

RoughCam e.Vario



User Manual

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1 Introduction

The RoughCam e.Vario is a very compact and robust analog camera (type T10) which is manufactured by SAMCON Prozessleittechnik GmbH and can be used very flexibly for various industrial applications. The ExCam® e.Vario is a static camera system with a motorized lens and for fix installation.

The RoughCam series is suitable for indoor as well as outdoor applications. It is extremely robust and therefore perfect for even the roughest industrial conditions. The stainless steel housing allows additional alloys, a powder coating, or coats of varnishes as well as various mechanical accessories in order to extend the resistance towards extreme environmental conditions (salt water, acid, solar radiation, high mechanical strains etc.). Due to the usage of high-quality PTFE sealings, not only the protection level IP68 is reached but also the chemical resistance is maximized.

2 Technical Data

Protection level:	IP 68 (IEC/ EN 60529)
Transportation / storage temperature:	-5°C ... +55°C
Ambient temperature:	-10°C ... +50°C (Typ ... N.N...)
	-40°C ... +50°C (Typ ... L.N...)

2.1 Illustration of the model key

1) Productname	2) Type	3) Housing- combination	4) Temp.- range	5) Cable length [m]	6) Termination
ExCam e.Vario	T10-	VA1.2.K1.BOR-	N.N-	005.N-	P-
	T10-	VA1.2.K1.BOR-	N.N-	005.N-	K-
	T10-	VA1.2.K1.BOR-	L.N-	005.N-	P-
	T10-	VA1.2.K1.BOR-	L.N-	005.N-	K-

Table 2.1 – Model key

Explanations:

- 1) RoughCam e.Vario = Functional camera description of the RoughCam Series (technical data / specification of the individual camera module)
- 2) **T10** = SAMCON Production type 10 (for safe areas)
- 3) **VA1.2.K1.BOR** = T11 housing (stainless steel 1.4404) with small diameter ($\varnothing_{VA}=79\text{mm}$)
VA1.2.K1.BOR = T11 VA1.x 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) **N.N =** Normal ambient temperature range, no heater installed ($T_{amb} > -10^{\circ}\text{C}$)
N.N= No cooling system installed ($T_{amb} < +50^{\circ}\text{C}$)
L.N= PTC heater installed ($T_{amb} > -40^{\circ}\text{C}$)
- 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 0.75mm^2 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
 24VDC (Heater) (see electrical connection)

2.2 Electrical parameters

Power supply camera: 14VDC – 30VDC

Power supply heater: 20W @ -40°C @ 20VDC to 26VDC

Attention!

Per module, the switch-on power can reach $P_{max} > 100\text{W}$! Supply cable fine wire fuses have to be dimensioned accordingly by the end user.

*It is recommended to use, for example, type: **2000 mA -T- time-lag** (ESKA UL-micro fuse 20x5mm)*

The typical continuous power rating at artic temperature range ($T_{AMB} -60^{\circ}\text{C}$) is $P_{(-60^{\circ}\text{C})} = 14.8 \text{ W}$ at a saturated condition

The typical start-up peak at artic temperature range (-60°C) is $I_{max} \approx 4860\text{mA}$!

The typical in-rush-duration for $I_{PTC} < 1000\text{mA}$ per module is $t_{ON} \leq 45\text{s}$

The typical in-rush-duration for $I_{PTC} < 500\text{mA}$ per module is $t_{ON} \leq 120\text{s}$ (saturated range/ steady current)

2.3 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 2x2x0,25mm ² +4x0,75mm ² AWG24
Shielding:	Copper braid, multiple wires 0.10 vz, opt. coverage approx. 90%
Outer sheath/characteristics:	PUR FHF, halogen free, flame resistant (EN 60332-1-2), EMV shielded

2.4 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.

