



OPTIBAR DP 7060 Supplementary Instructions

Differential pressure transmitter

Category

ATEX II 1/2G, 2G Ex db ia IIC T6...T1 Ga/Gb, Gb

IECEx Ex db ia IIC T6...T1 Ga/Gb, Gb

Housing

Aluminium: Single chamber, double chamber

Stainless steel (precision casting): Single chamber, double chamber



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1.1 General notes

These safety instructions are valid for the differential pressure transmitter OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with integrated electronics Z (4...20 mA), H (4...20 mA/HART®), A (4...20 mA/HART® with SIL qualification), P (Profibus PA), F (Foundation Fieldbus) according to the EU type-examination certificate TÜV 16 ATEX 169551 X with the 1st supplement (certificate number on the nameplate).

The differential pressure-based measuring devices OPTIBAR DP 7060 C VGK7*A/W/V E/Z/6/7 are also used for differential pressure, level, flow, density and interface measurement in hazardous areas.

The measured products can also be combustible liquids, gases, mist or vapours.

The OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 consist of an "Ex-d"-electronics housing with integrated electronics module, a process connection element and a sensor, the pressure measuring cell with optionally connected diaphragm seal. As an option, the display and adjustment module can also be mounted.

The OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring category 1/2G or 2G equipment.

When the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are installed and operated in hazardous areas, the general Ex installation regulations EN 60079-14 as well as these safety instructions must be observed.

The operating instructions as well as the installation regulations and standards that apply for explosion protection of electrical systems must always be observed.

The installation of potentially explosive systems must always be carried out by qualified personnel.

1.2 EU Conformity

The manufacturer declares with the EU declaration of conformity on his own responsibility conformity with the protection goals of directive 2014/34/EU acc. to EN 60079-0, EN 60079-1, EN 60079-11 and EN 60079-26 for use in hazardous areas with gas.

The EU type test certificate of the TÜV NORD CERT GmbH forms the basis of the EU declaration of conformity:

TÜV 16 ATEX 169551 X

The "X" after the certificate number refers to special conditions for safe use of the device, which have been listed in these instructions.

If needed the EU type examination certificate can be downloaded from the manufacturer's website.

1.3 Approval according to the IECEx scheme

Conformity with IECEx standards was tested in accordance with the IECEx Certification Scheme for Explosive Atmospheres acc. to IEC 60079-0, IEC 60079-1, IEC 60079-11 and IEC 60079-26.
The number of the IECEx certificate is:

IECEx TUN 16.0035X

The "X" after the certificate number refers to special conditions for safe use of the device, which have been listed in these instructions.

If needed, the IEC certificate can be downloaded from the manufacturer's website.

1.4 Safety instructions

Assembly, installation, start-up and maintenance may only be performed by personnel trained in explosion protection!



CAUTION!

The operator or his agent is responsible for observing any additional standards, directives or laws if required due to operating conditions or place of installation. This applies in particular to the use of easily detachable process connections when measuring flammable media.

2.1 Description of device

The differential pressure transmitter of the OPTIBAR 7060 series is designed to measure the pressure of vaporous, gaseous and liquid media. The differential pressure transmitters are supplied as standard with 2-wire, 4...20 mA signal outputs.

2.2 Marking

2.2.1 Marking for ATEX

The marking of the entire device is on the housing, where the following identification plate can be found.

