

ExCam e.Vario



User Manual

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1 Introduction

The ExCam e.Vario is a very compact and robust digital camera (type T08) which is manufactured by SAMCON Prozessleittechnik GmbH and can be used very flexibly for various applications. The main application is the usage within the hazardous areas of the chemical and/or petro-chemical industry, at offshore plants, and at biogas plants. The ExCam® e.Vario is a static camera system a motorized lens.

The camera is suitable for the usage within the Ex zones 1, 2, 21, and 22 including the gas group IIC (all gases, steams, and fogs including acetylene, hydrogen, and carbon disulphide) and the dust group IIIC (conductive dusts and flammable fibrous material). Besides for fixed installation, the T08 ExCam series is also certified to be used for mobile applications (hand-held etc. DIN EN 60079: 0 2012). Due to the usage of high-quality PTFE sealings, not only the protection level IP68 is met but also the chemical resistance is maximized.

2 Technical Data

2.1 Parameters of the explosion protection

Identification marks according to Directive RL 2014/34/EU:

 II 2G (Zone 1 and 2)
 II 2D (Zone 21 and 22)

Explosion protection (gas):
 Explosion protection (dust):

Ex db IIC T6 Gb
 Ex tb IIIC T80°C Db

Protection level:

IP 68 (IEC/ EN 60529)
 (24h/3m water column and 0.5h/8m, pH-neutral, temp. of test mediums: +5°C ≤ T_{water} ≤ +20°C)

Transportation / storage temperature:
 Ambient temperature (EX):

-5°C ... +55°C
 -40°C ... +50°C

Noticed body:
 EU Type Examination:
 IECEx certificate:
 Further certificates:

TÜV Rheinland (number 0035)
 TÜV 18 ATEX 8218 X (2018)
 IECEx TUR 18.0023X (2018)

see: <https://www.samcon.eu/en/products/analog/excam-evario/>



Attention!

The instructions stated on the type and instruction plates have to be observed!

2.2 Illustration of the model key

| Ex product-name | Model versions | | | | | Product No |
|-----------------|----------------|-------------------------------|-----------------------|---------------------------|-------------------|--------------------------------|
| 1) | 2) Type | 3) Housing- combination | 4) Temp.- range | 5) Cable length [m] | 6) Termination | Link to digital user manual |
| ExCam e.Vario | T08- | VA1.2.K1.BOR- | L.N- | 005.N- | P- | 22070241 |
| | T08- | VA1.2.K1.BOR- | L.N- | 005.N- | K- | 22070242 |

Table 2.1 – Model key

Explanations:

- 1) ExCam e.Vario = Functional camera description of the ExCam Series (technical data / specification of the individual camera module)
- 2) **T08** = SAMCON Production type 08
- 3) **VA1.2.K1.BOR** = Ex d housing (stainless steel 1.4404) with small diameter ($\varnothing_{VA1}=79\text{mm}$)
VA1.2.K1.BOR = T07 VA1.2 housing with maximum body length ($L_{VA1.2,R} = 136\text{mm}$)
VA1.2.K1.BOR = K1 cable gland flange (axial cable gland, standard)
VA1.2.K1.BOR = Borosilicate sight glass DIN7080 standard execution, for video cameras within visible spectral range and photographic infrared range (NIR), not suitable for thermographic applications (MIR/ FIR)
- 4) **L.N**= No cooling system installed ($T_{amb} < +50^{\circ}\text{C}$)
L.N= Low temperatures ($T_{amb} > -40^{\circ}\text{C}$)
- 5) **005.N** = Length of the connection line in meter at delivery. The standard cable length is 5 m, minimum / maximum cable length is: 001...200 [m]
005.N = Non armoured cable
- 6) **P** = Plug- termination (standard): cable stripped ca. 30 cm with anti-kink grommet, 4x single wire 0.75mm² with wire end ferrules (grey) and 1x double wire (Koax) on BNC angle plug AWG24 crimped
- K** = Terminal block execution (optional): Approx. 30 cm of the system cable is stripped and equipped with tension reliefs, 6x single conductors with ferrules (see electrical connection)

2.3 Electrical parameters

Power supply camera: 14VDC – 30VDC

2.4 System cable

Outer diameter: 9.4 ± 0.3mm
 Bending radius: >12 x outer diameter
 Temperature range: -20°C to +80°C (at point of installation)
 -40°C to +80°C (fixed installed)
 Conductor design: Koax 75OHM 2x2x0,25mm² +4x0,75mm² AWG24
 Shielding: Copper braid, multiple wires 0.10 vz, opt. cover-
 age approx. 90%
 Outer sheath/characteristics: PUR FHF, halogen free, flame resistant (EN
 60332-1-2), EMV shielded



Attention!