Data sheets:

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

2.5 Other technical data

Housing material:

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

Additional metallic and non-metallic materials of the T11-VA1.2.x.x 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 "IImadur 10/ I-420"

Internal materials:	Optical and electronical components, div. thermoplastic plastics: polyamide (PA6.6/ PA2000) and polyoxymethylene (POM) isolators and supporting adapters, aluminum die cast, zined (housing 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 <u>WMB-S</u>) 400 g (hood <u>WPR-VA1.2</u>) 50 g (hinge attachment <u>SCH-VA1.x</u>) (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)
<u>Flange / body</u>	Nominal diameter: 57 mm (plain cylindrical)
<u>Cable glands</u>	1x M20*1.5 _12 mm (ISO metrical fine thread acc. to <i>DIN13-2</i>), Quality 6H (medium or fine (acc. to <i>ISO 965-1 / ISO 965-3</i>
Media resistance:	<i>Exclusively checked upon request!</i> <u>Generally:</u> 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 housing ¹ , elastomer sealings of the cables, as well as the GYLON® flat seals of the housing flange, etc.)

¹ Protective coating, electro polishing, etc. ...

3 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 and the safety guidelines described in this user manual!

3.1 Step 1: Installation

Install the RoughCam® e.Vario at the desired location.



Attention!

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

3.2 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 RoughCam® Series has to be grounded via a PE-connection!

The T10 RoughCam® 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 RoughCam® e.Vario is manufactured with a cable pigtail reflecting the desired cable length. Any electro-technical or mechanical work inside the camera's 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 enclosure.

3.2.1 Potential equalization

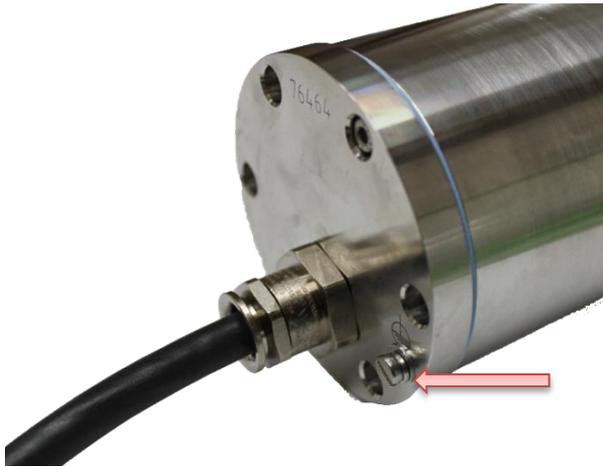


Figure 4.1 – PE connection RoughCam e.Vario

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

3.2.2 Connection and protection

Cable gland:
 ADE 4F MsNi Type5 - M20x1.5

Cable

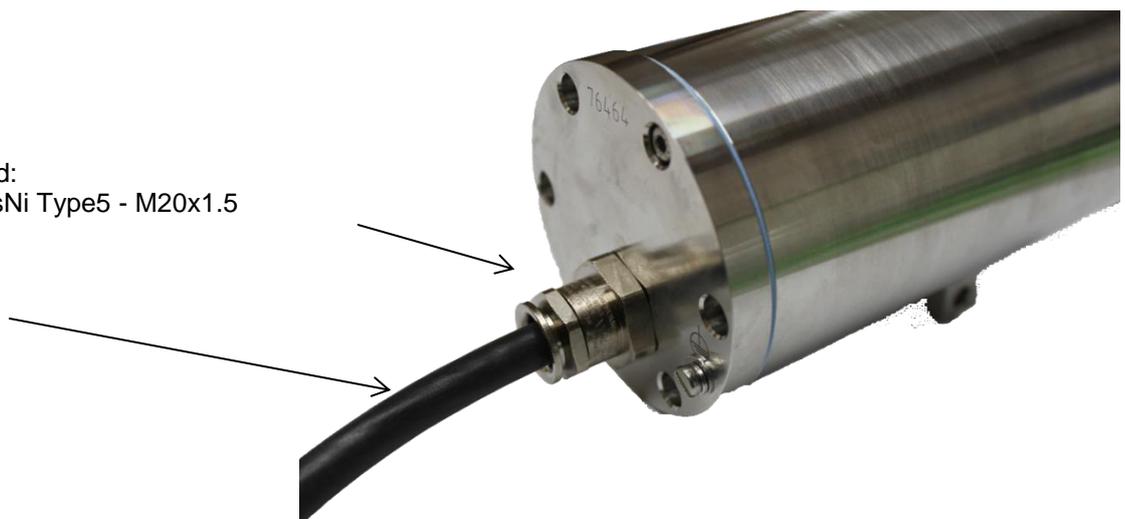


Figure 4.2 – Cable gland with cable

Figures 4.3 – 4.6 illustrate the possible cable terminations available for the RoughCam e.Vario.