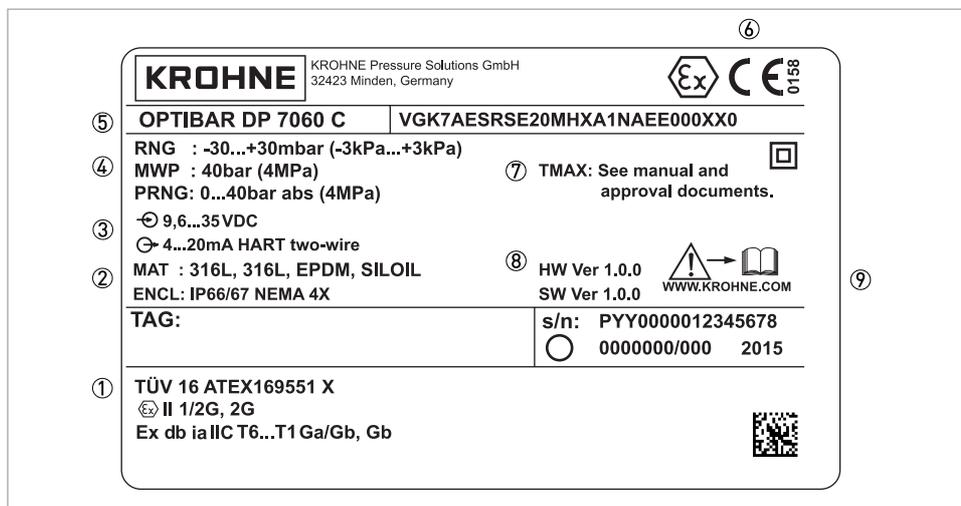


Figure 2-1: Example for an ATEX nameplate for a OPTIBAR DP 7060

- ① Approvals and Ex-designation
- ② Ingress protection and material of wetted parts
[Diaphragm, process connections, sealing and fill fluid]
- ③ Electronics power supply and signal output
- ④ Nominal range
Allowable process pressure
- ⑤ Product name and type code
- ⑥ Marking of notified body and CE marking
- ⑦ Permissible temperature range
- ⑧ Hardware and Software version
- ⑨ Observe the installation and operating instructions

2.2.2 IECEx marking

The marking of the entire device is on the housing, where the following identification plate can be found.

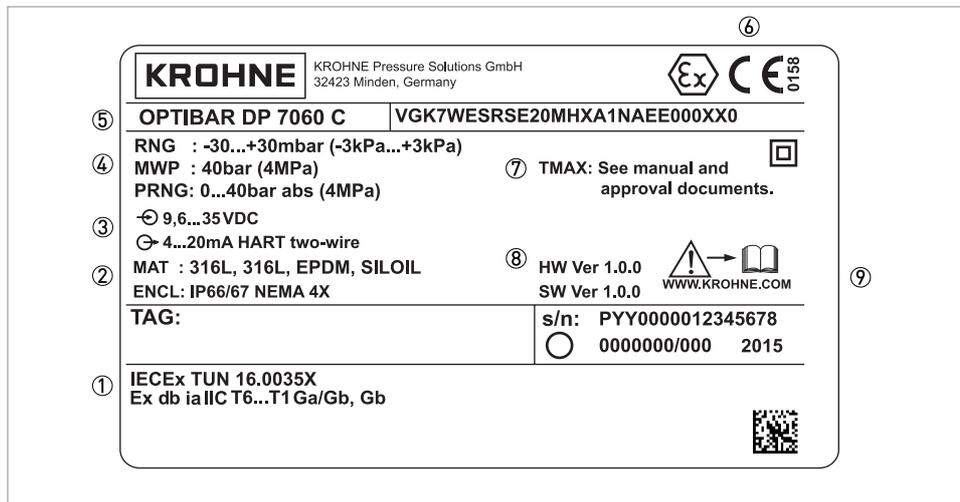


Figure 2-2: Example for an IECEx nameplate for a OPTIBAR DP 7060

- ① Approvals and Ex-designation
- ② Ingress protection and material of wetted parts
(Diaphragm, process connections, sealing and fill fluid)
- ③ Electronics power supply and signal output
- ④ Nominal range
Allowable process pressure
- ⑤ Product name and type code
- ⑥ CE marking
- ⑦ Permissible temperature range
- ⑧ Hardware and Software version
- ⑨ Observe the installation and operating instructions

2.3 Flammable products

Atmospheric conditions:

An explosive atmosphere is a mixture of air and flammable gases, vapours, mists or dusts under atmospheric conditions. It is defined by the following values

$$T_{\text{atm}} = -20...+60^{\circ}\text{C} / -4...+140^{\circ}\text{F} \text{ and } P_{\text{atm}} = 0.8...1.1 \text{ bar} / 11.6...15.9 \text{ psi.}$$

Outside of this range, for most mixtures no key figures are available for the ignition behaviour.

Operating conditions:

Outside of atmospheric conditions, the explosion protection according to directive 2014/34/EC (ATEX) – regardless of the zone assignment – is not applicable due to the lack of key safety data.

2.4 Device category

Category 1/2G equipment (EPL-Ga/Gb equipment)

The process connection element is installed in the separating wall, which separates areas in which equipment of category 2G or 1G are required. The electronics housing is installed in hazardous areas requiring equipment of category 2G. The sensor is installed in hazardous areas requiring equipment of category 1G.

