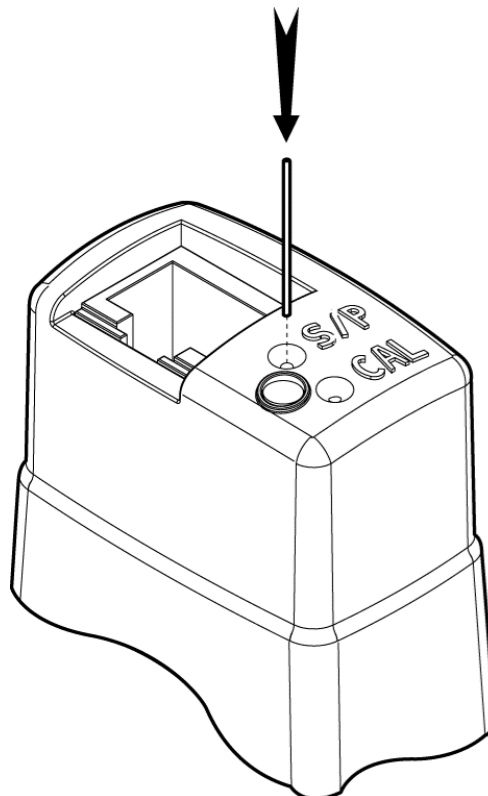
To adjust the set-point threshold push the "S/P" button and hold it down for more than three seconds. The threshold value will increase steadily. Release the button when you reach the required value. To make finer adjustment release the button just before the required value is reached and immediately push the button as many times as required.

Each time you push the button the threshold value will increase by 10 mV. If during adjustment the threshold reaches the maximum value (10.0 V) it will jump to the minimum (1.4 V) and increase again.

If you do not need to use the set-point or if you require the set-point to be permanently off, you can adjust the threshold to 1.4 V. This will ensure that the set-point does not operate. The TTR 91 R is shipped from the factory with the threshold set to 1.4 V.

The set-point can also be used to indicate that the gauge is operating correctly. If you adjust the threshold to 10.0 V then the set-point output will be ON as long as the gauge is operating correctly and will turn OFF if an error is detected

Adjusting the set-point



5.4 Error monitoring

If an error occurs during operation of the TTR 91 R then the status LED will turn red to indicate an error and the output voltage will change to indicate an error condition. Error voltages are shown in the table below. The set-point will be disabled as soon as an error is detected. Refer to the FAQ section.

Error indication	
Error condition	Output (V)
Broken filament or tube removed	0.5
Calibration error	0.5

5.5 Bakeout

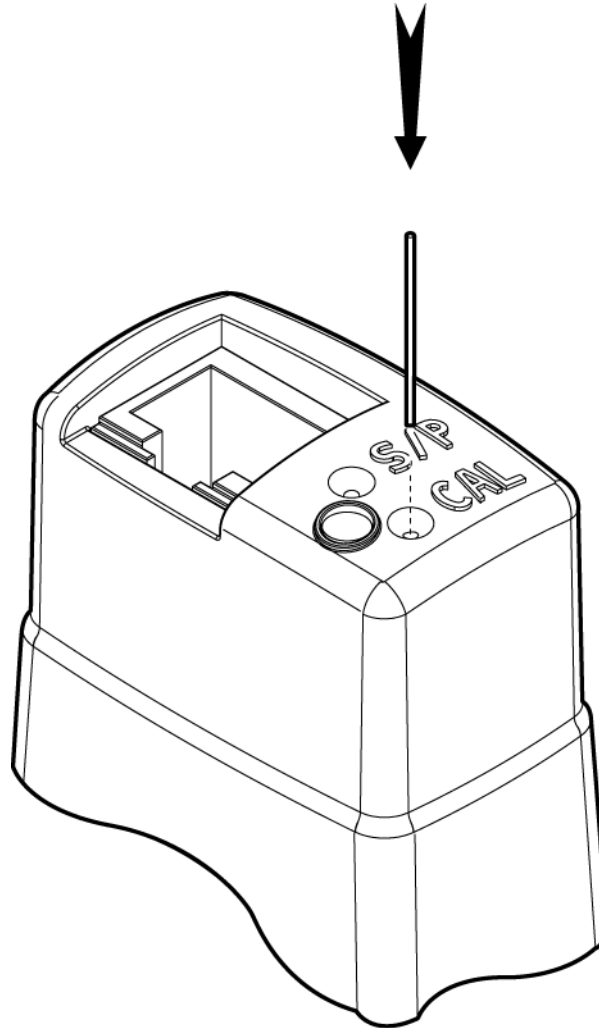
In some UHV applications it is desirable to bake the vacuum system components in order to achieve a lower base pressure. The tube of the TTR 91 R can be baked to 150°C, but the electronics housing must be removed. Referring to the figure in section 6.7, remove the electronics housing. When baking the tube on your system, do not exceed 150°C. Always allow the tube to cool before refitting the electronics housing.

