



## Operating Manual

## Camera Housing Sets

EN-US

# Table of Contents

<b>1. General Information</b> .....	<b>3</b>
<b>2. General Safety Instructions</b> .....	<b>5</b>
<b>3. Housing Set Models</b> .....	<b>6</b>
3.1 Housing Base Set A VCXG.I r IP65/67 HA.....	6
3.1.1 Environmental Requirements .....	9
3.1.2 Tube assembly .....	9
3.2 Housing Base Set B V4A VCXG.I r IP69K .....	11
3.2.1 Environmental Requirements .....	13
3.2.2 Clamp elements assembly .....	14
3.2.3 Cable gland .....	17
3.2.4 Rear wall assembly .....	19
3.2.5 Tube assembly .....	22
3.2.6 Approved cables .....	23
3.3 Housing Base Set C V4A VCXG.I r IP65/67 .....	24
3.3.1 Environmental Requirements .....	28
3.3.2 Tube assembly .....	29
<b>4. IP rating and chemical resistance</b> .....	<b>30</b>
4.1 IP Protection Classes (EN 60529) .....	30
4.2 Chemical resistance of sealing materials.....	31
4.2.1 EPDM, TPE .....	31
4.2.2 Flouroprene® XP .....	32
4.2.3 Acrylic glass.....	33
4.2.3.1 Alcohols, mono- and polyhydric.....	33
4.2.3.2 Organic solvents, fuels .....	34
4.2.3.3 Acids (organic and inorganic) .....	36
4.2.3.4 Leach.....	37
4.2.3.5 Salts, inorganic and organic (saturated solutions).....	38
4.2.3.6 Inorganic compounds .....	40
4.2.3.7 Organic compounds .....	40
<b>5. Cleaning</b> .....	<b>41</b>
5.1 Cleaning and care of acrylic glass (Tube M60 / M62).....	41

# 1. General Information

Thanks for purchasing a product of the Baumer family. This user's guide explains how to install cameras in an enclosure to protect your vision system and achieve IP 69 K protection.



Read this manual carefully and observe the notes and safety instructions!

## Support

In case of any questions please contact our Technical & Application Support Center.

Worldwide: **Baumer Optronic GmbH**  
Badstrasse 30  
DE-01454 Radeberg, Germany

Tel: +49 (0)3528 4386 845

Website: [www.baumer.com](http://www.baumer.com)

E-mail: [support.cameras@baumer.com](mailto:support.cameras@baumer.com)

## Target group for this User's Guide

This user's guide is aimed at experienced users, which want to integrate camera(s) into an enclosure.

## Intended Use

The enclosure is used to protect a built-in camera in a production environment. Once the camera is mounted in an enclosure, it can be easily adjusted and robustly installed on the machine.

### Notice

Use the enclosure only for its intended purpose!

For any use that is not described in the technical documentation poses dangers and will void the warranty. The risk has to be borne solely by the unit's owner.

## Classification of the safety instructions

In the user's guide, the safety instructions are classified as follows:

### Notice

Gives helpful notes on operation or other general recommendations.



### Caution!



Indicates a possibly dangerous situation. If the situation is not avoided, slight or minor injury could result or the device may be damaged.

## Disposal



Dispose of outdated products with electrical or electronic circuits, not in the normal domestic waste, but rather according to your national law and the directives 2002/96/EC and 2006/66/EC for recycling within the competent collectors.



Through the proper disposal of obsolete equipment will help to save valuable resources and prevent possible adverse effects on human health and the environment.



The return of the packaging to the material cycle helps conserve raw materials and reduces the production of waste. When no longer required, dispose of the packaging materials in accordance with the local regulations in force.

Keep the original packaging during the warranty period in order to be able to pack the device properly in the event of a warranty claim.

## Warranty Notes

If it is obvious that the device is / was reworked or repaired by other than Baumer technicians, Baumer Optronic will not take any responsibility for the subsequent performance and quality of the device!