For wiring and connection of the camera, **DIN/EN/IEC 60079-14** has to be observed.

2.5 Technical specification of the camera module

Please note:

Technical details of the internal module such as light sensitivity, resolution, frame rate sensor, lens details and optional accessories are thoroughly provided in the data sheets on our homepage and are not part of the T08 ExCam user manual.

Data sheets:

<https://www.samcon.eu/en/products/analog/excam-evario/>

2.6 Other technical data

Housing material of the pressure resistant enclosure (Ex d / DIN EN 60079-1: 2014) according to **DIN EN 10027-2: 2015-07** (designation system for steel):

Housing material (standard) MNo.: 1.4404 (X2CrNiMo17-12-2),
AISI 316L / V4A

Additional metallic and non-metallic materials of the T07-VA1.2.x.x ex-d housing:

Zincd spring steel MNo.: 1.0330, PTFE with glass microbeads (GYLON® Style 3504 blue), silicone-coating (Silcoset 105 incl. CureAgent)

28), VMQ (silicone), thermos transfer foil made of polyester (acetone resistant), cable glands made of brass, nickel-plated (MsNi)

Sight glass material:

Borosilicate glass "Ilmadur 10/ I-420"
 (DIN7080¹:2005-05)

Internal materials:

Optical and electronical components, div. thermoplastic plastics: polyamide (PA6.6/ PA2000) and polyoxymethylene (POM) isolators and supporting adapters, aluminum die cast, zinc (protection housing T08 aluminum universal adapter (EN AW-ALSi1MgMn), PTC-ceramics, PUR, etc.

Weight (without accessories):

3,000 g (with K1 cable flange)

Weight of accessories:

800 g (wall mount bracket WMB-S)

400 g (hood WPR-VA1.2)

50 g (hinge attachment SCH-VA1.x)

(further accessories upon request)

Dimensions housing (wxhxd):

79.0mm x 96.0mm x 158.0mm

Dimensions with accessories (WxHxD):

97.0mm x 193.0mm x 299.5mm

(with wall mount bracket and hood)

Fitting of the **flame proof gap** preventing the transmission of ignition (cylinder) (EX) of the T07-VA1.2.x.x housing:

Flange / body

Nominal diameter: **57 mm** (plain cylindrical)

Clearance fit: **H8 f7** (DIN ISO 286)

Tolerance: (-60...-30) µm ... (0...+46) µm

Smallest gap length > 12.5 mm

(according to DIN EN 60079-1)

Largest gap length < 0.15 mm

(according to DIN EN 60079-1)

Average surface finish: $R_a \approx 2.0 \mu\text{m}$

(DIN ISO 468) / $R_a \leq 6.3 \mu\text{m}$

(according to DIN EN 60079-1: 2014 [5.2.2])

Cable glands

1x **M20*1.5**_12 mm (ISO metrical fine thread acc. to *DIN13-2*), **Quality 6H** (medium or fine (acc. to. *ISO 965-1 / ISO 965-3*), supporting/

¹ Valid standards for translucent components in a pressure-tight housing: DIN7080:2005-05 „Round sight glasses made of borosilicate glass for compressive stress without limitation of the low temperature ranges“

gripping threads ≥ 5 (acc. to the requirements of *DIN EN 60079-1: 2014 [5.3]* table 3 „cylindrical threads“)

Media resistance:

Exclusively checked upon request!

Generally: Corrosion as well as chemical highly resistant against a variety of fluid and gaseous components of the industrial area and suitable for offshore applications (see general specification of stainless steel MNo.:1.4404 / AISI316L), surface finish and modification of the Ex d housing², elastomer sealings of the cables, as well as the GYLON® flat seals of the housing flange, etc.)

² Protective coating, electro polishing, etc. ...

3 Safety guidelines

Please observe the national regulations regarding security and accident prevention and the safety guidelines given below in this user manual!



Attention!

Cameras of the type ExCam T08 Series are not suitable for the use in zone 0 and zone 20. The temperature class and explosion group as stated on the type plate has to be observed. Alterations are not permitted. The camera is to be operated in sound conditions and in the intended way.



Attention!

Only original parts of SAMCON Prozessleittechnik GmbH may be used for repairs. Repairs concerning the explosion protection may only be carried out in accordance with the nationally applied regulations and by SAMCON Prozessleittechnik GmbH.