Figure 4.3 – RoughCam e.Vario T10-VA1.2.K1.BOR-N.N-xxx.N-P



Figure 4.4 – RoughCam e.Vario T10-VA1.2.K1.BOR-L.N-xxx.N-P



Figure 4.5 – RoughCam e.Vario T10-VA1.2.K1.BOR-N.N-xxx.N-K



Figure 4.6 – RoughCam e.Vario T10-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 and the optional heating mode is also conducted via this cable.

3.2.2.1 Power supply & protection of the camera circuit



Attention!

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

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)!

3.2.2.2 Power supply & protection of the heating's power circuit (optional)

The power supply is to be carried out via the grey (GY) as well as the white (WH) strand.

Connection table:

Potential	Color (IEC 60757)	Potential level	Profile	Comments
V+	GY	+20 VDC...+26 VDC	0.75 mm ²	
V-	WH	0 VDC / GND	0.75 mm ²	

Table 4.4 – Electrical connection PTC heating element (CB06)

The heating's maximum power consumption is 20.0 Watt (type L).

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
24 V DC	≤ 200 m	2000 mA - T -delay fuse-	Inrush current peak type „L“ ≥ 2000mA (depending on the ambient temperature/ PTC characteristic)

Table 4.5 – Supply protection PTC heating element type „L“

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

3.2.2.3 Video picture connection (FBAS or AHD)

Depending on the model key, the video signal of the RoughCam® 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 (T10-VA1.2.K1.BOR-N.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 4.6 – Terminal block connection FBAS signal

Connection table (T10-VA1.2.K1.BOR-N.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 4.7 – Plug connection FBAS signal

3.2.2.4 Control signal connection (RS485)

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

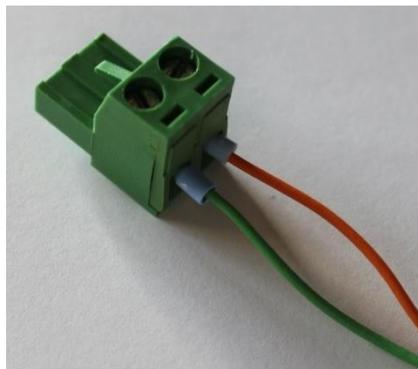


Figure 4.7 – RS485 pin assignment

Connection table (T10-VA1.2.K1.BOR-N.N-xxx.N-X)

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

Table 4.8 – Control signal

3.2.3 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!

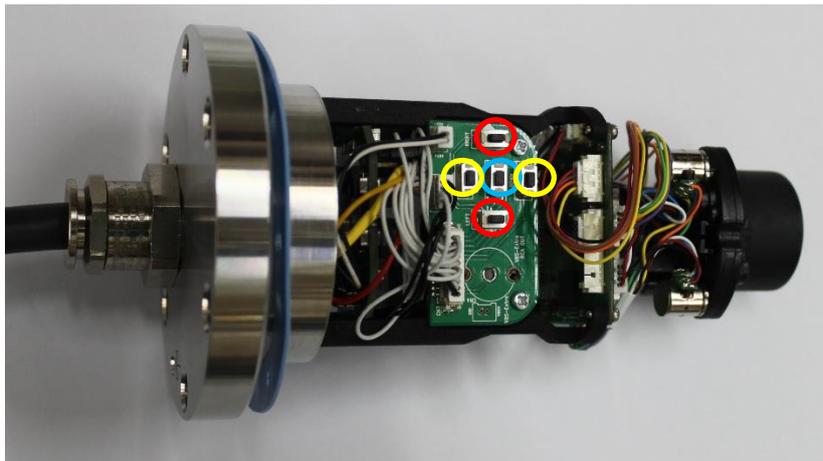
Do not switch on the camera at temperatures below 0°C!