## Copyright

Any duplication or reprinting of this documentation, in whole or in part, and the reproduction of the illustrations even in modified form is permitted only with the written approval of Baumer. The information in this document is subject to change without notice.

## 2. General Safety Instructions

### Notice

Please observe the instructions and notes in the technical documentation of the camera to be installed!

#### Caution



The suitability of the product for the users application **with its specific conditions of practice has to be tested and guaranteed by the user himself.**

For special applications, please contact us in writing. We reserve the right to make technical changes.

#### Caution



Please follow these assembly guidelines carefully when assembling the enclosures, as the IP protection rating stated may otherwise not be reached!

#### Caution



Inappropriate handling of the enclosure or any parts thereof may lead to a leaky enclosure and may cause damage to the enclosed camera. Baumer can take no liability for damages caused by improper handling.

#### Caution



The enclosures have been designed for a typical machine vision application where the camera set-up is done once in order to build an application. Frequent disassembly of the enclosure requires all seals and gaskets to be renewed. Please order replacement seals or O-rings from Baumer when disassembling the enclosure.

#### Caution



Baumer uses the best possible sealing materials for typical applications. However every application is different - please check if our sealing material is durable under the use intended.

#### Caution



Do not assemble the enclosure if any parts are damaged – this counts especially for the seals and sealing flanges of the enclosure! In doubt – please contact Baumer for advice.

#### Caution

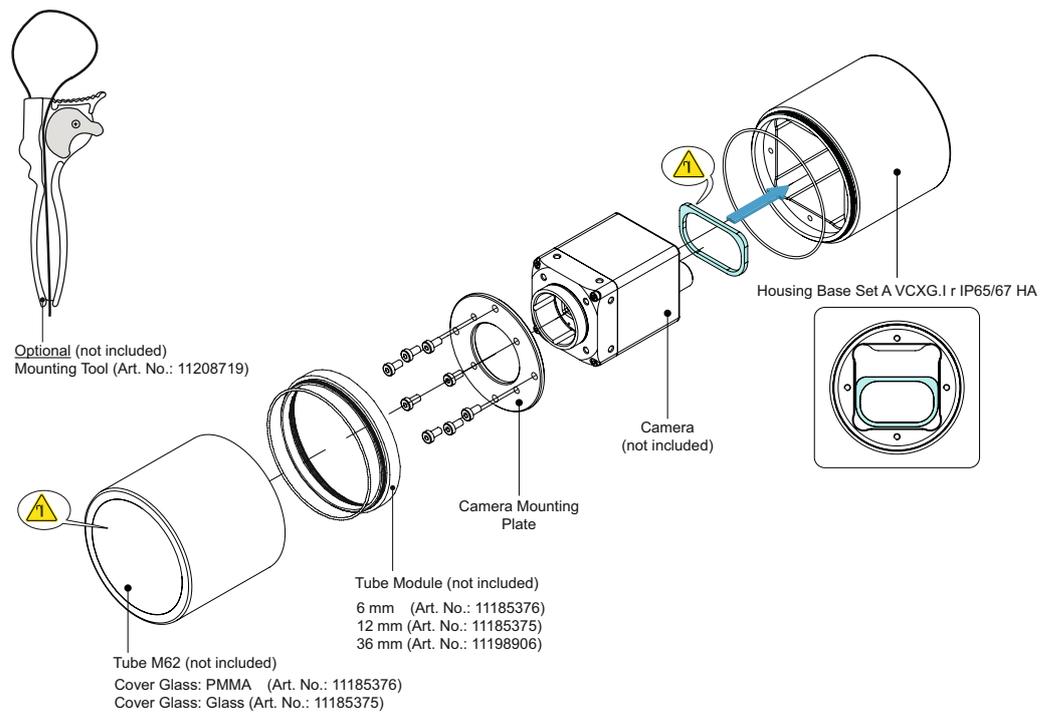


Tighten the tube / rear wall as far as possible and don't use excessive force in case it is not possible to screw the tube / rear wall completely down to the metal middle housing part.