Attention!

External heat and/ or cooling sources are to be taken into account during the setting up. The permissible temperature range for transportation, storage, and operation of the camera has to be observed



Attention!

The instructions stated on the type and instruction plates have to be observed:

**„WARNING - DO NOT OPEN IN POTENTIALLY EXPLOSIVE
ATMOSPHERES “**

“WARNING – DO NOT OPEN WHILE ENERGIZED“



The use in hazardous areas with regard to temperature and dust layers is defined in the respective national regulations.

Prior to the first use, you should test the camera corresponding to the instructions given in the chapter commissioning.

4 Commissioning

For the camera's installation and operation, the relevant national regulations, as well as the generally accepted rules of technology shall prevail. Before mounting the camera, thoroughly check it for any transportation damages, especially at the housing and cable. Installation, electrical connection, and the first commissioning must only be carried out by qualified personnel.



Attention!

Please observe the national regulations regarding security, installation, and accident prevention (e.g. DIN EN 60079-14) and the safety guidelines described in the user and in the EX installation manual!



Attention!

Please observe the installation and commissioning advices described in the ATEX/ IECEx/ EAC-Ex Ex-installation manual!

4.1 Step 1: Installation

Install the ExCam[®] e.Vario at the desired location. Mounting options and conditions, accessories, as well as safety guidelines are described in the EX installation manual of the T08 ExCam[®] Series.



Attention!

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

4.2 Step 2: Electrical connection



Attention!

The electrical connection of the equipment must be executed by qualified personnel only!



Attention!

It is mandatory that the housing of the ExCam[®] Series has to be grounded via a PE-connection!



Attention!

Please observe the national regulations regarding security, installation, and accident prevention (e.g. DIN EN 60079-14), as well as the safety guidelines described in this user manual and the EX installation manual!

The T08 ExCam® e.Vario is delivered with an electrical connection. The maximum transmission distance from camera to receiver typically is 250 m (depending on electromagnetic tolerance/ EMC environment) and can be determined individually to reflect the particular customer specifications.

The ExCam® e.Vario is manufactured with a cable pigtail reflecting the desired cable length. Any electro-technical or mechanical work inside the camera's flameproof enclosure which is done by the user is prohibited and not required. Depending on the model option, the ending of the camera's cable connection is either furnished with a plug or terminal block excusion.

4.2.1 Potential equalization

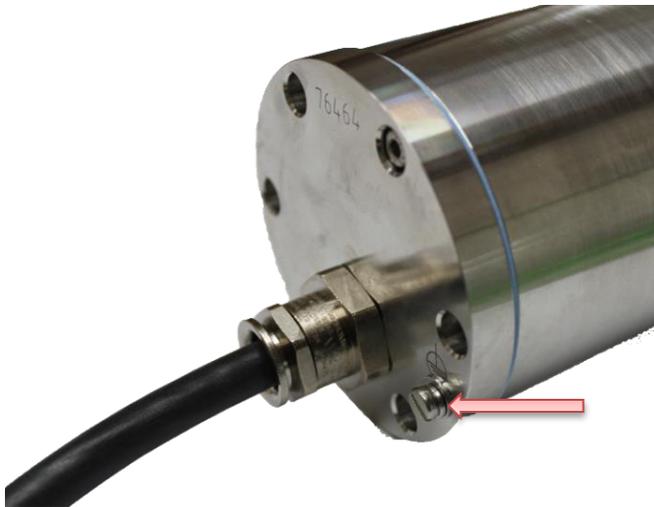


Figure 4.1 – PE connection ExCam e.Vario

The potential equalization (earthing of the camera housing) is mandatory in order to avoid electrostatic charging and hence spark generation. The screw terminal on the housing's rear side is intended for this purpose (q.v. figure 4.1). The profile of the potential equalization has to reflect the national grounding instructions (min. 4 mm²).

