OPTIBAR 3050 Supplementary Instructions

Pressure transmitter

Category
ATEX: II 1G,1/2G,2G Ex ia IIC T6...T1 Ga, Ga/Gb, Gb
II 1D,1/2D,2D Ex ia IIIC TX Da, Da/Db, Db

IECEx: Ex ia IIC Ga, Ga/Gb, Gb T6...T1
Ex ia IIIC TX Da, Da/Db, Db

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1.1 General notes

These safety instructions are valid for the pressure and differential pressure transmitter OPTIBAR * 3050 VGKB/N * A/W/V C/R/H with integrated electronics type H (4...20 mA/HART®) according to the EU type-examination certificate BVS 19 ATEX E 070 X.

The pressure-based measuring devices OPTIBAR * 3050 VGKB/N * A/W/V C/R/H are also used for pressure and level measurement in hazardous areas.

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

The OPTIBAR * 3050 VGKB/N * A/W/V C/R/H consist of an electronics housing with integrated electronics module, a process connection element and a sensor, the pressure measuring cell with optionally connected chemical seal. As an option, the display and adjustment module can also be mounted.

The OPTIBAR * 3050 VGKB/N * A/W/V C/R/H are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring category 1G, 1/2G or 2G equipment and dust atmospheres of group IIIA, IIIB and IIIC for applications requiring category 1D, 1/2D, 1/3D and 2D equipment.

When the OPTIBAR * 3050 VGKB/N * A/W/V C/R/H 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 and EN 60079-11 and EN 60079-26 for use in hazardous areas with gas.

The EU type test certificate forms the basis of the EU declaration of conformity:

BVS 19 ATEX E 070 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 60079-11 and IEC 60079-26. The number of the IEC certificate is:

IECEx BVS 19.0063 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 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 pressure transmitter of the OPTIBAR 3050 series is designed to measure the pressure of vaporous, gaseous and liquid media. The 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.