4 Handling and Settings

4.1 Manual adjustment of the camera image

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

For manual adjustments, manual parametrizations at the camera modul have to be made. For this, the 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 – RoughCam® e.Vario – Lens and sensor board



Information!

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

If desired, we customize the RoughCam® 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).

4.1.1 Work preparation

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

4.1.2 Opening the housing

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

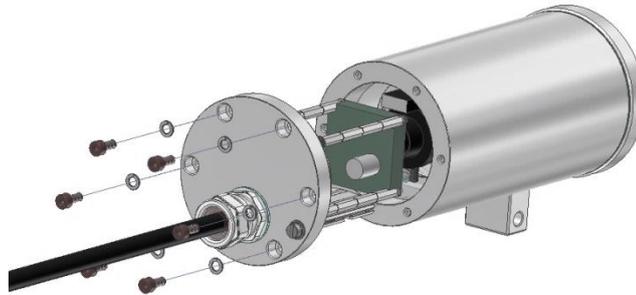


Figure 5.2 – Opening the RoughCam e.Vario

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. 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 trough!):

1.



2.



3.



4.



Figure 5.3 removing the camera

4.1.3 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.)!

4.1.4 Adjustment of the image sharpness (focus)

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

4.1.5 Further possibilities to optimize image quality

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

4.1.6 Closing of the housing

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

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!

Do not lock-in any foreign objects in the housing

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

4.2 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

Table 5.1 – Key assignment remote control

Please refer to our video-tutorial:

https://go.samcon.eu/excam_eario_01

4.3 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.



DIP Switch 1 (CVBS OUT)
 2 IN/OUT connector setting as CVBS mode

1 IN	→	Input1 = 1080p@30
2 IN / OUT	→	CVBS = MISC Underscan 20%
HDMI / VGA OUT	→	Output = 1080p@60

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:

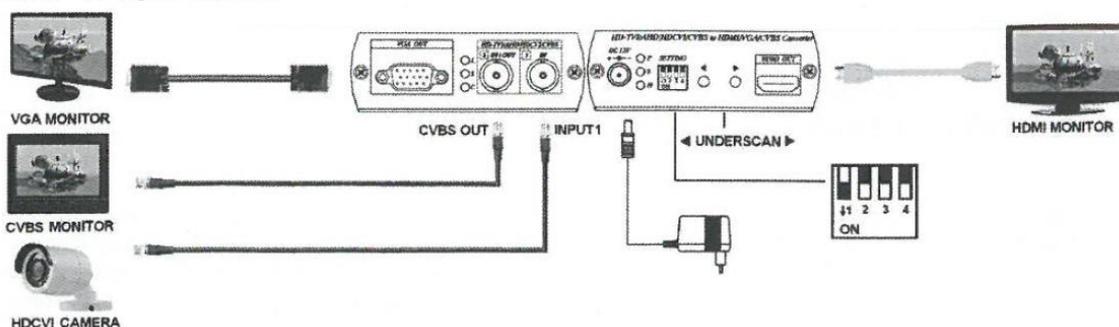
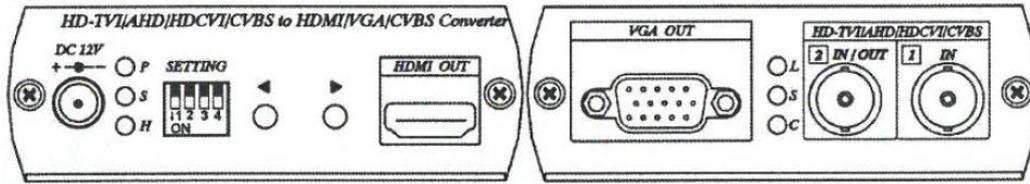


Figure.5.6 –Signal-output-variants



- | | |
|----------|------------------------------|
| 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

5 Maintenance / Servicing / Alterations

The national regulations concerning the maintenance and servicing of electrical devices 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. If maintenance measures are necessary they have to be initiated and/or executed.

6 Repairs and Maintenance

Repairs must only be carried out with original parts of SAMCON Prozessleittechnik GmbH.

Repairs 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.

7 Disposal / Recycling

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

This document is subject to alterations and additions.