Connection table:

| Potential | Color (IEC 60757) | Profile | Comment |
|-----------|-------------------|-------------------------|--|
| PE | GN/YE | 4 mm ² (fix) | Screw terminal: Slotted screw M4 x 0.7 (DIN 84) with washer Ø 9 mm (DIN 125A). 3Nm tightening torque has to be observed! |

Table 4.1 – Potential equalization

4.2.2 Connection and protection

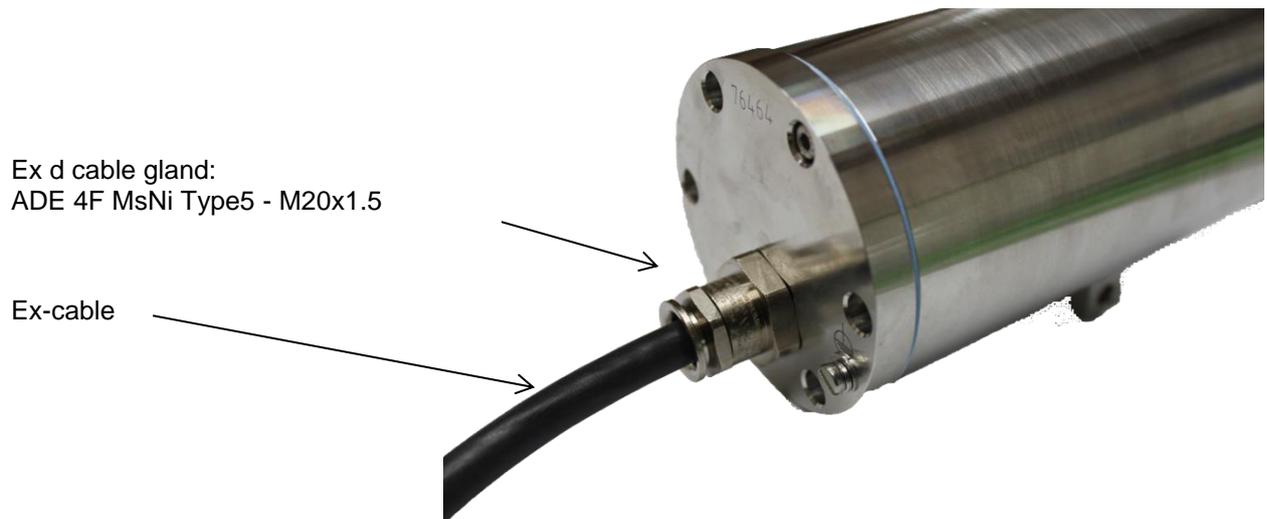


Figure 4.2 – Ex d cable gland with cable

Figures 4.3 – 4.4 illustrate the possible cable terminations available for the ExCam e.Vario.



Figure 4.3 – ExCam e.Vario T08-VA1.2.K1.BOR-L.N-xxx.N-**P**



Figure 4.4 – ExCam e.Vario T08-VA1.2.K1.BOR-**L**.N-xxx.N-K

Via the system cable the AHD/ CVI/ TVI or FBAS signal is transferred. The power supply of the camera is also conducted via this cable.

4.2.2.1 Power supply & protection of the camera circuit



Attention!
Cables and wires must comply with the requirements of the IEC 60079-0/1/7 & 14.



Attention!
The supply line must have a sufficient cross-section. The cable protection must comply with national and international regulations.



Attention!
Use only terminals approved by SAMCON.

The power supply has to be done via the red (RD) as well as the black (BK) connection strand.

Connection table:

| Potential | Color (IEC 60757) | Potential level | Profile | Remarks |
|-----------|-------------------|----------------------|----------------------|---------|
| L+ | RD | +14 V DC ... +30 VDC | 0.75 mm ² | |
| L- | BK | 0 V DC / GND | 0.75 mm ² | |

Table 4.2 – Electrical connection camera module

The camera's maximum power consumption is 2.6 Watt.

The dimensioning of the equipment or the supply protection depends on:

- The selected power supply
- The cable length
- The national regulations

The following safety recommendations may serve as a basis:

| Supplied power | Length system cable | Recommended protection | Comments |
|----------------|---------------------|------------------------|--|
| 14 V DC | < 100 m | 1000 mA - mT | In case the transmission range exceeds 100 m and it is intended to supply the camera with 14 V DC, please make sure to use an adjustable power supply in order to compensate voltage drops |
| 24 V DC | 100 m ≤ 200 m | 500 mA - mT | |

Table 4.3 – Supply protection camera module

The release current of the protection has to be less than the maximum short-circuit current of the power supply (switch-mode power supply)!

4.2.2.2 Video picture connection (FBAS or AHD)

Depending on the model key, the video signal of the ExCam® e.Vario is either provided with wire-end (K-option) or with a BNC connector (P-option). The video signal is only to be connected to a monitor, a video matrix, or a video server.

The video output is always 16:9. For systems with a resolution at 4:3, a video converter (see chapter 5.4) is needed.