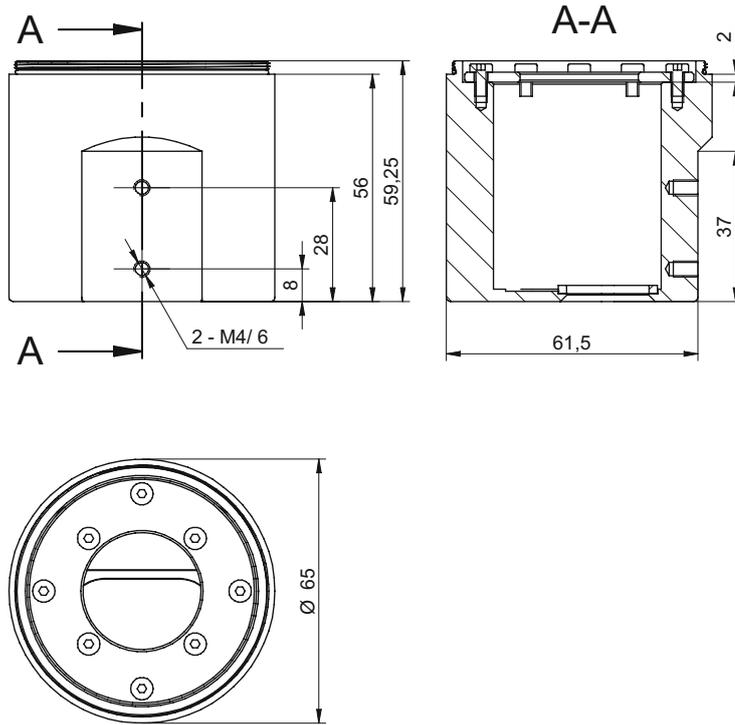
### 3. Housing Set Models

#### 3.1 Housing Base Set A VCXG.I r IP65/67 HA

- Hard anodized cylindric housing corpus for VCXG.I (.XT) cameras for modular housing to meet Parma and Food & Beverage applications requirements
- optional tube extension with Tube Module 6 mm (11185376), Tube Module 12 mm (11185375) or Tube Module 36 mm (11198906).
- thread: M62
- length 56 mm

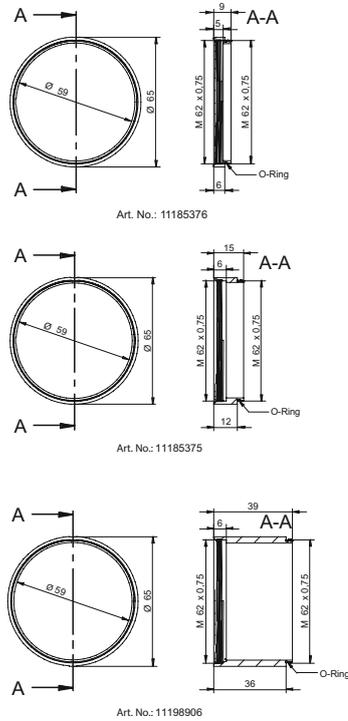


## Dimensions

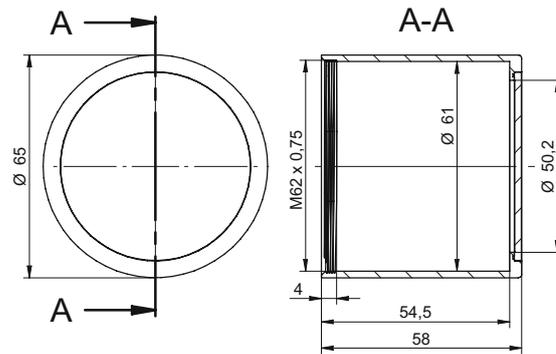


## Tube Moduls

For the installation of longer lenses, Tube Moduls with different lengths are available.