8 Drawings

The drawings below are technical drawings of the T10 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/roughcam/roughcam-evario/>

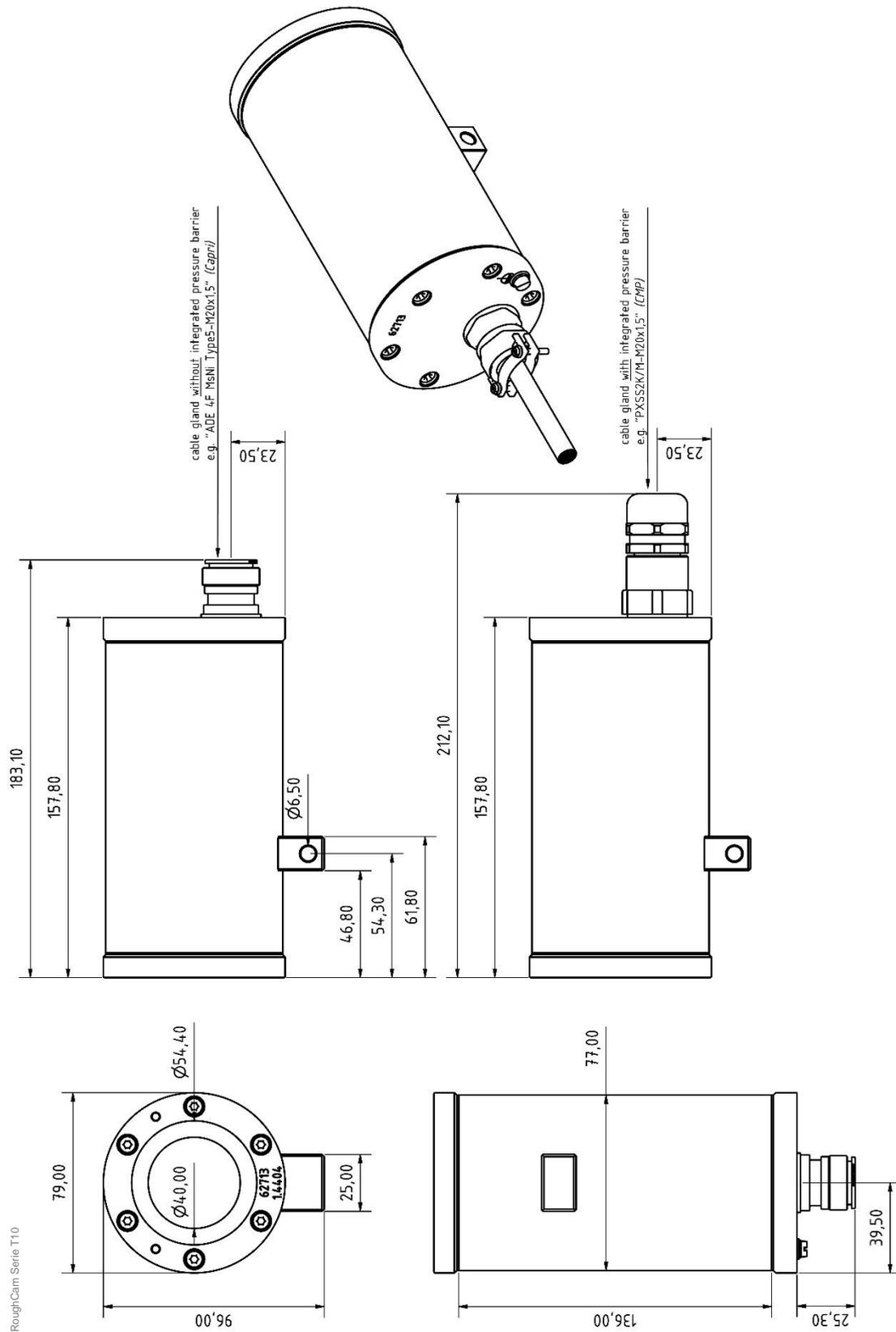


Figure 10.1 – Dimensions of the T10 RoughCam e.Vario



SAMCON

Schillerstrasse 17, 35102 Lohra-Altenvers
www.samcon.eu, info@samcon.eu
fon: +49 6426 9231-0, fax: - 31