Connection table (T08-VA1.2.K1.BOR-L.N-xxx.N-K)

| Potential | Color (IEC 60757) | Potential level | Profile | Comments |
|-----------|-------------------|--------------------------------------|---------------------|----------|
| FBAS+ | WH/ BU | 1.0 V _{p-p} (sync negative) | 0.5 mm ² | |
| FBAS _GND | BU | 0 V / GND | 2.7 mm ² | |

Table 4.4 – Terminal block connection FBAS signal

Connection table (T08-VA1.2.K1.BOR-L.N-xxx.N-P)

| Potential | BNC connector | Potential level | Profile | Comments |
|-----------|----------------------|--------------------------------------|---------|----------|
| FBAS + | Center (Pin) / core | 1.0 V _{p-p} (sync negative) | | AWG24 |
| FBAS _GND | Shield (bayonet cap) | 0 V / GND | | |

Table 4.5 – Plug connection FBAS signal

4.2.2.3 Control signal connection (RS485)

This connection applies both for the K- and the P-option.

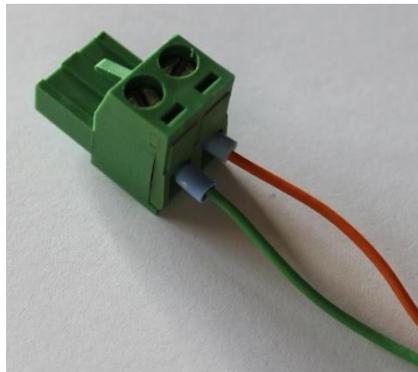


Figure 4.5 – RS485 pin assignment

Connection table (T08-VA1.2.K1.BOR-L.N-xxx.N-X)

| Potential | Color (IEC 60757) | Profile | Comments |
|-----------|-------------------|----------------------|----------|
| RS485+ | GN | 0.25 mm ² | |
| RS485- | OG | 0.25 mm ² | |

Table 4.6 – Control signal

4.2.3 Tests prior to switching on voltage



Attention!

Prior to commissioning, all tests as indicated by the national regulations have to be executed. In addition, it is mandatory that the proper functioning of the operating device in accordance with this user manual and all other applicable regulation has been executed.



Attention!

Incorrect installation and operation of the camera may lead to a loss of warranty!



Attention!

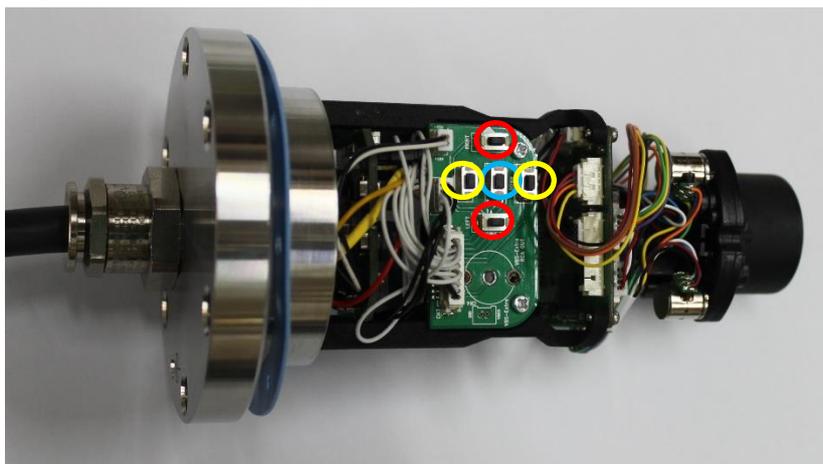
Do not switch on the camera at temperatures below 0°C!

5 Handling and Settings

5.1 Manual adjustment of the camera image

This step is only necessary in case the picture's default settings (angle, focus, iris or back-light settings) do not deliver a suitable picture quality.

For manual adjustments, manual parametrizations at the camera modul have to be made. For this, the ex-d housing has to be opened. The settings of the circuit board module are explained below.



1 OSD (on-screen menu)

2 Focus

3 Zoom

Figure 5.1 – ExCam® e.Vario – Lens and sensor board



Information!

If not determined differently, the default setting for the ExCam® e.Vario is set to wide angle. With a distance of about 10 meter an object is then focused.

If desired, we customize the ExCam® e.Vario settings to reflect specific requirements. In such a case please advise us at order placement on the requested angle and the object distance. With the remote control unit you can do this easy on your own (see chapter 5.2).

5.1.1 Work preparation



Attention!

Please carry out any preoperational work carefully and in accordance with the applicable regulations.



Attention:

Note: Depending on the zone classification, it might be necessary to obtain a work permit/clearance! When adjusting the camera settings potentially explosive atmosphere must be avoided by any means!