Category 2G equipment (EPL-Ga equipment)

The devices are installed in hazardous areas requiring equipment category 2G.

2.5 Protection types

The pressure transmitter is designed in protection type flameproof enclosure with internal intrinsically safe circuits "d ia" according to EN 60079-1/EN 60079-11 and IEC 60079-1/IEC 60079-11, however the device does **NOT** require an intrinsically safe supply.

The marking according to ATEX is:

II 1/2G, 2G Ex db ia IIC T6...T1 Ga/Gb, Gb

The marking according to IECEx is:

Ex db ia IIC T6...T1 Ga/Gb, Gb

The marking contains the following information:	
II	Explosion protection, group II
G	Gas explosion protection
Ex db ia	Flameproof enclosure with internal intrinsically safe circuits "db ia"
IIC	Gas group, suitable for gas groups IIC, IIB and IIA
1/2	Equipment category 1/2
2	Equipment category 2
Ga/Gb	EPL, suitable for zone 0 / zone 1
Gb	EPL, suitable for zone 1
T6...T1	Temperature class, suitable for temperature classes T6 ... T1

2.6 Ambient temperature / temperature classes

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with integrated electronics Z (4 ... 20 mA), H (4 ... 20 mA/HART) or A (4 ... 20 mA/HART® with SIL qualification), P (Profibus PA), F (Foundation Fieldbus)

The maximum permissible ambient temperatures depending on the temperature classes are specified in the following tables.

Category 1/2G equipment

Temperature class	Ambient temperature range at the electronics (zone 1)	Media temperature range at the sensor (zone 0)
T1, T2, T3, T4	-40...+60°C / -40...+140°F	-40...+60°C / -40...+140°F
T5, T6	-40...+46°C / -40...+114.8°F	-40...+46°C / -40...+114.8°F

For applications requiring equipment category 1/2G, the process pressure of the media must be between 0.8...1.1 bar. If OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are operated at temperatures higher than those specified in the table above, please make sure by means of appropriate measures that there is no danger of ignition from the hot surface. The maximum permissible temperature of the electronics/housing should not exceed the values given in the table above. The application conditions in areas without hazardous mixtures are specified in the manufacturer information.

Category 2G equipment

Temperature class	Ambient temperature range at the electronics (zone 1)	Media temperature range at the sensor (zone 0)
T1, T2, T3, T4	-40...+60°C / -40...+140°F	-40...+60°C / -40...+140°F
T5, T6	-40...+46°C / -40...+114.8°F	-40...+46°C / -40...+114.8°F

If OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are operated at temperatures higher than those specified in the table above, please make sure by means of appropriate measures that there is no danger of ignition from the hot surface. The maximum permissible temperature of the electronics/housing should not exceed the values given in the table above. The application conditions in areas without hazardous mixtures are specified in the manufacturer information.

2.6.1 Temperature derating

Category 1/2G equipment

Temperature class	Process temperature range at the measuring cell	Ambient temperature range at the housing and at the electronics
T1...T4	-40...55°C / -40...131°F -40...85°C / -40...185°F ①	-40...60°C / -40...140°F
	-40...72°C / -40...161.6°F -40...85°C / -40...185°F ①	-40...50°C / -40...122°F
	-40...85°C / -40...185°F -40...85°C / -40...185°F ①	-40...40°C / -40...104°F
T5...T6	-40...46°C / -40...114.8°F -40...55°C / -40...131°F ①	-40...46°C / -40...114.8°F

① Only permitted with separate sensor unit

Category 2G equipment

Temperature class	Process temperature range at the measuring cell	Ambient temperature range at the housing and at the electronics
T1...T4	-40...55°C / -40...131°F -40...85°C / -40...185°F ①	-40...60°C / -40...140°F
	-40...72°C / -40...161.6°F -40...85°C / -40...185°F ①	-40...50°C / -40...122°F
	-40...85°C / -40...185°F -40...85°C / -40...185°F ①	-40...40°C / -40...104°F
T5...T6	-40...46°C / -40...114.8°F -40...55°C / -40...131°F ①	-40...46°C / -40...114.8°F

① Only permitted with separate sensor unit

2.7 Electrical data

2.7.1 With electronics Z (4...20 mA), H (4...20 mA/HART®), A (4...20 mA/HART® with SIL qualification)

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with electronics Z (4...20 mA), H (4...20 mA/HART®) or A (4...20 mA/HART® with SIL qualification), version with single chamber housing A, V	
Supply and signal circuit: (Terminals 1[+], 2[-] in electronic compartment) Indicating and adjustment circuits: (terminals 5, 6, 7, 8)	<ul style="list-style-type: none"> • $U_i = 9.6...35$ VDC • $U_m = 253$ VAC
Circuit for the display and adjustment module: (spring contacts in the electronic compartment)	For connection to the display and adjustment module.

