

To7 Series²⁰²⁰

Ex-d Enclosure Series

Ex Assembly and
Installation Instructions



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Revision History

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01	09.05.2018	T.Gruber	Supplement/ correction of the red entries	
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03	15.04.2019	E.Schneider	Revision for the new certificates	
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1 Introduction

The Ex d enclosure combination (type 07) is used as pressure-resistant components bearing a "U" certificate.

The stainless steel enclosures are available in various sizes. They also differ in length, profile, quantity of threaded holes/connecting elements, as well as in blind holes. However, the characteristic design is identical.

Different enclosure combinations also allow usage of non-ex electrical components in gas and/or dust explosion risk atmospheres. Due to the sight glass, the pressure-resistant enclosure is particularly suitable for the installation of a camera module or an illuminant. Dome-shaped optics allow the integration of pan-tilt camera systems. Furthermore a high-quality germanium plate for thermography applications is available.

The variety of combination possibilities guarantees a very high degree of flexibility, meeting the requirements of the various applications, for example for hazardous areas in the chemical and petrochemical industry, at off-shore installations, pits at risk of firedamp, and biogas plants (See model key and type plate!).

According to the shatter and impact-resistance tests (DIN EN 60079:0 2014), the enclosures VA1.x and VA2.x are certified both as stationary and as mobile components.

Regarding the electrical input, neither limits nor mandatory values were determined. Surface temperatures or temperatures inside the enclosure possibly caused by thermal dissipation must be evaluated in the course of the equipment approval process.

Both metal and non-metal enclosure components are highly resistant against environmental and chemical conditions, such as sea water corrosion, highly acid environments, etc..

2 General Safety Instructions



Attention!

The enclosures must not be used in zones 0 or 20! The specific values given on the nameplate of the enclosure combination must be adhered to. Rebuilding of or alterations to the devices are not permitted! The enclosure must be operated in a proper and sound condition and in the way intended.



Attention!

Be careful when opening and closing the enclosures. Absolutely observe the specified torques of threaded connections. Cylindrical surfaces must be checked for damages and residues at the fits of the flange and body, as well as at the fine threads of the cable glands.



Attention!

For repair, use only original parts of SAMCON Prozessleittechnik GmbH! Repair which affects the explosion protection may only be carried out by SAMCON Prozessleittechnik GmbH in accordance with the nationally applied regulations.



Attention!

Prior to installation, take external sources of heat or cold into account! Observe the permissible temperature range!



Attention!

Required temperature ranges must not be exceeded or fallen short of! Parameters on the type plate are to be complied!



Attention!

Do not use the housing combinations T07-VA0.x.K1.GER and T07-VA4.x.PS1 in mining (ATEX group 1) or in areas with high mechanical hazards (ATEX group 2).



Attention!

The housing combination T07-VA2.x.Kx.BOR5 must be used in mining with reduced temperature range (-30°C instead of -60°C) only!



Attention!

Extreme care should be taken when cleaning the plastic dome. Use only scratch-free and damp cloths. Do not use any aggressive cleaning agents. Static charging has to be avoided.

3 Conformity to Standards

The T07 enclosure combinations comply with the following rules and regulations:

IEC	EN	DIN EN
IEC 60079-0: 2017	EN IEC 60079-0: 2018	DIN EN IEC 60079-0: 2019-09
IEC 60079-1: 2014	EN IEC 60079-1: 2014	DIN EN IEC 60079-1: 2015-04
IEC 60079-31: 2013	EN IEC 60079-31: 2014	DIN EN IEC 60079-31: 2014-12

4 Technical Data

4.1 Characteristic values for explosion protection

Equipment identification marks acc. to Directive 2014/34/EC:

Explosion protection (gas): II 2 G (zones 1 and 2)
 Explosion protection (dust): II 2 D (zones 21 and 22)
 Explosion protection (mining): I M2 (mining)*

Identification marks according to protection level

Explosion protection (gas): Ex db IIC GB
 Explosion protection (dust): Ex tb IIIC DB IP68
 Explosion protection (mining): Ex db I Mb*

* Not valid for T07-VA0.x.Kx.GER and VA4.x.PS1 models

Named testing authority:	TÜV Rheinland (number 0035)	
EU Type Examination Certificate:	TÜV 14 ATEX 7473 U	(2014)
	TÜV 18 ATEX 8217 U	(2018)
	TÜV 18 ATEX 8217 U ^{1st. suppl.}	(2019)
IECEX certificate:	IECEX TUR 14.0024U	(2014)
	IECEX TUR 18.0022U	(2018)
	IECEX TUR 18.0022 U ^{issue No: 01}	(2019)

4.2 Materials

BOR and BOR2 flanges:	Stainless steel 1.4305, Ra ≤ 6,3 µm
All other stainless steel parts:	Stainless steel 1.4404, Ra ≤ 6,3 µm
Spring steel (inside):	Spring steel 1.0330
Flat seals:	GYLON® Style 3504 blue
Glass optics visible light:	Borosilicate
Crystal optics long-wave light IR:	Germanium
Plastic optics:	Thermoplastic materials
1k-Silicone casting compounds:	XIAMETER™ ADH-6066 Momentive TSE 326 M, Silcoset 105
Silicone buffer (inside):	VMQ quality 025/SI/60 red Silicone 60° +/-5 Shore A, Sandwich Silicone PTFE foil coated one-side SW06 Sili/PTFE
UV/anti-scratch coating:	Upon request

4.3 Absolute dimensions* and pressure chamber volumes

(*without mounting cam / welded elements)

Type	Width [mm]	Height [mm]	Length [mm]	Weight [g]	Empty volume [cm ³]
VA0.0.Kx.GER	48	48	112	508	114
VA0.0.Kx.BOR	48	48	112	464	114
VA0.1.Kx.GER	48	48	127	542	136
VA0.1.Kx.BOR	48	48	127	498	136
VA0.2.Kx.BOR	48	48	142	532	158
VA0.3.Kx.BOR	48	48	157	566	179
VA0.4.Kx.BOR	48	48	172	600	200
VA1.1.K1.BOR	79	79	128	2000	360
VA1.1.K2.BOR	79	79	141	2450	360
VA1.2.K1.BOR	79	79	158	2200	480
VA1.2.K2.BOR	79	79	171	2650	480
VA2.0.K1.BOR(x)	113	113	161	3600	1080
VA2.0.K2.BOR(x)	113	113	176	4850	1080
VA2.1.K1.BOR(x)	113	113	211	4100	1520
VA2.1.K2.BOR(x)	113	113	226	5350	1520
VA2.2.K1.BOR(x)	113	113	261	4600	1960
VA2.2.K2.BOR(x)	113	113	276	5850	1960
VA2.3.K3.BORx	113	113	311	5900	2350
VA4.1K.Px1	216	216	236	11370	4880