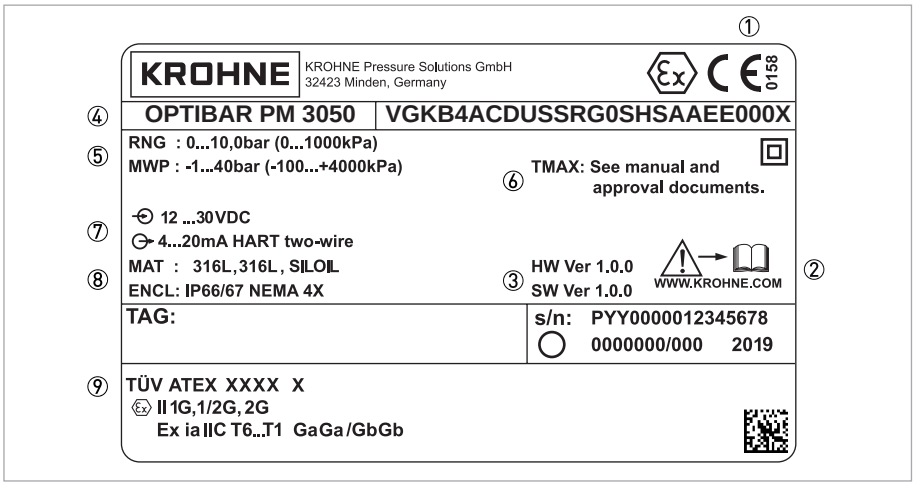

Figure 2-1: Example for an ATEX nameplate for a OPTIBAR 3050

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

2.2.2 IECEx marking

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

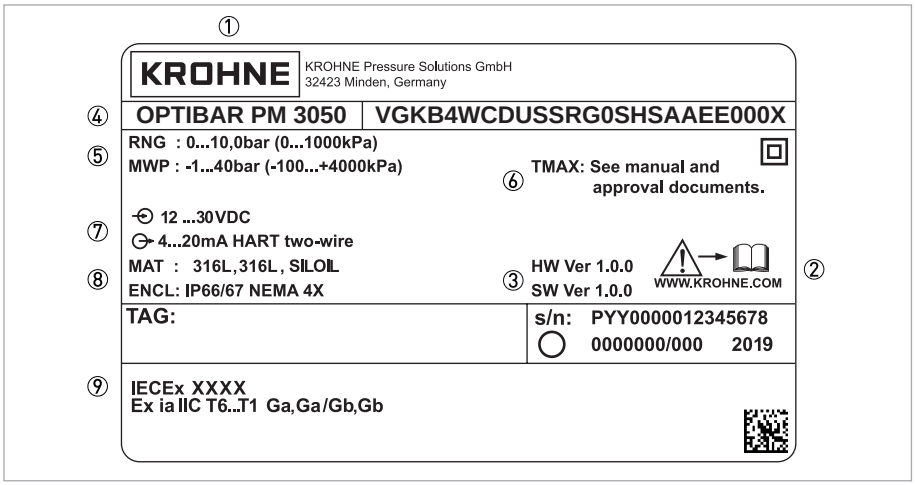

Figure 2-2: Example for an IECEx nameplate for a OPTIBAR 3050

① Manufacturer logo and address
② Observe the installation and operating instructions
③ Hardware and Software version
④ Product name and type code
⑤ Nominal range
Permissible process pressure
⑥ Permissible temperature range
⑦ Electronics power supply and signal output
⑧ Ingress protection and material of wetted parts
(Diaphragm, process connections, gasket and fill fluid)
⑨ Approvals and approval directive

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_{atm} = -20...+60°C / -4...+140°F and P_{atm} = 0.8...1.1 bar / 11.6...15.9 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/EU (ATEX) – regardless of the zone assignment – is not applicable due to the lack of key safety data.

2.4 Device category

Category 1G equipment (EPL-Ga equipment)
The devices are installed in hazardous areas requiring equipment category 1G.

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

Category 1D equipment
The OPTIBAR * 3050 VGKB/N*A/W/V R/H*******(*) are installed in hazardous areas requiring equipment category 1D.

Category 1/2D equipment
The electronics housing is installed in hazardous areas requiring equipment category 2D. The process connection element is installed in the separating wall which separates areas in which category 2D or 1D equipment are required. The sensor with the mechanical fastener is installed in hazardous areas requiring category 1D equipment.

Category 1/3D equipment
The electronics housing is installed in hazardous areas requiring equipment category 3D. The process connection element is installed in the separating wall which separates areas in which category 3D or 1D equipment are required. The sensor with the mechanical fastener is installed in hazardous areas requiring category 1D equipment.

Category 2D equipment
The OPTIBAR * 3050 VGKB/N*A/W/V R/H*******(*) are installed in hazardous areas requiring equipment category 2D.

2.5 Protection types

The pressure transmitter is designed with protection type intrinsic safety, protection level "ia" according to EN 60079-11 or IEC 60079-11.

The marking according to ATEX is:
II 1G, 1/2G, 2G Ex ia IIC T6...T1 Ga, Ga/Gb, Gb or
II 1D,1/2D,2D Ex ia IIIC TX Da, Da/Db, Db

The marking according to IECEx is:
Ex ia IIC T6...T1 Ga, Ga/Gb, Gb or
Ex ia IIIC TX Da, Da/Db, Db

The marking contains the following information:	
II	Explosion protection, group II
1	Equipment category 1
G	Gas explosion protection
D	Dust ignition protection
Ex ia	Intrinsically safe, level of protection "ia"
IIC	Gas group, suitable for gas groups IIC, IIB and IIA
IIIC	Dust group, suitable for dust groups IIIA, IIIB and IIIC
1/2	Equipment category 1/2
2	Equipment category 2
Ga	EPL, suitable for zone 0
Ga/Gb	EPL, suitable for zone 0 / zone 1
Gb	EPL, suitable for zone 1
Da	EPL, suitable for zone 20
Da/Db	EPL, suitable for zone 20 / zone 21
Db	EPL, suitable for zone 21
T6...T1	Suitable for temperature classes T6, T5, T4, T3, T2, T1
TX °C	Maximum permissible surface temperature X°C

Table 2-1: Protection types

2.6 Ambient temperature / temperature classes

OPTIBAR * 3050 VGKB/N * A/W/V C/R/H with integrated electronics H (4 ...20 mA/HART®)

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

General Temperature Range for OPTIBAR PM 3050 and OPTIBAR DP 3050

For IIC Application the following temperature limits are applicable

Temperature class	Ambient / process temperature
T1...T3	-40 ... 85°C / -40...+185°F
T4	-40 ... 80°C / -40...+176°F
T5...T6	-40 ... 36.5 °C / -40...+97.7°F

Table 2-2: IIC application for OPTIBAR 3050 with integrated electronics H

For IIIC Application the following temperature limits are applicable:

Temperature class	Ambient / process temperature
T1...T3	-40 ... 85°C / -40...+185°F
T4	-40 ... 80°C / -40...+176°F
T5...T6	-40 ... 55°C / -40...+131°F

Table 2-3: IIIC application for OPTIBAR 3050 with integrated electronics H

The surface temperature of the transmitter changes with the ambient temperature.