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with electronics H (4...20 mA/HART®), A (4...20 mA/HART® with SIL qualification), version with double chamber housing D, W	
Supply and signal circuit: (Terminals 1[+], 2[-] in terminal compartment) Indicating and adjustment circuits: (terminals 5, 6, 7, 8)	<ul style="list-style-type: none"> • $U_i = 9.6...35$ VDC • $U_m = 253$ VAC
Circuit for the display and adjustment module: (spring contacts in the electronic compartment)	For connection to the display and adjustment module.

The metallic parts of OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are electrically connected with the ground terminals.

The supply and signal circuit is reliably isolated from parts which can be grounded by a galvanic isolation.

2.7.2 With electronics P (Profibus PA), F (Foundation Fieldbus)

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with electronics P (Profibus PA), F (Foundation Fieldbus), version with single chamber housing A, V	
Supply and signal circuit: (Terminals 1[+], 2[-] in electronic compartment) Indicating and adjustment circuits: (terminals 5, 6, 7, 8)	<ul style="list-style-type: none"> • $U_i = 9...32$ VDC • $U_m = 253$ VAC
Circuit for the display and adjustment module: (spring contacts in the electronic compartment)	For connection to the display and adjustment module.

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with electronics P (Profibus PA), F (Foundation Fieldbus), version with double chamber housing D, W	
Supply and signal circuit: (Terminals 1[+], 2[-] in terminal compartment) Indicating and adjustment circuits: (terminals 5, 6, 7, 8)	<ul style="list-style-type: none"> • $U_i = 9...32$ VDC • $U_m = 253$ VAC
Circuit for the display and adjustment module: (spring contacts in the electronic compartment)	For connection to the display and adjustment module.

The metallic parts of OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are electrically connected with the ground terminals.

The supply and signal circuit is reliably isolated from parts which can be grounded by a galvanic isolation.

2.7.3 With separate cable outlet

OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 version with separate cable outlet (all electronics)	
Circuit between sensor and external electronics (terminal 1 - yellow, terminal 2 - white, terminal 3 - red, terminal 4 - black)	<p>in protection type intrinsic safety Ex ia IIC</p> <p>For the OPTIBAR DP 7060 VGK7*A/W/V E in the version with the permanently mounted cable to the measuring sensor unit and external electronics, the length of the supplied cable between the external housing and the measuring sensor unit should not exceed 180 m.</p>

The metallic parts of OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 are electrically connected with the ground terminals.

The supply and signal circuit is reliably isolated from parts which can be grounded by a galvanic isolation.

3.1 Installation

Installation and setup must be carried out according to the applicable installation standards (e.g. EN 60079-14 or IEC 60079-14) by qualified personnel trained in explosion protection. The information given in the manuals and the supplementary instructions must be observed at all times.

Install pressure transmitters so that:

- there is sufficient overvoltage protection in the event of lightning or overvoltage.
- they are not in a pneumatic flow.
- excessive dust deposits (over 5 mm) and complete dust coverage are prevented.
- there is no danger from mechanical impact effects.
- the device is accessible for any necessary visual inspections and can be viewed from all sides.
- the nameplate is clearly visible.
- it can be operated from a location with secure footing.

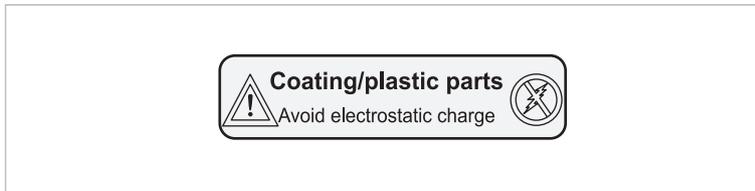


CAUTION!

The manufacturer is not liable for any damage resulting from improper use or use other than the intended purpose. This applies in particular to hazards due to insufficient corrosion resistance and suitability of the materials in contact with product.