VA4.1K.BORx	216	216	145	13660	3580
VA4.1.K1.PS1	218	218	240	16900	3550
VA4.1.K1.BORx	218	218	148	17310	3240
VA4.2.K1.PS1	218	218	287	15610	7000
VA4.2.K1.BORx	218	218	195	17900	5150
VA4.3.K1.PS1	218	218	412	18500	10500
VA4.3.K1.BORx	218	218	320	20300	9400

4.4 Number of cable glands

T07-VA0.x.K1...:	1x M20*1.5
T07-VA1.x.K1...:	1x M20*1,5
T07-VA1.x.K2...:	1x M16*1,5
T07-VA2.x.K1...:	2x M20*1,5
T07-VA2.x.K2...:	1x M20*1,5
T07-VA2.x.K3...:	2x M20*1,5
T07-VA4.x.K1...:	2x M20*1,5 + 1x M25*1,5

4.5 General tolerance of the body and flange components made of stainless steel

f (fine)	- lengths and angular dimensions -	acc. DIN ISO 2768-1
H	- shape and position -	acc. DIN ISO 2768-2

4.6 Flameproof gaps

Housing combinations

Housing	Fitting type	Diame- ter /mm	Tolerance	Biggest span/ μm	Smallest span/ μm	Joint length/mm
T07-VA0.x	1x clearance fit (ISO 286- 2)	35	$[d_{f7}^{H8}] = -$ 50...-25 / 0...+39 [μm]	89	25	BOR/ GER: n.a. K1: 10.6 mm
T07-VA1.x	2x clearance fit (ISO 286- 2)	57	$[d_{f7}^{H8}] = -$ 60...-30 / 0...+46 [μm]	106	30	BOR: 16.0 mm Kx: 13.0 mm
T07-VA2.0 T07-VA2.1 T07-VA2.2	2x clearance fit (ISO 286- 2)	91	$[d_{f7}^{H8}] = -$ 71...-36 / 0...+54 [μm]	125	36	BOR(x): 23.0 mm Kx: 15.0 mm
T07-VA2.3	2x clearance fit (ISO 286- 2)	91	$[d_{f7}^{H8}] = -$ 71...-36 / 0...+54 [μm]	125	36	BORx: 27.5 mm K3: 27.5 mm

T07-VA4.1K.x	1x clearance fit (ISO 286-2)	187	$[d_{g7}^{H8}] = -61...-15 / 0...+72 [\mu\text{m}]$	133	15	BORx: 27.5 mm Px1: 27.5 mm
T07-VA4.x	2x clearance fit (ISO 286-2)	187	$[d_{g7}^{H8}] = -61...-15 / 0...+72 [\mu\text{m}]$	133	15	BORx: 27.5 mm Px1: 27.5 mm K1: 27.5 mm

Shaft connections

Housing	Fitting type	Diame-ter /mm	Tolerance	Largest gap width / μm	Smallest gap width / μm	Gap length /mm
VA2.x.BOR5	1x clearance fit (ISO 286-2)	5	$[d_{d9}^{H7}] = -60...-30 / 0...+12 [\mu\text{m}]$	72	30	27 mm
VA4.x.BOR2	1x clearance fit (ISO 286-2)	5	$[d_{d9}^{H7}] = -60...-30 / 0...+12 [\mu\text{m}]$	72	30	29 mm

4.7 Resistance against various media

Aceton, alcohol, acetylene, ammonia, aniline, benzene, butane, chlorine, pressure water, compressed air, ethane, petroleum, fluorine, glycerine, sea water, methane, oils, phosphoric acid, propane etc.

(Extract! Further media approval upon request: support@samcon.eu)

4.8 Temperatures and protection levels

All VA0 housings:

Model Key	Protection level	T _{Amb min}	T _{Amb max}
T07-VA0.x.K1.BOR	IP68	-60°C	+135°C
T07-VA0.x.K1.GER	IP68	-30°C	+135°C

All VA1 housings:

Model Key	Protection level	T _{Amb min}	T _{Amb max}
T07-VA1.x.K1.K1	IP68	-60°C	+160°C
T07-VA1.x.K1.BOR	IP68	-60°C	+160°C

All VA2 housings:

Model Key	Protection level	T_{Amb} min	T_{Amb} max
T07-VA2.x.K3.K3	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR2	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR3	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR5	IP68	-60°C	+160°C
T07-VA2.x.x.BOR5 (Mining 4J)	IP68	-30°C	+135°C

All VA2 housings shorter/equal VA2.2.R:

Model Key	Protection level	T_{Amb} min	T_{Amb} max
T07-VA2.x.K1.K1	IP68	-60°C	+160°C
T07-VA2.x.K1.BOR	IP68	-60°C	+160°C
T07-VA2.x.K1.BOR2	IP68	-60°C	+160°C
T07-VA2.x.K1.BOR3	IP68	-60°C	+160°C
T07-VA2.x.K1.BOR5	IP68	-60°C	+160°C
T07-VA2.x.K2.K2	IP68	-60°C	+160°C
T07-VA2.x.K2.BOR	IP68	-60°C	+160°C
T07-VA2.x.K2.BOR2	IP68	-60°C	+160°C
T07-VA2.x.K2.BOR3	IP68	-60°C	+160°C
T07-VA2.x.K2.BOR5	IP68	-60°C	+160°C
T07-VA2.x.K3.K3	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR2	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR3	IP68	-60°C	+160°C
T07-VA2.x.K3.BOR5	IP68	-60°C	+160°C
T07-VA2.x.x.BOR5 (Mining 4J)	IP68	-30°C	+135°C

All VA4 housings:

Model Key	Protection level	T_{Amb} min	T_{Amb} max
T07-VA4.x.K1.K1	IP68	-60°C	+160°C
T07-VA4.x.K1.BOR1	IP68	-60°C	+160°C
T07-VA4.x.K1.BOR2	IP68	-60°C	+160°C
T07-VA4.x.x.PS1	IP68	-50°C	+135°C

5 Transportation, storage, recycling



Avoid impacts, mechanic stresses and vibrations.



Heed that neither the package nor the enclosure is damaged.



Before the enclosure is completely installed and assembled, store it in its original package and in a dry and weatherproof place and protect it against dirt and climatic influences.