The maximum surface temperature is declared as follows:
TX°C = ambient temperature + 28.5K
The above stated temperature values are the absolute maximum values allowed for the OPTIBAR PM 3050 and OPTIBAR DP 3050. These values can be influenced over the electrical power, the ambient and the process temperature in combination. This influence is determined in the following tables.

Temperature range electrical connection materials

Component	Order code	Service temperature
Cable gland (316L)	DP 3050: VGKN 4 **********X*********	-40°C ≤ Ta ≤ 85°C -40°F ≤ Ta ≤ 185°F
	PM 3050: VGKB 4 **********X********	
Cable gland (brass)	DP 3050: VGKN 4 **********E*********	-40°C ≤ Ta ≤ 70°C -40°F ≤ Ta ≤ 158°F
	PM 3050: VGKB 4 **********E********	
M12 connector	DP 3050: VGKN 4 **********C*********	-40°C ≤ Ta ≤ 55°C -40°F ≤ Ta ≤ 131°F
	PM 3050: VGKB 4 **********C********	

Table 2-4: Temperature range electrical connection materials

2.6.1 Temperature Derating for OPTIBAR DP 3050

For the OPTIBAR DP 3050, the combination of the intrinsically safe components gives the following temperature classification as equipment of categories 1G, 1/2G, 2G and 1D, 1/2D, 2D. The calculation of the temperatures is made under consideration of the respective coupling factors determined in the temperature derating measurement (Witness-Test).

Temperature class	Medium temperature	Ambient temperature
T1...T3	-40…105°C / -40...221°F	-40…40°C / -40...104°F
	-40…96°C / -40...204.8°F	-40…60°C / -40...140°F
	-40…75°C / -40...167°F	-40…74°C / -40...165.2°F
T4	-40…105°C / -40...221°F	-40…40°C / -40...104°F
	-40…96°C / -40...204.8°F	-40…60°C / -40...140°F
	-40…81°C / -40...177.8°F	-40…70°C / -40...158°F
T5...T6	-40…54°C / -40...129.2°F	-40…25°C / -40...77°F
	-40…36.5°C / -40...97.7°F	-40…36.5°C / -40...97.7°F

Table 2-5: Temperature range OPTIBAR DP 3050 VGKN.***_

INFORMATION!
With respect to the temperature limitation of each component listed in table 2-4 the significant components are determined as the electrical connection materials. When configuring the OPTIBAR DP 3050 with electrical connection material which is uncertified. Specified in the type code category "electrical connection material" with the letter E or C at this category the ambient temperature must stay within the service temperature range of these components.

2.6.2 Temperature Derating for OPTIBAR PM 3050 with cooling fins

For the OPTIBAR PM 3050 with cooling fins, the combination of the intrinsically safe components gives the following temperature classification as equipment of categories 1G, 1/2G, 2G and 1D, 1/2D, 2D.
The calculation of the temperatures is made under consideration of the respective coupling factors determined in the temperature derating measurement (Witness-Test).

Temperature class	Medium temperature	Ambient temperature
T1...T3	-40…150°C / -40...302°F	-40…40°C / -40...104°F
	-40…150°C / -40...302°F	-40…60°C / -40...140°F
	-40…94°C / -40...201.2°F	-40…74°C / -40...165.2°F
T4	-40…135°C / -40...275°F	-40…40°C / -40...104°F
	-40…135°C / -40...275°F	-40…60°C / -40...140°F
	-40…119°C / -40...246.2°F	-40…70°C / -40...158°F
T5...T6	-40…61°C / -40...141.8°F	-40…25°C / -40...77°F
	-40…36.5°C / -40...97.7°F	-40…36.5°C / -40...97.7°F

Table 2-6: Temperature range OPTIBAR PM 3050 VGKB.***

INFORMATION!
With respect to the temperature limitation of each component listed in table 2-4 the significant components are determined as the electrical connection materials. When configuring the OPTIBAR PM 3050 with electrical connection material which is uncertified. Specified in the type code category "electrical connection material" with the letter E or C at this category the ambient temperature must stay within the service temperature range of these components.

2.6.3 Temperature Derating for OPTIBAR PM 3050 without cooling fins

For the OPTIBAR PM 3050 without cooling fins, the combination of the intrinsically safe components gives the following temperature classification as equipment of categories 1G, 1/2G, 2G and 1D, 1/2D, 2D.
The calculation of the temperatures is made under consideration of the respective coupling factors determined in the temperature derating measurement (Witness-Test).