6 Maintenance

6.1 Atmosphere and vacuum adjustment

Every TTR 91 R is individually adjusted before shipment, however thermal conductivity gauges can drift with time or as contamination builds up on the filament. Use the procedures outlined below to adjust the atmosphere and vacuum settings of the gauge. The frequency with which they should be repeated will vary depending on the level and nature of the contamination associated with the process.

Adjustment of TTR 91 R



6.2 Atmosphere adjustment

1. Switch on the power supply to the TTR 91 R and allow it to operate at atmospheric pressure for at least 10 minutes. Ensure that the green status LED is lit.
2. Press the 'CAL' button. The status LED turn amber and the gauge will automatically adjust to read atmospheric pressure. Do not hold the 'CAL' button down for longer than 5 seconds (see 'Adjustment for new tube' below).

6.3 Vacuum adjustment

1. Reduce the system pressure to 1×10^{-4} mbar (or below).
2. Allow the gauge to operate for at least 10 minutes.
3. Momentarily press the 'CAL' button. Do not hold the 'CAL' button down for longer than 5 seconds (this would start the 'Adjustment for new tube', as described below). The status LED will turn amber and the gauge will automatically adjust to read vacuum.

6.4 Remote adjustment

The atmosphere and vacuum adjustments can be performed remotely using a switch connected as shown in the Figure in section 4.1. Follow the procedure described above, but momentarily close the remote switch instead of using the 'CAL' button on the gauge.

6.5 Adjustment for new tube

If a replacement tube is fitted to the gauge it will be necessary to adjust the gauge to match the new tube. Note that this is not required unless a new tube is fitted, and it is always necessary to perform a vacuum adjustment afterwards.

1. Switch on the power supply to the TTR 91 R.
2. With the gauge at atmospheric pressure, press the 'CAL' button and hold it down for longer than 5 seconds. The status LED will begin to flash red / green alternately and the gauge will automatically adjust to match the new tube. This may take several seconds.
3. Allow the gauge to operate at atmospheric pressure for at least 10 minutes and then repeat step 2.
4. It is now necessary to perform the vacuum adjustment as described above.

6.6 Replace the gauge tube

If the gauge tube has become severely contaminated so that atmosphere or vacuum adjustment cannot be achieved, or if the filament is broken, then you can fit a replacement tube to the gauge.

Refer to the below figure and follow this procedure to replace the gauge tube.

Unplug the electrical cable, vent the vacuum system to atmospheric pressure and remove the gauge from the vacuum system.

Pull the retaining clip from side of gauge.

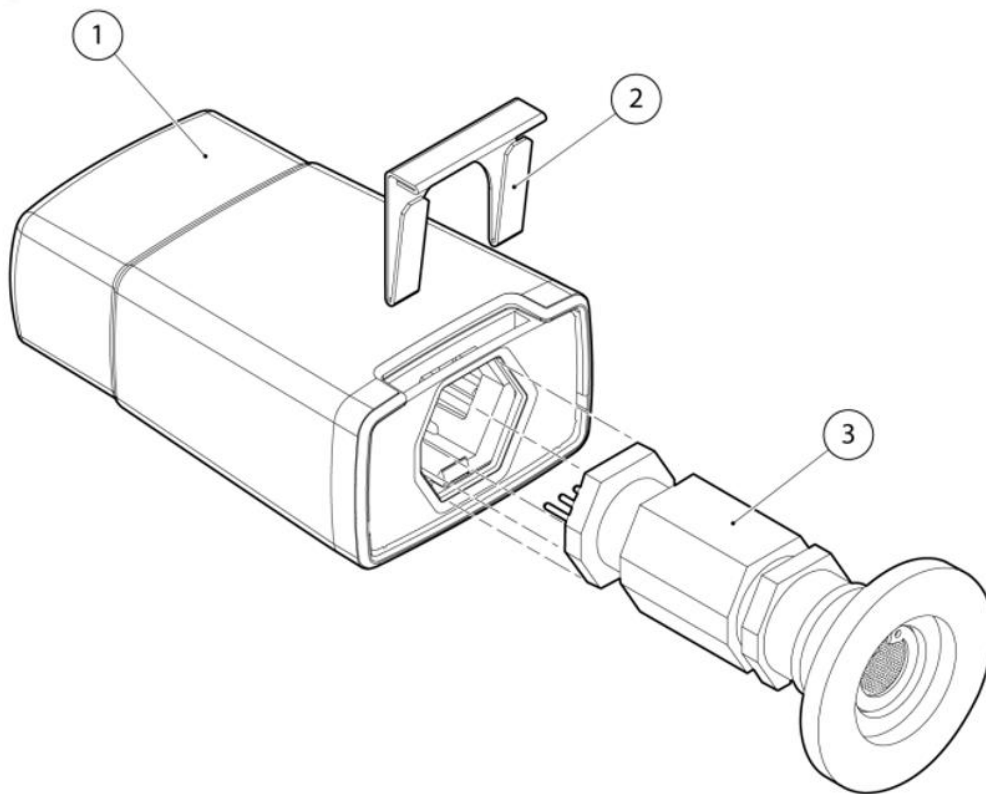
Pull the tube from the electronics housing.