Avoid extreme heat or cold shock.



Use mild detergents for cleaning and care of the optical plastic elements, as well as scratch-free and damp cloths. Static charging has to be avoided.



Ensure an environmentally friendly disposal of all components in accordance with national regulations for waste disposal.

6 Installation and Assembly

6.1 Structure of the empty enclosure combinations

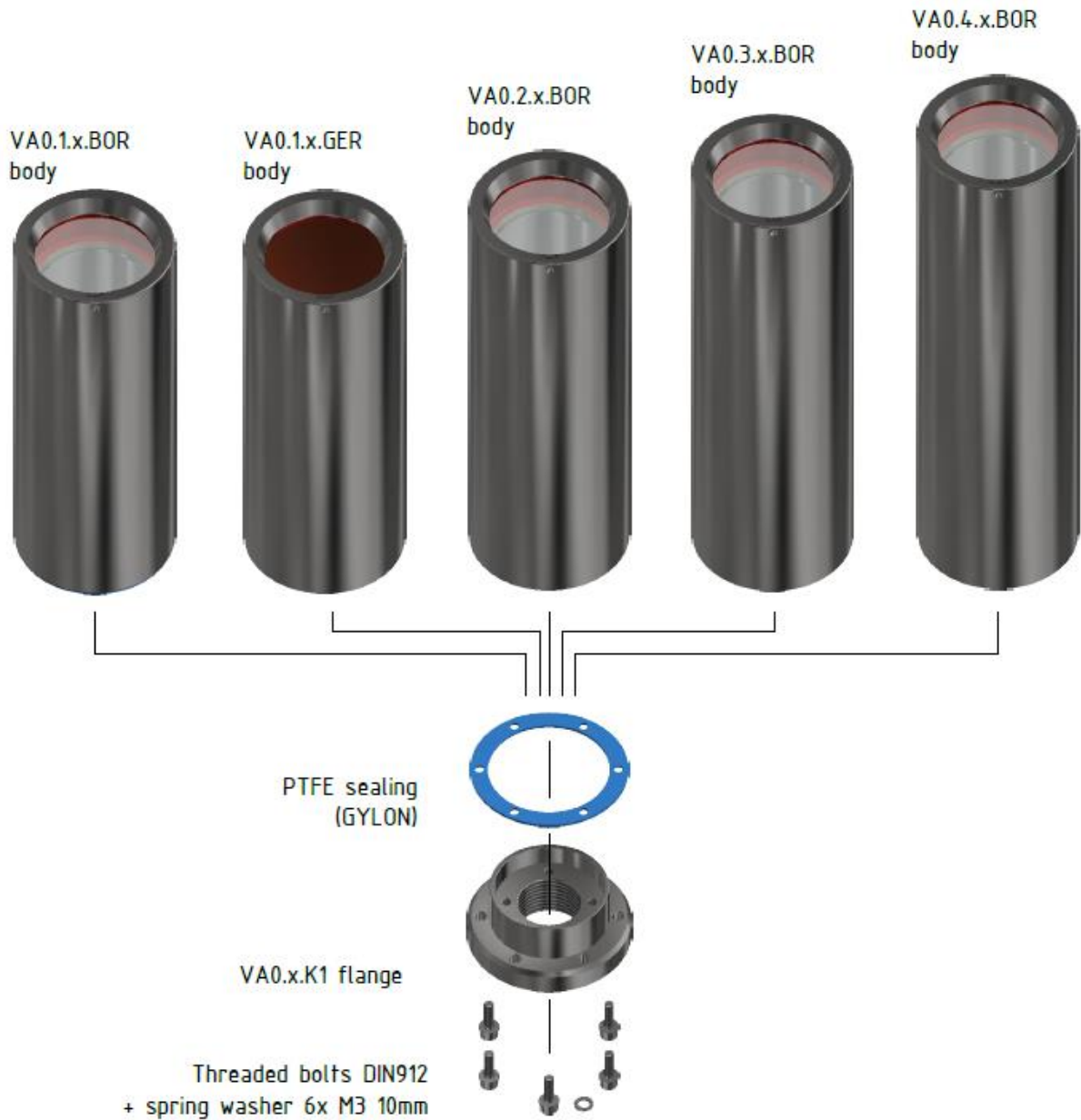


Fig. 6-1: Configuration example of the T07-VA0.x enclosure-combination

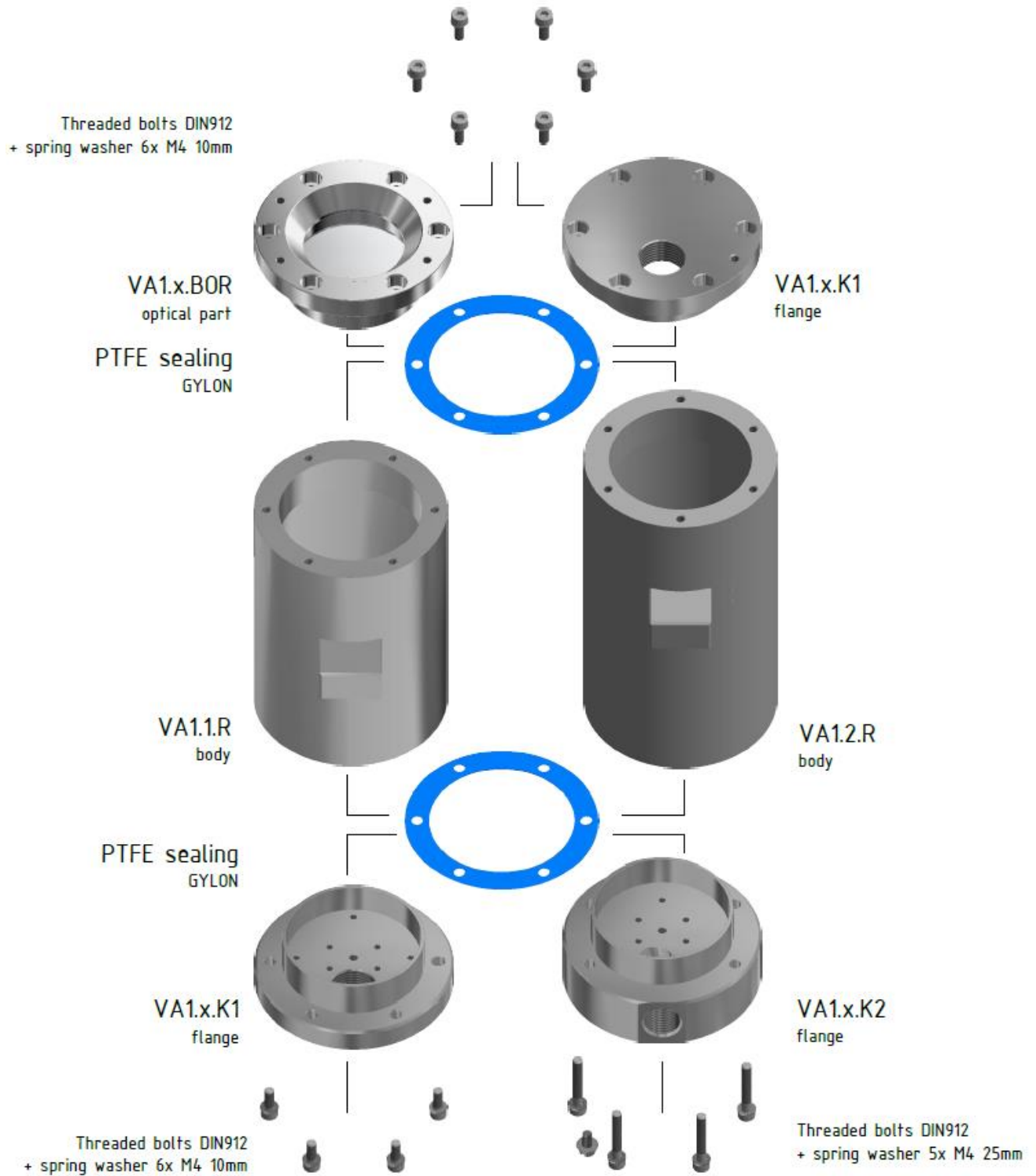


Fig. 6-2: Configuration example of the T07-VA1.x enclosure-combination

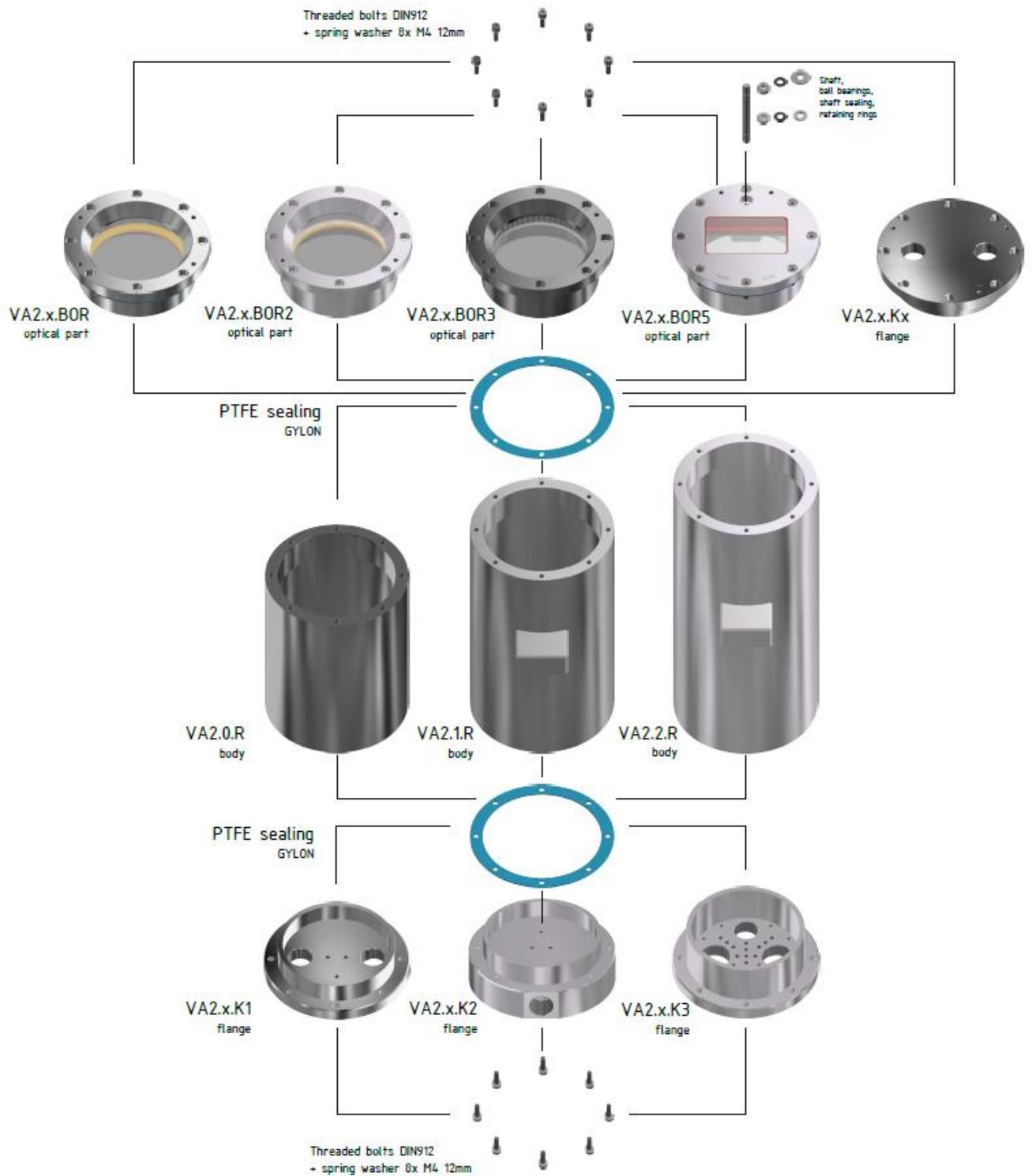


Fig. 6-3: Configuration example of the T07-VA2.0/1/2 enclosure-combination

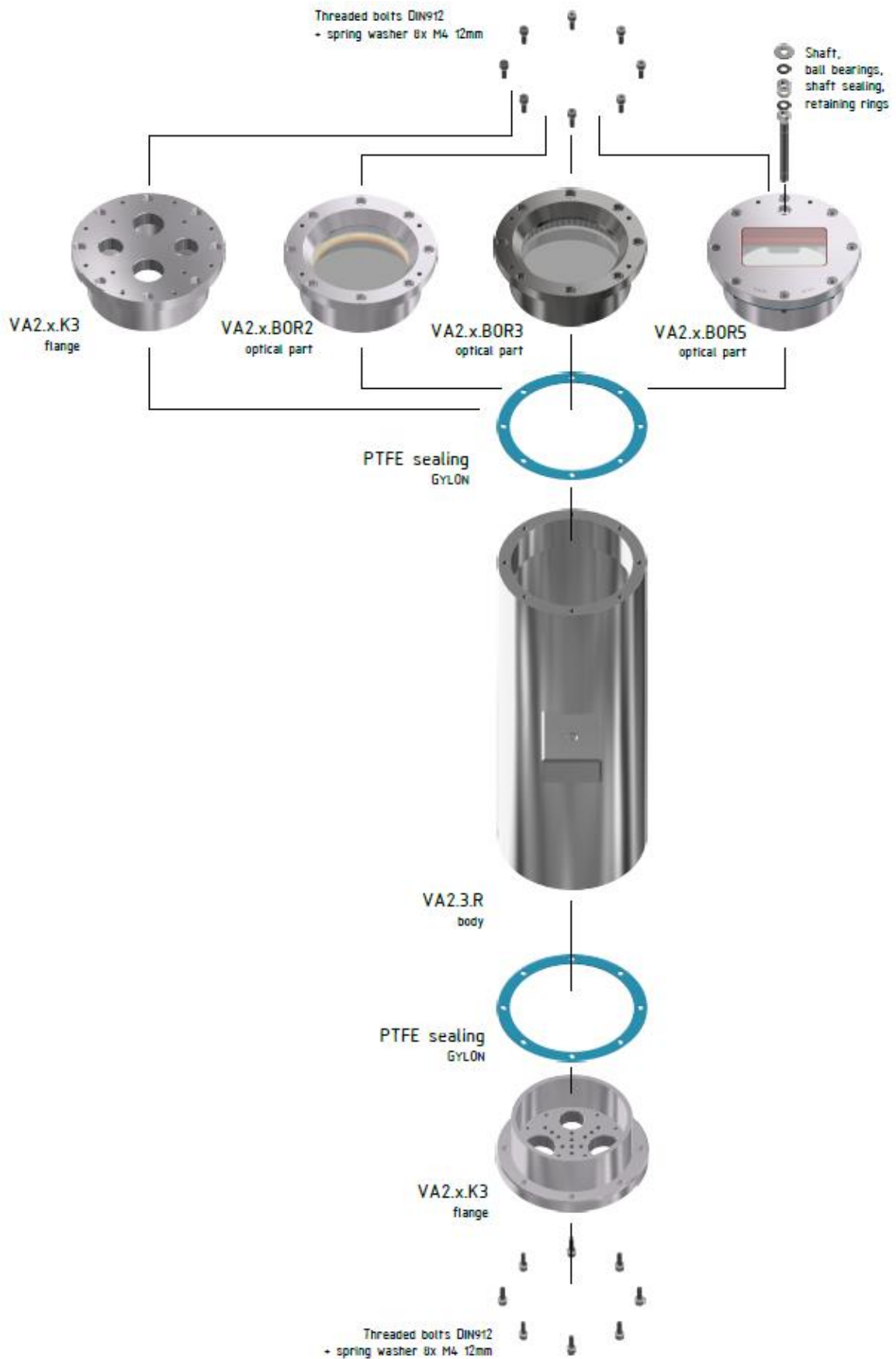


Fig. 6-4: Configuration example of the T07-VA2.3 enclosure-combination

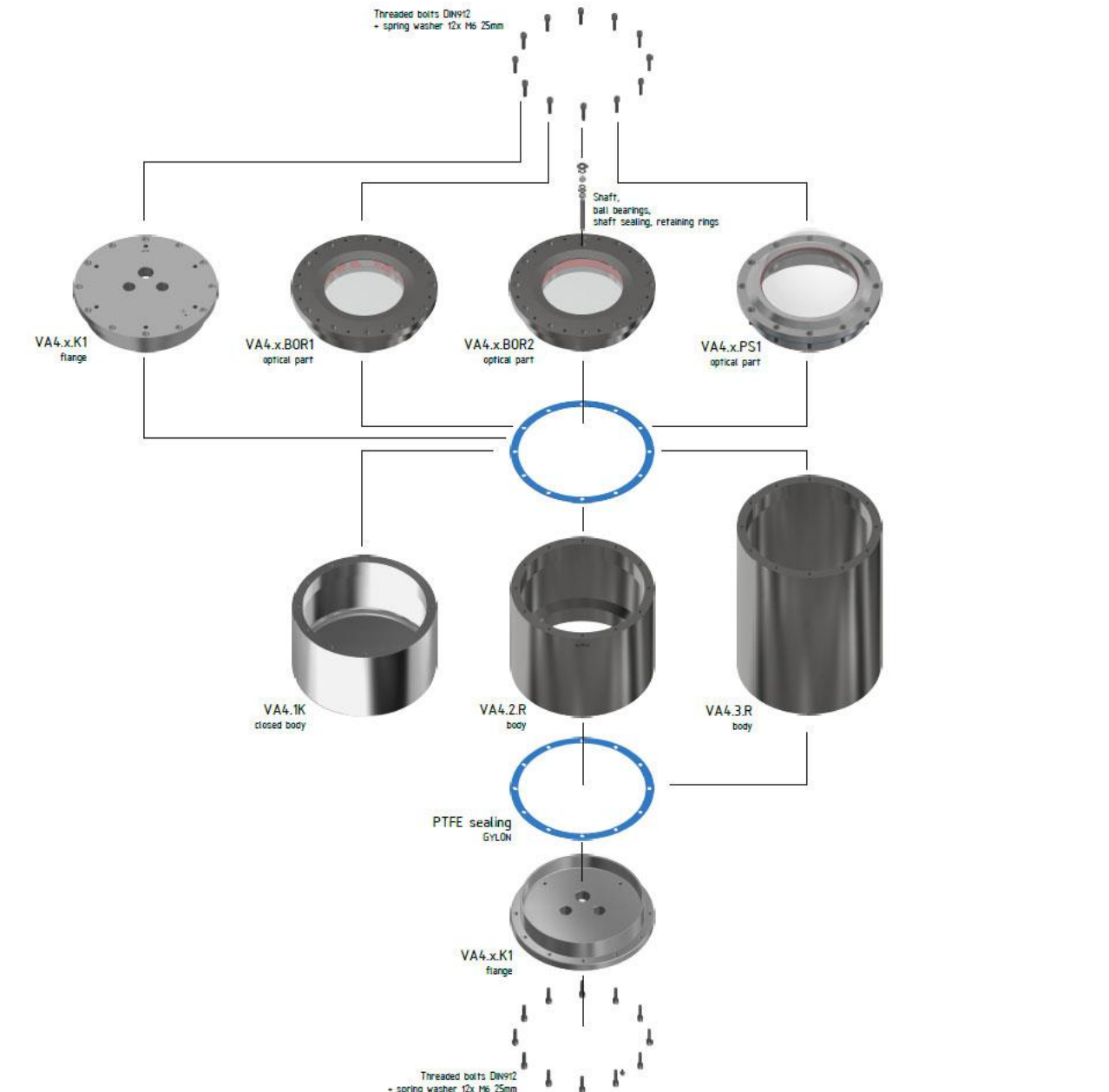


Fig. 6-5: Configuration example of the T07-VA4.x enclosure-combination

6.2 Opening the pressure-resistant enclosure

- In order to open a pressure-resistant enclosure, loosen the cylinder head screws (DIN 912) situated at the flanges with, depending on the housing design, an Allen-key of width over flat 2.5 mm (for M3), 3mm (for M4) or 5 mm (for M6). Tools required are included in the delivery. To avoid unintentional loosening of the screws as a result of vibrations, impacts, etc., the threaded connections have spring washers (DIN 127 Form A).

Attention: To avoid the unintentional loosening of the threaded connection as well as to allow for an additional sealing purpose, an acrylate (LOCTITE® 243™) is applied to the threads. Avoid contact with skin and/or clothes!

Threaded connections of the current T07 enclosure combinations:

	VA0.x.GER	VA0.x.BOR	VA0.x.K1
Type	<i>n.a.</i>	<i>n.a.</i>	Cylinder screw, hexagon socket
Specification			M3x0,5 ISO metric, right-handed
Number			6
Thread length			10 mm
Materials			1.4301, 1.4404 / A2-70
Grade			6g
Norm			DIN 912/ ISO 4762
Tightening torque			2,0 Nm

Tab.6-1: Connection elements VA0.x enclosure

	VA1.x.BOR	VA1.x.K1	VA1.x.K2
Type	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket
Specification	M4x0.7 ISO metric, right-handed	M4x0.7 ISO metric, right-handed	M4x0.7 ISO metric, right-handed
Number	6	6	6
Thread length	10 mm	10 mm	25 mm
Materials	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70
Grade	6g	6g	6g
Norm	DIN 912/ ISO 4762	DIN 912/ ISO 4762	DIN 912/ ISO 4762