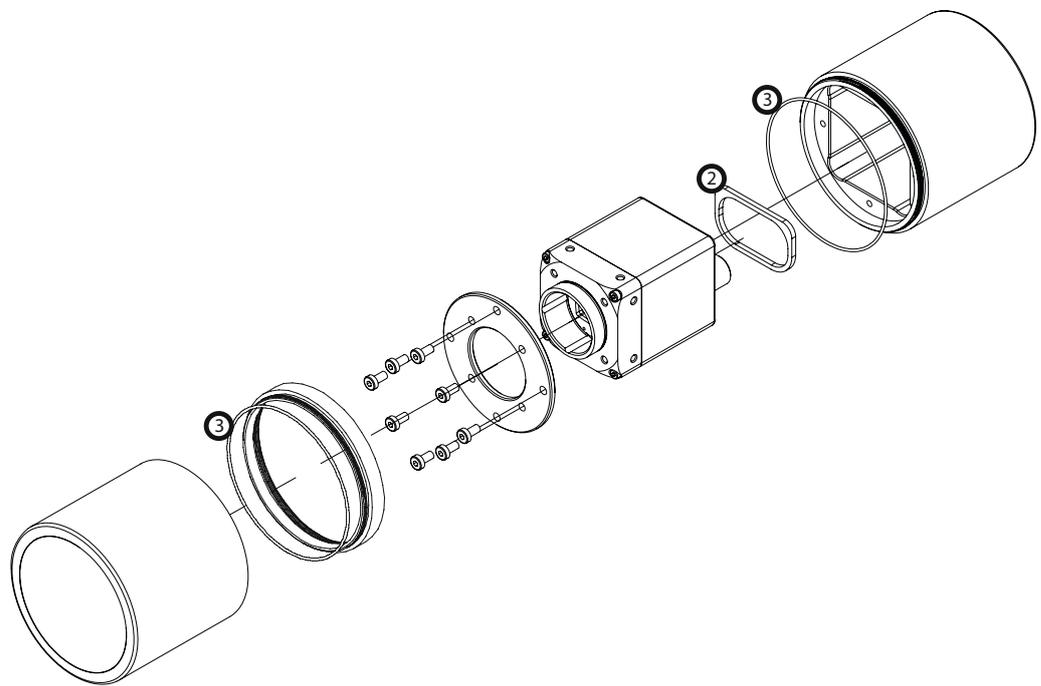
## Tube



Cover Glass: PMMA (Art. No.: 11185374)

Cover Glass: Glass (Art. No.: 11701125)

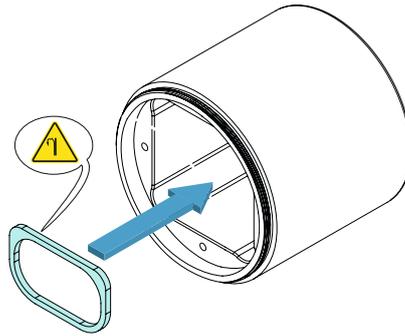
## Sealing material



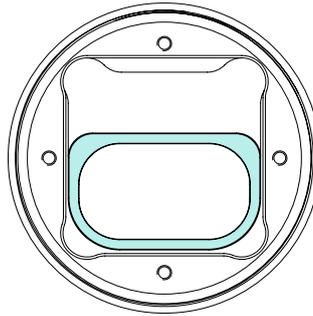
No.	Material
2	EPDM cellular rubber
3	EPDM

### Assembly the seal in the housing

Pull off the backing film from the seal.



Glue the seal in the housing as shown.



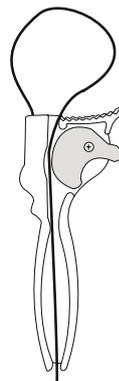
### 3.1.1 Environmental Requirements

Operating temperature	-40 °C (-40 °F) ... 70 °C (158 °F)
Humidity	10 % ... 90 % non condensing

### 3.1.2 Tube assembly

#### Optional Tool

Housing Mounting Tool  
(Art. No.: 11208719)



After positioning the camera, mount the Tube M62.