Fit the replacement tube into electronics housing, noting the correct alignment.

Refit the retaining clip.

Whenever a new tube is fitted it is necessary to adjust the gauge to match the new tube. Refer to 'Adjustment for new tube' above.

Replacement of gauge tube



- 1 Electronic housing
- 2 Retaining clip
- 3 Gauge tube

7 FAQ (Frequently Asked Questions)

Fault finding Guide

Symptom	Possible cause	Remedy
LED not lit	Incorrect electrical supply voltage. Supply polarity reversed.	Check electrical supply and connections
Pressure reading incorrect	Vacuum leak	Leak check vacuum system
	Tube has drifted and requires adjustment	Perform the atmosphere and vacuum adjustments
	Tube contaminated	Replace the tube
Gauge indicates error voltage	Adjustment has been attempted at an inappropriate pressure	Repeat the adjustment but make sure that the pressure is at atmosphere or good vacuum
	New tube has been fitted	Perform 'Adjustment for new tube'
	Tube has drifted outside permissible limits and can no longer be adjusted	Replace the tube
	Tube is missing	Fit the tube and remove then re- insert the electrical connector
	Filament is broken	Replace the tube

8 Storage and disposal

Dispose of the TTR 91 R and any components safely in accordance with all local and national safety and environmental requirements.

Particular care must be taken if the TTR 91 R has been contaminated with dangerous process substances



Attention

For the benefit of the environment, at the end of life of the transmitter, it should not be disposed in the normal unsorted waste stream. It should be deposited at an appropriate collection point or facility to enable recovery or recycling.

9 Declaration of Contamination

Safety information on contamination of compressors, vacuum pumps and components.

Scope:

Every employer (user) is held responsible for the health and safety of his employees. This also applies to service personnel performing maintenance work either at the premises of the user or the service company in charge.

By means of the declaration attached the contractor is to be informed about any possible contamination of the compressor, vacuum pump or component sent in for servicing. Based on this information the contractor will be able to take the necessary safety precautions.

Preparation before dispatch

Before shipping any parts, the user must complete the following declaration and add it to the dispatch papers. All dispatch instructions laid down in the manual must be followed e.g.:

- Drain all service fluids
- Remove filter elements
- Seal all openings airtight
- Pack / handle appropriately
- Attach the declaration of contamination outside of the packaging

Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, vacuum pumps and components will be carried out only if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer can refuse to accept any equipment without a declaration.

A separate declaration has to be completed for each single component.

This declaration may be completed and signed only by authorized and qualified staff.