Tightening torque	3.0 Nm	3.0 Nm	3.0 Nm

Tab. 6-2: Connection elements VA1.x enclosure

	VA2.x.BOR(x)	VA2.x.K1/K3	VA2.x.K2
Type	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket
Specification	M4x0.7 ISO metric, right-handed	M4x0.7 ISO metric, right-handed	M4x0.7 ISO metric, right-handed
Number	8	8	7
Thread length	12 mm	12 mm	30 mm
Materials	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70
Grade	6g	6g	6g
Norm	DIN 912 / ISO 4762	DIN 912 / ISO 4762	DIN 912 / ISO 4762
Tightening torque	3.0 Nm	3.0 Nm	3.0 Nm

Tab. 6-3.: Connection elements, VA2.x enclosure

	VA4.x.BORx	VA4.x.PS1	VA4.x.K1
Type	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket	Cylinder screw, hexagon socket
Specification	M6x1.0 ISO metric, right-handed	M6x1.0 ISO metric, right-handed	M6x1.0 ISO metric, right-handed
Number	12	12	12
Thread length	25 mm	25 mm	25 mm
Materials	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70	1.4301, 1.4404 / A2-70
Grade	6g	6g	6g
Norm	DIN 912 / ISO 4762	DIN 912 / ISO 4762	DIN 912 / ISO 4762
Tightening torque	6-8 Nm	6-8 Nm	6-8 Nm

Tab. 6-4. Connection elements VA4.x enclosure

2. Pull out the flanges extremely carefully and straight (vertical). Because of under-pressure created during separating the flanges, you might need to apply a little more force.

Heed that the components are not canted!

Absolutely heed that the cylindrical clearance-fit surface (H8f7 – ISO 286) of body and flange components (drill holes and arbour) will not get damaged (flame-proof gap – DIN EN 60079-1)!

Besides the ISO286 fine tolerances d_{f7}^{H8} or d_{g7}^{H8} of this elements, the measure of surface roughness R_a [μm] at clearance-fit is relevant for explosion protection!

Danger by damaging the flameproof gap (EN 60079-1)!

Attention: At the cylindrical fit surfaces of the body and flange components, a thin lubrication layer (Molykote® P-40) is preventively applied in order to avoid fits' corrosion and to ensure protection against mechanical stresses. Avoid contact with skin and/or clothes.

6.3 Adapting of a Mounting Adapter

For flexible adapting of built-in components, you can use inside blind threaded holes in different sizes with DIN 13-1 regular thread (for example M3x0.5 or M4x0.7, etc.). Figure 6-6 illustrates a raster with thread blind holes at an example of a T07-VA2.x.K1 flange. Attention: Supplied by the customer it is not allowed to do any mechanical postprocessing!