Temperature class	Medium temperature	Ambient temperature
T1...T3	-40…105°C / -40...221°F	-40…40°C / -40...104°F
	-40…105°C / -40...221°F	-40…60°C / -40...140°F
	-40…86°C / -40...186.8°F	-40…74°C / -40...165.2°F
T4	-40…105°C / -40...221°F	-40…40°C / -40...104°F
	-40…105°C / -40...221°F	-40…60°C / -40...140°F
	-40…98°C / -40...208.4°F	-40…70°C / -40...158°F
T5...T6	-40…70°C / -40...158°F	-40…25°C / -40...77°F
	-40…36.5°C / -40...97.7°F	-40…36.5°C / -40...97.7°F

Table 2-7: Temperature range OPTIBAR PM 3050 without cooling fins VGKB.***

INFORMATION!
With respect to the temperature limitation of each component listed in table 2-4 the significant components are determined as the electrical connection materials. When configuring the OPTIBAR PM 3050 with electrical connection material which is uncertified. Specified in the type code category "electrical connection material" with the letter E or C at this category the ambient temperature must stay within the service temperature range of these components.

2.7 Electrical data

2.7.1 With electronics H (4…20 mA/HART®)

OPTIBAR * 3050 VGKB/N * A/W/V C/R/H with integrated electronic H (4…20 mA/HART®)	
Supply and signal circuit: (Terminals 1[+], 2[-] in the "Ex-i" electronics compartment or connector	In protection type intrinsic safety Ex ia IIC and Ex ia IIIC
	Only for connection to a certified, intrinsically safe circuit
	Maximum values • U_i [V]: 30 V • I_i [mA]: 130 mA • P_i [mW]: 1000 mW
	The effective internal capacitance C_i is ≤ 1.1nF.
	The effective inner inductance L_i is L_i ≤ 118 µH.

Table 2-8: Electrical data for OPTIBAR 3050 with integrated electronic H

3.1 Installation

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.

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:

- the device process connection is tighly connected to the process.
- 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.

When used as Ga/Gb components: The partition wall (diaphragm) between the measuring cell and connection flanges has a wall thickness < 1 mm.

When used it must be ensured that an impairment of the diaphragm (i.e. through aggressive media or mechanical hazards) cannot occur.

The housing has to fulfill minimum IP54 acc. IEC 60529 and IEC 60079-11 Annex F.2. To avoid dirt and other ingress into the housing chamber, the following guidelines have to be observed:

- only approved and tested gaskets, cable glands and housing lids are being used.
- the device will be operated with a closed lid only.

4.1 Protection against static electricity

The OPTIBAR * 3050 VGKB/N * A/W/V C/R/H 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.

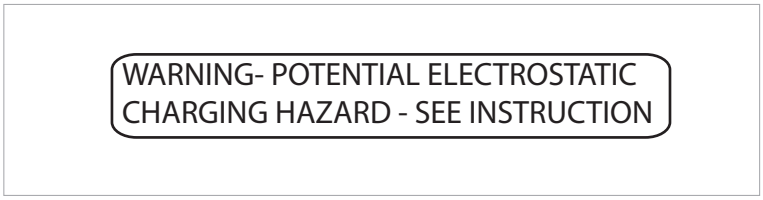

Figure 4-1: Warning sign

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 * 3050 VGKB/N * A/W/V C/R/H 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 Use of an overvoltage arrester

If necessary, a suitable overvoltage arrester can be connected in front of the OPTIBAR * 3050 VGKB/N * A/W/V C/R/H. When used as category 1G or 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.

4.3 Grounding

To avoid the danger of electrostatic charging of the metallic parts, the OPTIBAR * 3050 VGKB/N * A/W/V C/R/H, used as category 1G or 1/2G equipment, must be electrostatically connected to the local equipotential bonding (transfer resistance ≤ 1 MΩ), e. g. via the ground terminal.

4.4 Impact and friction sparks

When used as category 1G or 1/2G equipment, the OPTIBAR * 3050 VGKB/N * A/W/V C/R/H in aluminium/titanium versions must be mounted in such a way that sparks from impact and friction between aluminium/titanium and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

4.5 Material resistance

For applications requiring 1G or 1/2G category equipment the OPTIBAR * 3050 VGKB/N * A/W/V C/R/H must only be used in products against which the wetted materials are sufficiently resistant.

4.6 Installation / mounting

The OPTIBAR * 3050 VGKB/N * A/W/V C/R/H 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.

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