4.1 Protection against static electricity

The OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 in versions with electrostatically chargeable plastic parts, such as e.g. plastic housing, metal housing with inspection window, with plastic-coated sensors, suspension cable or suspension hose, distance tube or connection cable with the remote version, a caution label points out the safety measures that must be taken with regard to electrostatic charges during operation.



Caution: Plastic part! Risk of electrostatic charge!

- Avoid friction
- No dry cleaning
- Do not mount in areas with flowing, non-conductive products
- Setup / Installation

The OPTIBAR DP 7060 C VGK7*A/W/V E/Z/6/7 are to be setup/installed so that electrostatic charges during operation, maintenance and cleaning are excluded and process-related electrostatic charges, e.g. due to medium flowing by, are excluded.

4.2 Description of device

The differential pressure transmitter of the OPTIBAR 7060 series is designed to measure the pressure of vaporous, gaseous and liquid media. The differential pressure transmitters are supplied as standard with 2-wire, 4...20 mA signal outputs.

4.3 Use of an overvoltage arrester

If necessary, a suitable overvoltage arrester can be connected in front of the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7. When used as category 1/2G equipment, as far as necessary analogue, a suitable overvoltage arrester must be connected in front as protection against voltage surges according to EN 60079-14 or IEC 60079-14 Chapter 12.3.

4.4 Earth

In order to avoid the danger of electrostatic charging of the metallic parts, the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7, used as category 1/2G equipment, must be electrostatically connected to the local equipotential bonding, e.g. via the ground terminal.

The "Ex-d" terminal compartment of the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 contains a safety barrier that is not a galvanic isolation. For safety reasons, the intrinsically safe circuits must be earthed. The external / internal ground terminal on the housing of the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 must be connected to the equipotential bonding at low resistance.

4.5 Impact and friction sparks

When used as category 1/2G equipment, the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 in light alloy (aluminium/titanium) versions must be mounted in such a way that sparks from impact and friction between light alloy and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

4.6 Material resistance

With applications requiring 1/2G equipment, the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 should only be used in media for which the wetted materials are sufficiently resistant against.

4.7 Installation / mounting

The OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 must be mounted such that the sensor is effectively secured against touching the vessel wall, under consideration of other vessel installations and flow conditions in the vessel. This applies especially to suspension pressure transmitters and versions with distance tube lengths over 3 m.

4.8 Protection type flameproof enclosure Ex "d"

The terminals for connecting to the operating voltage, i.e. signal circuits, are integrated in the terminal compartment according to protection type flameproof enclosure "d".

The gaps between housing and cover as well as between threaded fitting and container are ignition-proof gaps.

The "Ex-d" electronic compartment has an M20 x 1.5 or 1/2-14 NPT thread for the connection of a certified "conduit" system or for the installation of an "Ex-d" cable entry certified according to EN 60079-1 or IEC 60079-1. Simple cable entries should not be used. Refer to sections 13.1 and 13.2 of EN 60079-1 or IEC 60079-1. When connecting to a "conduit" system, an appropriate sealing mechanism must be located directly on the "Ex-d" electronic compartment.

As an option, a certified "Ex-d" cable entry can be supplied from the factory. Depending on the type ordered, it is suitable for the insertion of reinforced or non-reinforced cables. The document supplied with the corresponding cable entry must be observed. The "Ex-d" cable entry must be permanently screwed into the housing. The supplied cable entry is suitable for the housing temperature range certified for the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7. If a cable entry other than the one supplied is used, the separately certified cable gland or the temperature class at the electronics determines the maximum permissible ambient temperature of the housing, depending on the permissible temperature.

The screw plug (blind plug) supplied by the factory, depending on the type ordered, is part of the "Ex-d" housing. If a screw plug other than the one supplied is used, it must be certified according to EN 60079-1 or IEC 60079-1.

Ensure that before opening the "Ex-d" terminal compartment and when the cover of the compartment is open (e. g. when connecting or servicing) the supply line is de-energised or that there is no explosive atmosphere present.

The connecting cable to the "Ex-d" electronic compartment must be fixed and laid so that it is sufficiently protected against damage. Lay the connecting cable in accordance with EN 60079-14 or IEC 60079-14.

The connecting cables, cable entries and screw plugs or pipeline sealing mechanisms must be suitable for the lowest ambient temperature.

Prior to start-up, ensure that the cover of the "Ex-d" electronic compartment is screwed in all the way until it stops. Secure it by unscrewing the locking screw of the cover until it stops.