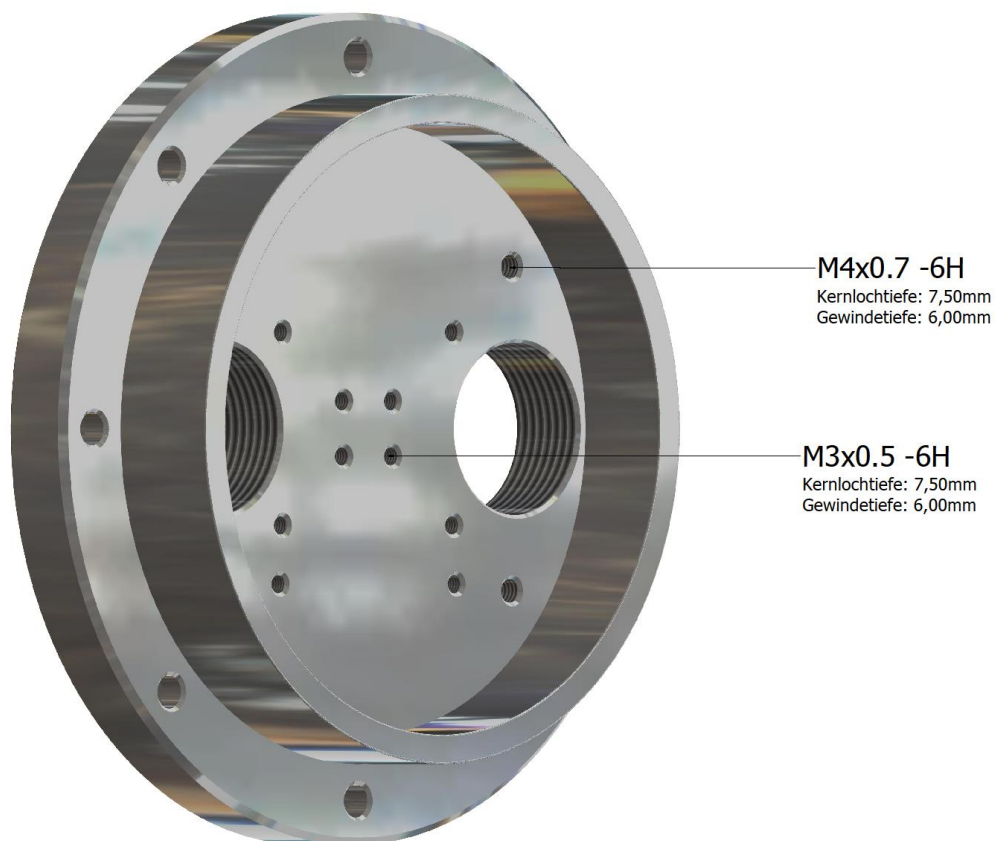


Fig. 6-6: Example Blind holes for mounting

Via the threaded holes, it is possible to adapt the position of sheet metal and plastic bending parts of different designs, as well as of electric, mechanic and optic modules, electronic circuit boards, etc.. Bolting together the built-in components must not cause any mechanical overstress to the threads (deformations). If adapting is necessary, use only the screws specified in the Installation Instructions! The installations must be applied in a stationary/fixed manner (immovable) and must resist potential impacts and vibrations. Mounting adapters are not included in the delivery scope.

Attention: According to DIN EN 60079-1: 2008 Annex [D.3.10], you can arrange the built-in components in ex-component housings of groups I, IIA and IIB as you like, provided that, at least, **20%** of each cross-sectional surface remains free. It is necessary to allow the unobstructed gas flow so that an explosion can develop without obstacles. In the case of ex-component housings of group **IIC**, you can arrange the built-in in components as you

like, provided that, at least, **40%** of each cross-sectional surface remains free - it is necessary to allow the unobstructed gas flow so that an explosion can freely develop without obstacles. To achieve the aforementioned rates, it is possible to combine individual areas; however, each area must have a minimum size of 12.5 mm in any direction.

6.4 Drill holes for ex cable glands

For the pressure-resistant threaded cable connections at the cable glands at the “Kx” flanges, the number, specification and position of the fine tapped holes (DIN13-2) can be selected within the limits of the Approval. Unused holes must be covered with suitable blind plugs (stainless steel or brass nickel-plated). Adhere to Standard IEC 60079-0/1/14!

6.5 Note for built-in components

All installations have to be certified according ATEX directive and IECEx schemata by an approved inspection body.

6.6 Closing the pressure-resistant enclosure

1. Heed that the flanges are not jammed when being inserted!
2. Observe the tightening torque of the DIN912 cylinder head screw (M3 with 2.0 Nm, M4 with 3.0 Nm, and M6 with 8.0 Nm)!
The screws must be tightened crosswise. Make sure that the spring washers are inserted.
If necessary, threads have to be cleaned!
3. Heed that the blue PTFE flat gaskets are placed correctly and not damaged (GY-LON® Style 3504). Note: The seals/hole grids for the optics adapter and the Kx flange are identical and have the same hole pattern.

6.7 Grounding / Potential Equalization

The potential equalisation of the T07 enclosure series shall be absolutely adhered to (danger of sparks because of electrostatic charging!). At a specified location, a cable eye or clip must be applied in full accordance with the national rules and regulations for grounding (advised $\varnothing_{\min}=4\text{mm}^2$ fixed).