Check the sealing surfaces for possible damages and scratches.

Feed the mounting tool over the enclosure lid at the round hole end.

Slide the tool over the lid in a way that it sits between the jaws of the tool. Insert the enclosure completely and straight into the tool in order to avoid scratching the enclosure lid!

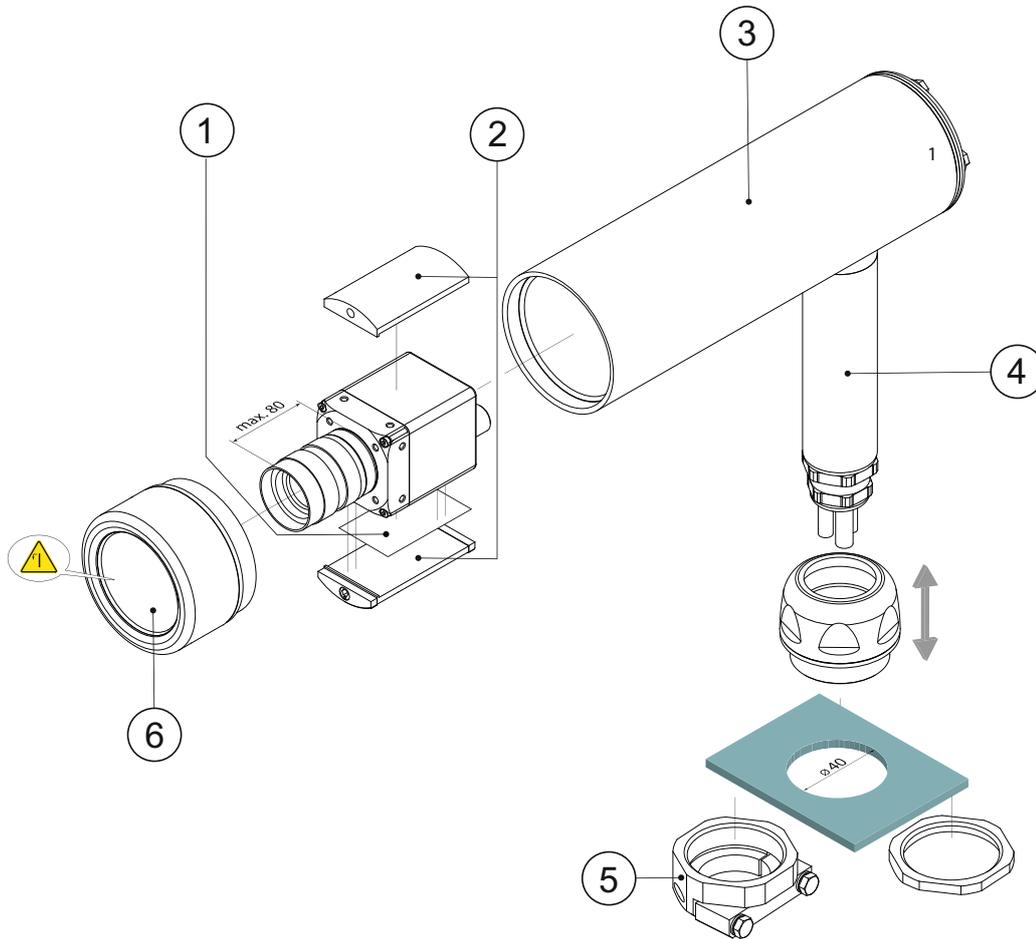
Tighten the lid firmly until no gaps are visible at the seal.