Unused openings must be sealed according to EN 60079-1 or IEC 60079-1 paragraph 11.9.

The cover of the "Ex-d" electronic compartment has the warning label "Do not open when an explosive gas atmosphere is present".

Single chamber housing with "Ex-d" electronic compartment

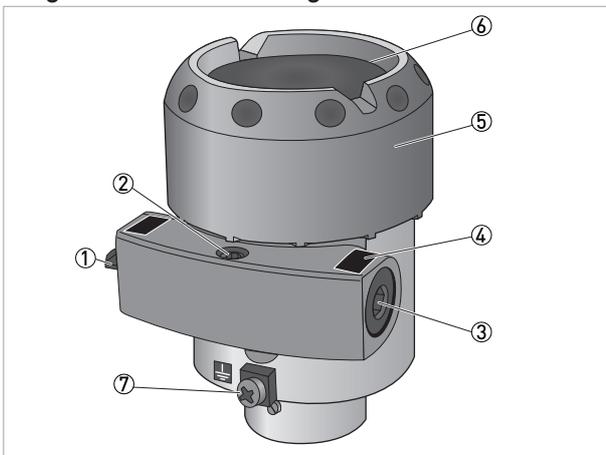


Figure 4-1: Single chamber housing with "Ex-d" electronic compartment

- ① Thread protection
- ② Locking screw of the cover
- ③ Screw plug
- ④ Marking of the thread
- ⑤ "Ex-d" electronic compartment with electronics module
- ⑥ Optionally with inspection window
- ⑦ External ground terminal

Double chamber housing with "Ex-d" electronic compartment

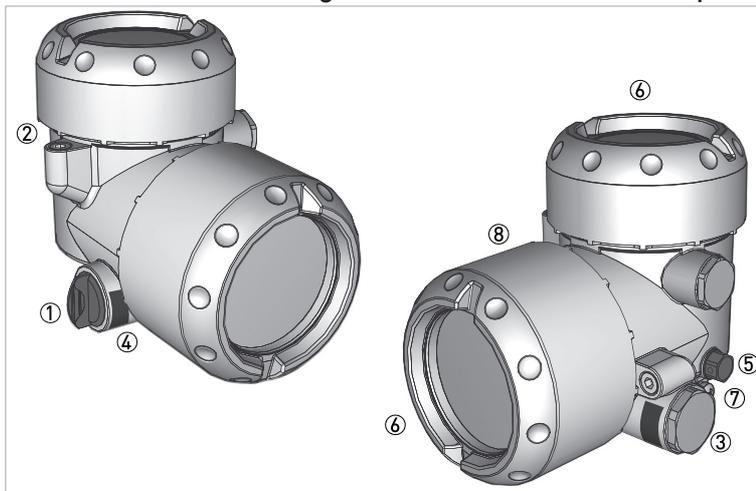


Figure 4-2: Double chamber housing with "Ex-d" electronic compartment

- ① Thread protection
- ② Locking screw of the cover
- ③ Screw plug
- ④ Marking of the thread
- ⑤ "Ex-d" electronic compartment with electronics module
- ⑥ Optionally with inspection window
- ⑦ External ground terminal
- ⑧ "Ex-d" terminal compartment

4.9 Mounting of the OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with remote housing

With the version with remote housing of the pressure transmitter OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 the equipotential bonding must be provided in the complete mounting area of the connection cable between electronics housing and transmitter housing.

4.10 Size and type of thread for the "Ex-d" cable entries

The "Ex-d" terminal compartment of OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with cable entry type 0, D or 6 has cable entries M20 x 1.5.

The "Ex-d" terminal compartment of OPTIBAR DP 7060 VGK7*A/W/V E/Z/6/7 with cable entry type N, 8 or P has cable entries 1/2-14 NPT.

4.11 Removal and replacement of the red thread/dust cover

Depending on the version, the thread or dust covers that are screwed in upon delivery of the device must be removed prior to start-up. The openings must be closed prior to start-up using a method permitted for the protection type. Permitted and suitable cable glands or plugs must be installed in accordance with the supplied documentation.