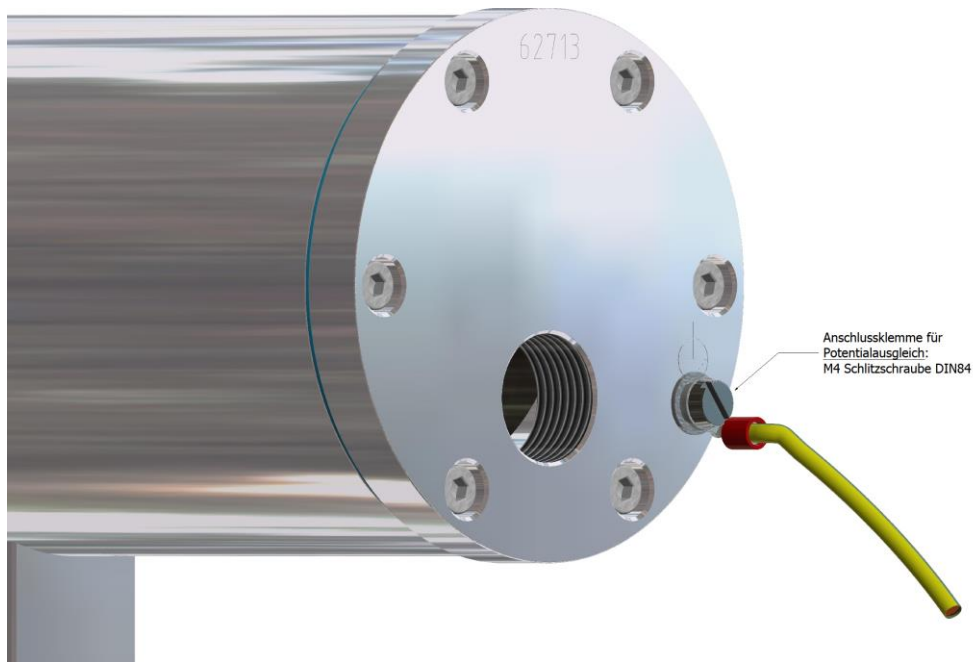


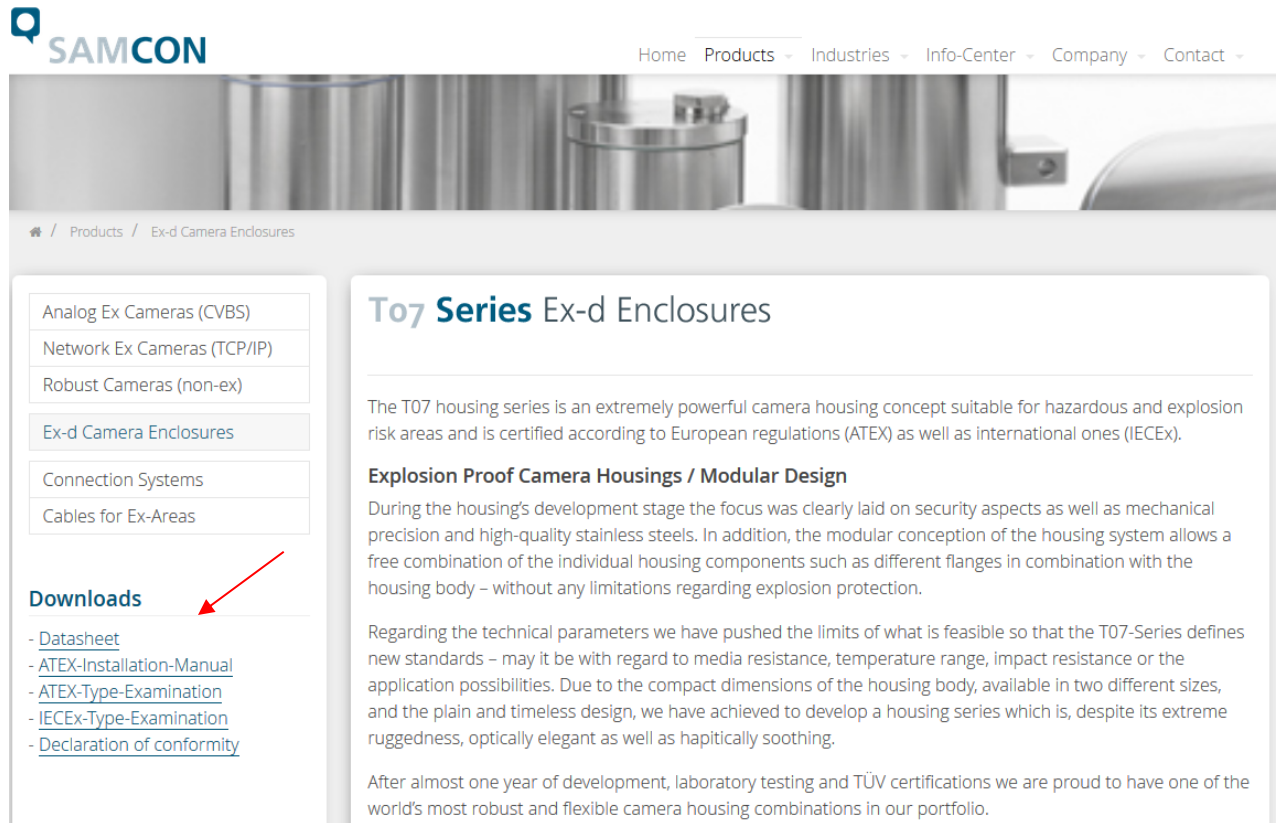
Fig. 6-7: Example terminal for potential equalization

6.8 Mounting options

1. via wall- and ceiling mount bracket at the welded cam(s) of body
2. via pipe clamp- or bracket mounting
3. via weldneck fixing at the optic adapter

7 Drawings, certificates and extended documentation

You can find further information on our homepage:



SAMCON Home Products Industries Info-Center Company Contact

Products / Ex-d Camera Enclosures

- Analog Ex Cameras (CVBS)
- Network Ex Cameras (TCP/IP)
- Robust Cameras (non-ex)
- Ex-d Camera Enclosures**
- Connection Systems
- Cables for Ex-Areas

Downloads

- [Datasheet](#)
- [ATEX-Installation-Manual](#)
- [ATEX-Type-Examination](#)
- [IECEX-Type-Examination](#)
- [Declaration of conformity](#)

T07 Series Ex-d Enclosures

The T07 housing series is an extremely powerful camera housing concept suitable for hazardous and explosion risk areas and is certified according to European regulations (ATEX) as well as international ones (IECEX).

Explosion Proof Camera Housings / Modular Design

During the housing's development stage the focus was clearly laid on security aspects as well as mechanical precision and high-quality stainless steels. In addition, the modular conception of the housing system allows a free combination of the individual housing components such as different flanges in combination with the housing body – without any limitations regarding explosion protection.

Regarding the technical parameters we have pushed the limits of what is feasible so that the T07-Series defines new standards – may it be with regard to media resistance, temperature range, impact resistance or the application possibilities. Due to the compact dimensions of the housing body, available in two different sizes, and the plain and timeless design, we have achieved to develop a housing series which is, despite its extreme ruggedness, optically elegant as well as haptically soothing.

After almost one year of development, laboratory testing and TÜV certifications we are proud to have one of the world's most robust and flexible camera housing combinations in our portfolio.

<https://www.samcon.eu/en/products/ex-d-camera-enclosures/>



8 EU declaration of conformity 2014/34/EU

EU - Konformitätserklärung

EU – Declaration of Conformity / UE – Déclaration de Conformité

Der Hersteller / The manufacturer / Le fabricant



erklärt in alleiniger Verantwortung, dass sein Produkt / declares under his sole responsibility, that his product /
déclare sous sa seule responsabilité, que son produit

To7 Ex-d Enclosure Series

gekennzeichnet mit / marked with / marqué avec

Gas:  II 2G Ex db IIC Gb* Dust:  II 2D Ex tb IIIC Db* Mining:  I M2 Ex db I Mb*


* Optional/Additional marking: see installation-/user manual

bescheinigt mit EU-Baumusterprüfbescheinigung / certified by EU type examination certificate /
ayant fait l'objet de l'attestation UE de type

TÜV 18 ATEX 8217 U

auf das sich diese Erklärung bezieht, mit der/den folgenden Richtlinien, Normen oder normativen Dokumenten übereinstimmt:
referred to by this declaration is in conformity with the following directives, standards or normative documents:
auquel se rapporte la présente déclaration, est conforme aux directives, normes ou aux documents normatifs suivants:

ATEX Richtlinie/ ATEX Directive/ Directive ATEX	Normen / Standards / Normes
2014/34/EU	EN 60079-0: 2018
2014/34/EU	EN 60079-1: 2014
2014/34/UE	EN 60079-31: 2014



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Lohra-Altenvers, den / the / le 07.01.2020

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