- Use appropriate tools
- Make sure you have a secure foothold
- Avoid static charge

5.1.2 Opening the pressure-resistant housing

Opening the pressure-resistant camera housing is only allowed for the manual adjustment of the lens. Afterwards, the housing has to be closed explosion-proof again! The steps below have to be followed very carefully:



„WARNING – DO NOT OPEN IN HAZARDOUS AREA“

Attention:

For opening the ExCam e.Vario's pressure-resistant stainless steel housing T07 VA1.2.K1.BOR, it is mandatory to follow the step-by-step instructions as stated in the T08 Ex installation manual!

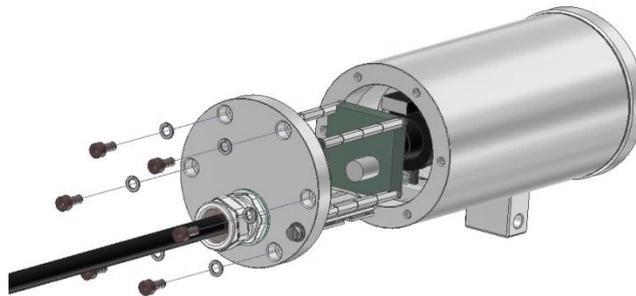


Figure 5.2 – Opening the ExCam e.Vario



Attention!

Beware not to damage the surface of bore hole and shaft (fit) at the flame proof gap preventing the transmission of ignition.



Attention!

Please make sure not to damage housing sealings and to keep them clean.

Carefully pull out the lead flange in a straight manner, ensuring that the board module does not tilt. Due to vacuum creation, it can be difficult to remove the flange. Neither the flange, nor the housing must be damaged at the flame proof gap preventing the transmission of ignition (DIN EN 60079-1:2012). Beware also of tilting. The cylindrical clearance fit H8f7

(DIN ISO 286) between body and flange may not be tilted! Avoid skin and clothing contact with the cylindrical fit, the surface is treated with lubrication paste (oleaginous).

Attention: The Mounting adapter with the temperature control (CB06 circuit board), the camera module and the varifocal optic are fixed at the cable flange.

When opening the housing, the Gylon flat seal (blue) must not be damaged or polluted! The flat seal is loosely fitted at the cable flange and only fixed with the screw connection.

Gently slide up the camera from the housing at slight tilt. The mounting adapter was particularly designed for this:

Pull out the camera carefully in a slight oblique position (it won't fit straight through!):

1.



2.



3.



4.



Figure 5.3 – removing the camera

5.1.3 Adjustment of viewing angle

Adjust the angle of view by pressing the zoom button (see button 3 Fig. 5.1).



When touching electrical components, potential equalization (grounding of the body) has to be observed (ESD clothing, PE wristband etc.)!

5.1.4 Adjustment of the image sharpness (focus)

Adjust the image sharpness by pressing the focus button (see button 2 Fig. 5.1).

5.1.5 Further possibilities to optimize image quality

For all further settings use the OSD (On Screen Display). For this, press button 1 Fig.5.1.

5.1.6 Closing of the pressure-resistant housing

Attention:

For closing the pressure-tight stainless steel T07 VA1.2.K1.BOR housing of the ExCam e.Vario, the instructions of the T08 Ex installation manual have to be followed step by step!

For closing the housing, please, follow, in reversed order, the steps described in opening the pressure-resistant housing. Please make sure that the disassembled screw locks (washer spring DIN7980) are reassembled.

If, when closing the housing, it is noted that the surface of the flameproof joint is dirty or not lubricated sufficiently, please clean it with a clean cloth and suitable cleaning detergent. Afterwards, re-lubricate it with a suitable lubrication agent.

Tighten the M4 flange screws with approx. 3 Nm at a non-lubricated thread. Please avoid extensive tightening – this might lead to a torn screw.



ATTENTION:

In case of any mechanical damages that happened to the flameproof joint, the housing must not be used anymore!



ATTENTION!

Do not lock-in any foreign objects in the housing



Cylinder head screws used for explosion-proof connection of the housing body with the flanges, always have to be tightened evenly and crosswise with a tightening torque of 3.0 Nm

When closing the housing take absolute care that the cables are not damaged. Mechanical stress in the Ex d housing has to be avoided and the required bending radii have to be fulfilled.

5.2 Adjustment and operation via remote control (optional accessory)

The remote control is an optional accessory (not included). It allows the easy and comfortable adjustment of zoom and focus without having to open the housing.