Customer/Dep./Institute : _____ Address : _____ _____ Person to contact: _____ Phone : _____ Fax: _____ End user: _____	Reason for return: <input checked="" type="checkbox"/> applicable please mark Repair: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty Exchange: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty <input type="checkbox"/> Exchange already arranged / received Return only: <input type="checkbox"/> rent <input type="checkbox"/> loan <input type="checkbox"/> for credit Calibration: <input type="checkbox"/> DKD <input type="checkbox"/> Factory-calibr. <input type="checkbox"/> Quality test certificate DIN 55350-18-4.2.1
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A. Description of the Leybold product: Material description : _____ Catalog number: _____ Serial number: _____ Type of oil (ForeVacuum-Pumps) : _____	Failure description: _____ Additional parts: _____ Application-Tool: _____ Application- Process: _____
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B. Condition of the equipment <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;"></td> <td style="width:10%; text-align: center;">No¹⁾</td> <td style="width:10%; text-align: center;">Yes</td> <td style="width:10%; text-align: center;">No</td> <td style="width:10%;"></td> </tr> <tr> <td>1. Has the equipment been used</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">→</td> </tr> <tr> <td>2. Drained (Product/service fluid)</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>3. All openings sealed airtight</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> <tr> <td>4. Purged</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table> If yes, which cleaning agent _____ and which method of cleaning _____ ¹⁾ If answered with "No", go to D. ←		No ¹⁾	Yes	No		1. Has the equipment been used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	→	2. Drained (Product/service fluid)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		3. All openings sealed airtight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		4. Purged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Contamination : <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:70%;"></td> <td style="width:10%; text-align: center;">No¹⁾</td> <td style="width:10%; text-align: center;">Yes</td> </tr> <tr> <td>toxic</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>corrosive</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>flammable</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>explosive ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>radioactive ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>microbiological ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>other harmful substances</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		No ¹⁾	Yes	toxic	<input type="checkbox"/>	<input type="checkbox"/>	corrosive	<input type="checkbox"/>	<input type="checkbox"/>	flammable	<input type="checkbox"/>	<input type="checkbox"/>	explosive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>	radioactive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>	microbiological ²⁾	<input type="checkbox"/>	<input type="checkbox"/>	other harmful substances	<input type="checkbox"/>	<input type="checkbox"/>
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C. Description of processed substances (Please fill in absolutely) 1. What substances have come into contact with the equipment ? Trade name and / or chemical term of service fluids and substances processed, properties of the substances According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive) <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:5%; text-align: center;">X</td> <td style="width:35%;">Tradename:</td> <td style="width:55%;">Chemical name:</td> </tr> <tr> <td></td> <td>a)</td> <td></td> </tr> <tr> <td></td> <td>b)</td> <td></td> </tr> <tr> <td></td> <td>c)</td> <td></td> </tr> <tr> <td></td> <td>d)</td> <td></td> </tr> </table>	X	Tradename:	Chemical name:		a)			b)			c)			d)		<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;"></td> <td style="width:10%; text-align: center;">No</td> <td style="width:10%; text-align: center;">Yes</td> <td style="width:10%;"></td> </tr> <tr> <td>2. Are these substances harmful ?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">←</td> </tr> <tr> <td>3. Dangerous decomposition products when heated ?</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> </tr> </table> If yes, which ? _____		No	Yes		2. Are these substances harmful ?	<input type="checkbox"/>	<input type="checkbox"/>	←	3. Dangerous decomposition products when heated ?	<input type="checkbox"/>	<input type="checkbox"/>	
X	Tradename:	Chemical name:																										
	a)																											
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2. Are these substances harmful ?	<input type="checkbox"/>	<input type="checkbox"/>	←																									
3. Dangerous decomposition products when heated ?	<input type="checkbox"/>	<input type="checkbox"/>																										

²⁾ Components contaminated by microbiological, explosive or radioactive products/substances will not be accepted without written evidence of decontamination.

D. Legally binding declaration

I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorized person (block letters) : _____

_____ Date

_____ signature of authorized person

firm stamp

10 EU Declaration of Conformity



EU Declaration of Conformity

The manufacturer:

Leybold GmbH
Bonner Strasse 498
D-50968 Köln
Germany

herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EU Directives. This declaration becomes invalid if modifications are made to the product without agreement of Leybold GmbH.

Product designation:

THERMOVAC Transmitter

Type designation:

TTR 91 R

Part numbers:

230049V01

The products comply with the following Directives:

Electromagnetic Compatibility (2014/30/EU)

Directive RoHS (2011/65/EU)

The following harmonized standards have been applied:

- | | |
|-----------------|---|
| EN 61010-1:2010 | Safety requirements for electrical equipment for measurement, control, and laboratory use — Part 1: General requirements |
| EN 61326-1:2013 | Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements
Emissions: Group 1, Class B
Immunity: Industrial electromagnetic environment |
| EN 50581:2012 | Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances |

Documentation officer:


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Herbert Etges
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F: +49(0)221 347 1250
documentation@leybold.com

Eastbourne, 16/01/2018

Larry Marini
Senior Technical Manager

Material Declaration

In accordance with the requirements of the Chinese regulatory requirement on the Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products Order No. 32 (also known as 'China RoHS2') and SJ/T 11364 Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products:

Product	Product Label	Meaning
230049V01 TTR 91 R		This product contains hazardous substances in at least one of the homogeneous materials used which are above the limit requirement in GB/T 26572 as detailed in the declaration table below. These parts can safely be used for the environmental protection use period as indicated.

材料成分声明

Materials Content Declaration

部件名称 Part name	有害物质 Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印刷电路组件 (PCA) Printed Circuit Assembly (PCA)	X	O	O	O	O	O
电缆/电线/连接器 Cable/wire/ connector	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。
O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

NOTE: This product is EU RoHS complaint, the following Exemptions apply:

6(c) Copper alloy containing up to 4% **lead** by weight

7(c) I Electrical and electronic components containing **lead** in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound

15 **Lead** in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages

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