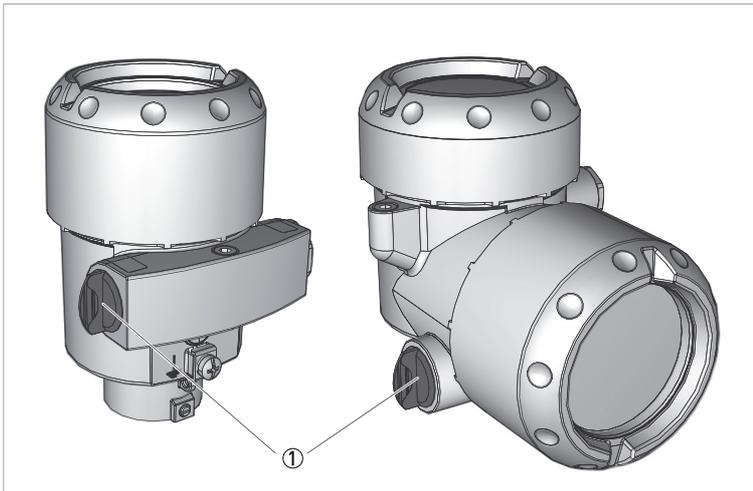
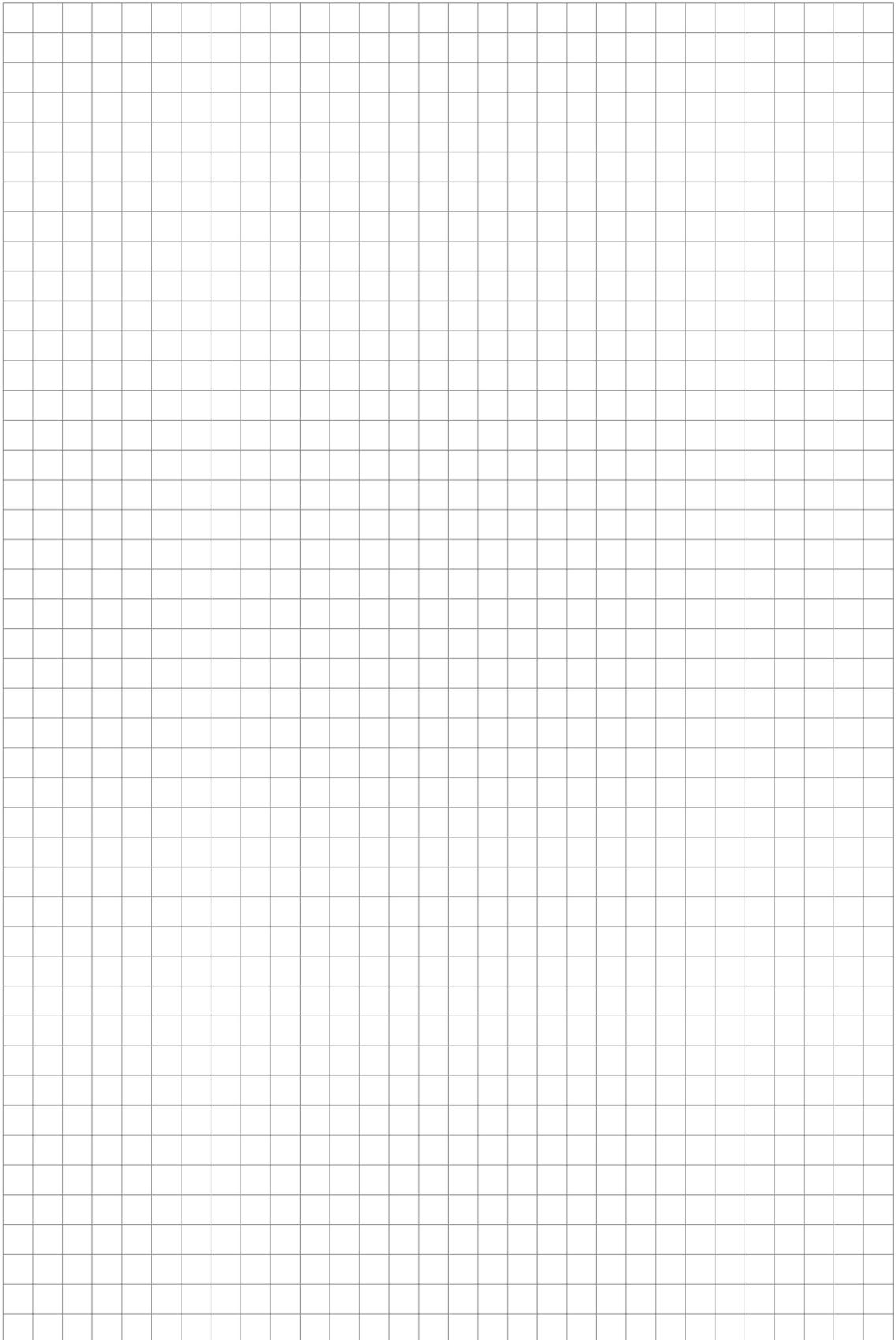
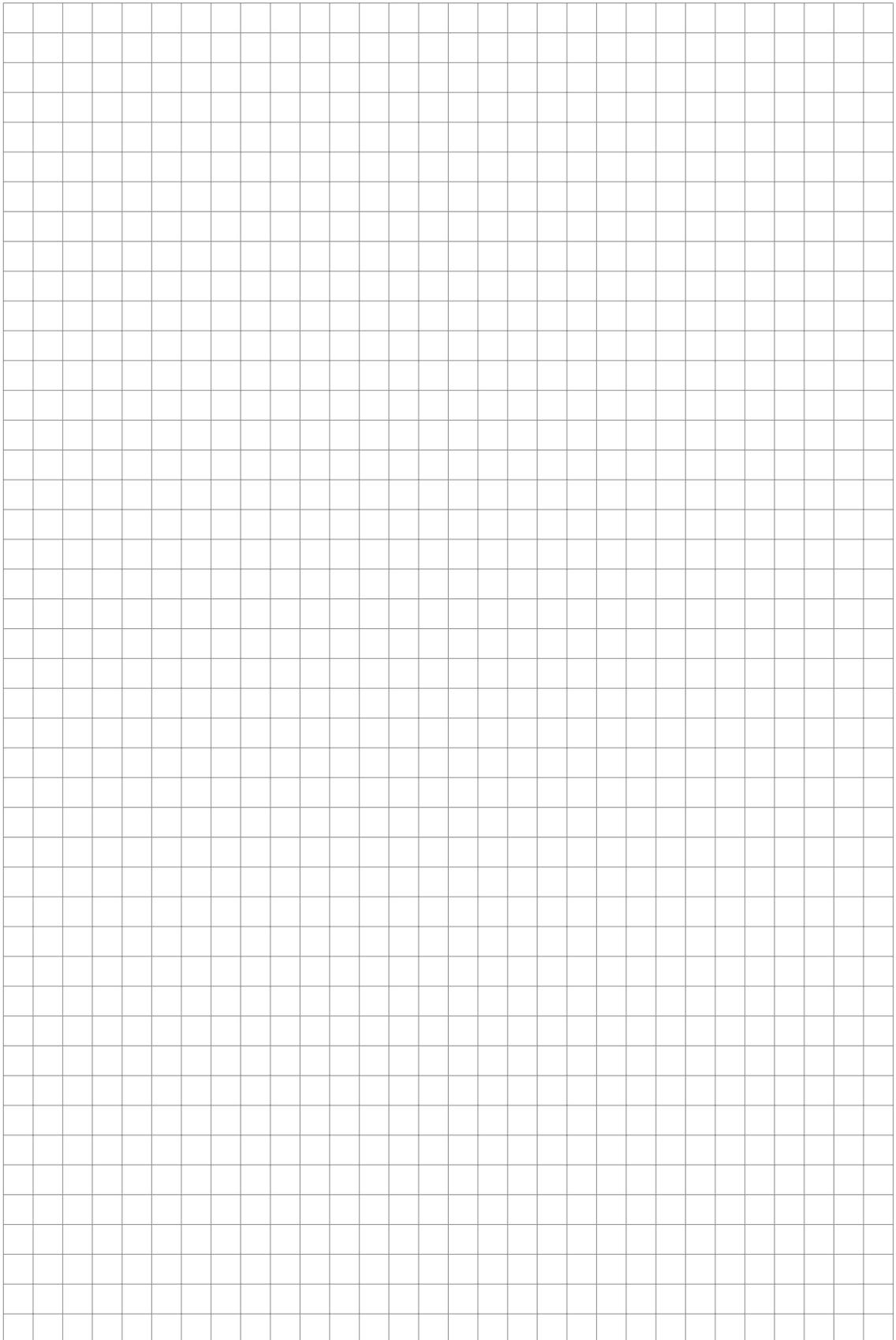


Figure 4-3: Arrangement of the thread/dust cover

- ① Red threads and dust covers must be removed prior to start-up. The opening must be closed prior to start-up using a method permitted for the protection type.







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