Figure.5.4 – remote control

| Key term | Function |
|--------------|----------|
| UP / DOWN | Zoom |
| LEFT / RIGHT | Focus |

Tab.5.1 – Key assignment remote control

Please refer to our video-tutorial:

https://go.samcon.eu/excam_evario_01

5.3 Video converter (optional accessory)

To switch the image format from 16:9 to 4:3 the video converter is needed. It is an optional accessory and not included.

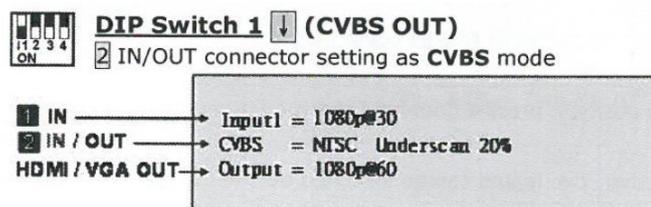


Figure.5.5 – Setting of the DIP Switch Videoconverter

To configure the Underscan, the arrow buttons have to be pressed: The left arrow minimizes the Underscan, the right arrow increases it. Maximum Underscan is up to 20%. By pressing both arrow buttons at the same time, the format can be selected 16:9 or 4:3. 3 possible signal-output-options (HDMI, VGA, CVBS/FBAS) can be displayed at the same time.

CVBS Output Mode:

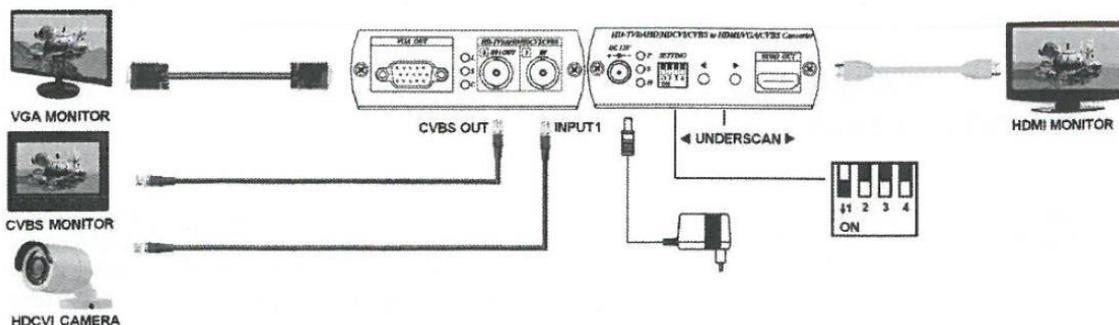
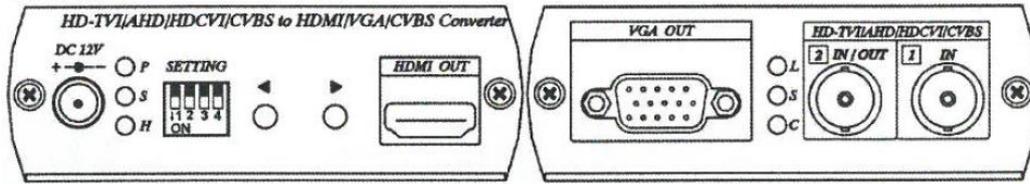


Figure.5.6 –Signal-output-variants



- | | |
|----------|------------------------------|
| DC 12 V | 12 V DC power supply |
| HDMI OUT | HDMI Out-connection |
| VGA OUT | VGA Out-connection |
| 1 IN | Camera Input (AHD IN 16:9) |
| 2 IN/OUT | Camera Output (FBAS OUT 4:3) |

Figure.5.7 – Panel-View

6 Maintenance / Servicing / Alterations

The national regulations concerning the maintenance and servicing of electrical devices within hazardous areas are to be observed.

The required maintenance intervals are specific to the individual devices. The operating company has to determine these intervals depending on the application parameters. During maintenance, focus has to be put on checking parts concerning the ignition protection category such as the integrity of the housing, the sealings and the cable glands. If maintenance measures are necessary they have to be initiated and/or executed.

7 Repairs and Maintenance

Repairs must only be carried out with original parts of SAMCON Prozessleittechnik GmbH. Damaged pressure-resistant housings have to be replaced completely. If in doubt, return the applicable part to SAMCON Prozessleittechnik GmbH.

Repairs concerning the explosion protection must only be carried out by SAMCON Prozessleittechnik GmbH or a qualified electrical technician authorized by SAMCON Prozessleittechnik GmbH in accordance with nationally applied regulations. Rebuilding of or alterations to the devices are not permitted.

8 Disposal / Recycling

When disposing of the device, nationally applicable regulations must be observed.

This document is subject to alterations and additions.

9 Drawings

The drawings below are technical drawings of the T08 ExCam e.Vario. Further drawings also for additional accessories, 3D models, STEP files and DXF shapes are available on the SAMCON homepage:

<https://www.samcon.eu/en/products/analog/excam-evario/>

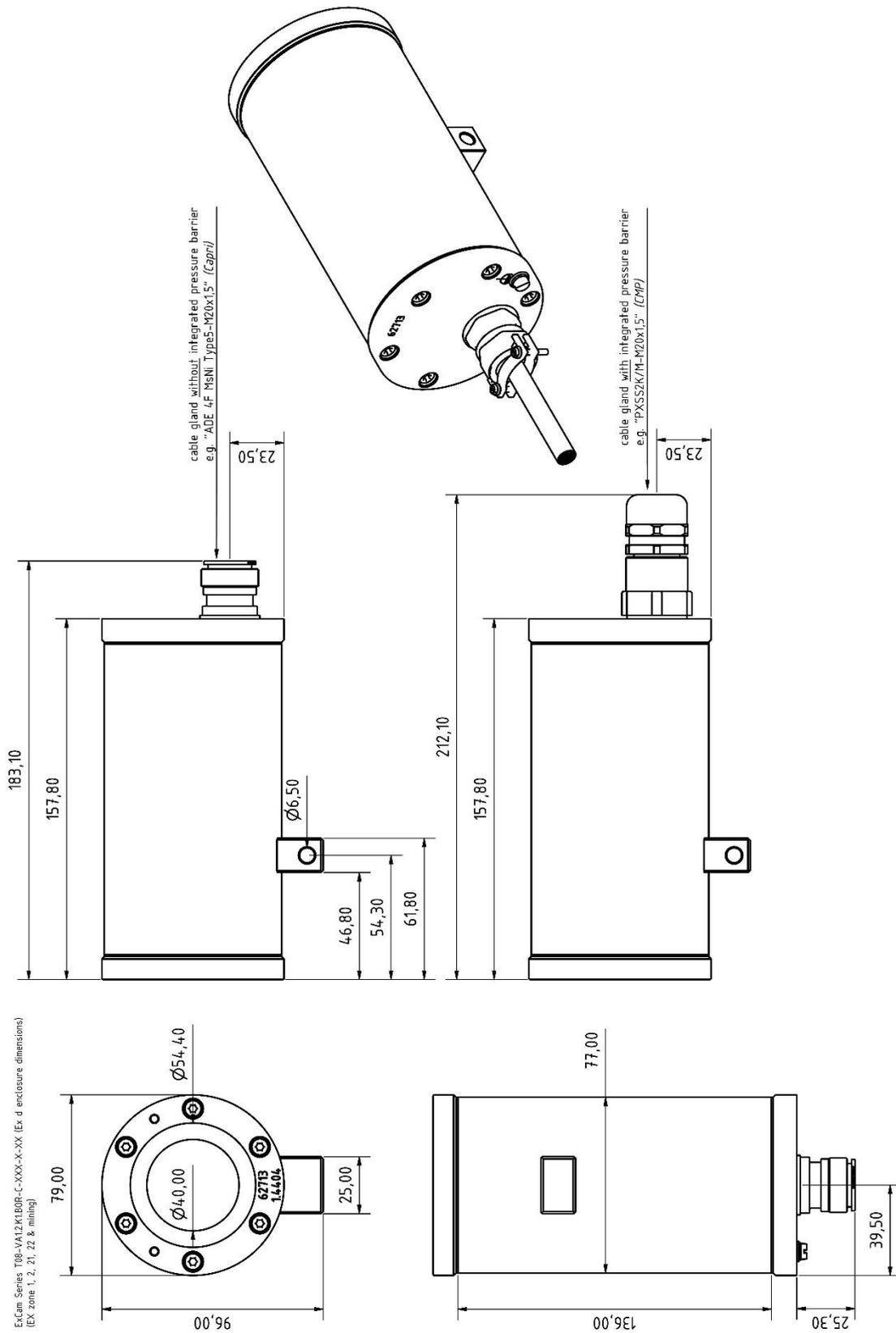


Figure 10.1 – Dimensions of the T08 ExCam e.Vario

10 Certificates and further documentation

Certificates and further technical documents can be found on our homepage:

<https://www.samcon.eu/en/products/analog/excam-evario/>

11 Notes



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