**Do not tighten the lid so tight that the seal forms a bead and protrudes over the housing!**



### 3.2 Housing Base Set B V4A VCXG.I r IP69K

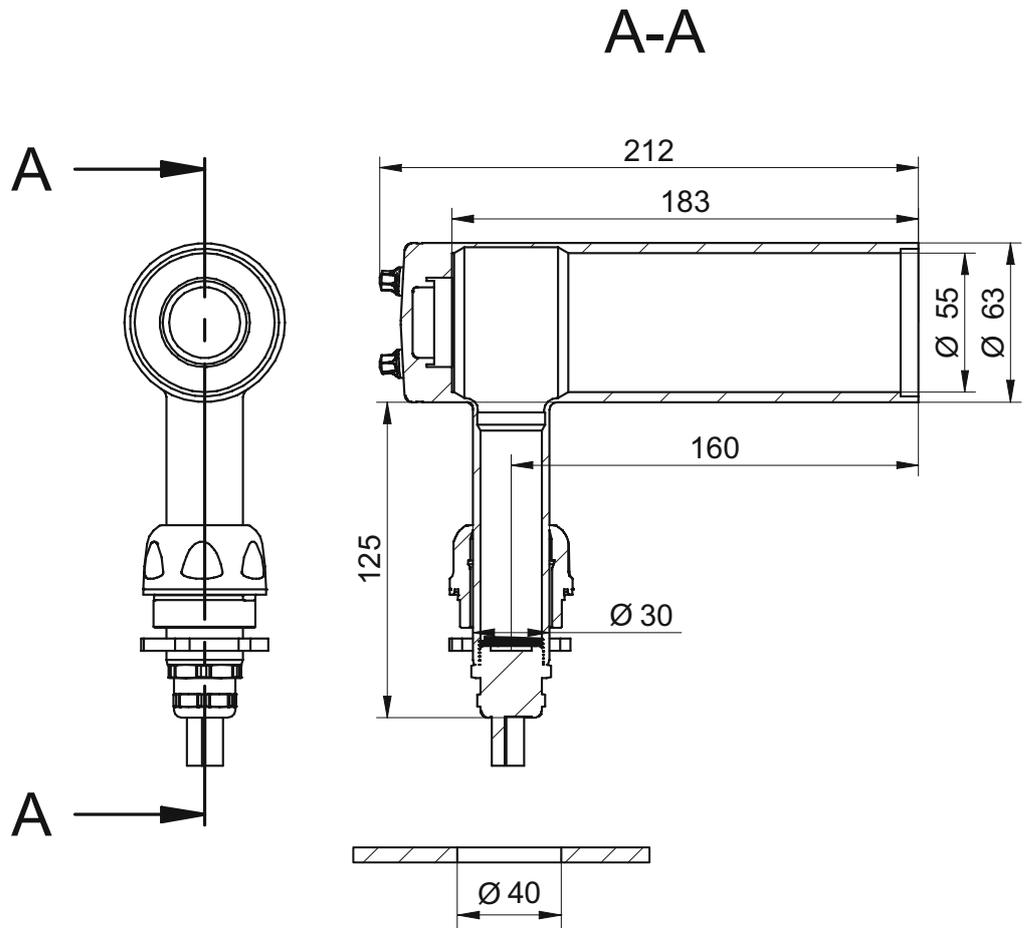
- For lenses up to 55 mm diameter (52 mm front lid) and VCXG.I (.XT) cameras
- Stainless steel 1.4404
- Compact size
- Robust construction
- Vibration-proof mounting
- IP 69K rating
- Design according to EHEDG guidelines: Hygienic design with 3 mm radii (washdown design) and hygienic surface (roughness < 0.8 µm, electropolished)
- Excellent heat dissipation



No.	Description	No.	Description
1	Thermal pad	4	Handle
2	Clamp elements for VCXG.I (.XT) camera  Clamp elements for VCXx camera available (11217114)	5	Rotation lock M40 V4A IP69K (11208731), Optional
3	Housing Base Set B V4A VCXG.I r IP69K	6	Tube M60 V4A IP69K Acryl (11208732) mandatory, tube has to be ordered separately

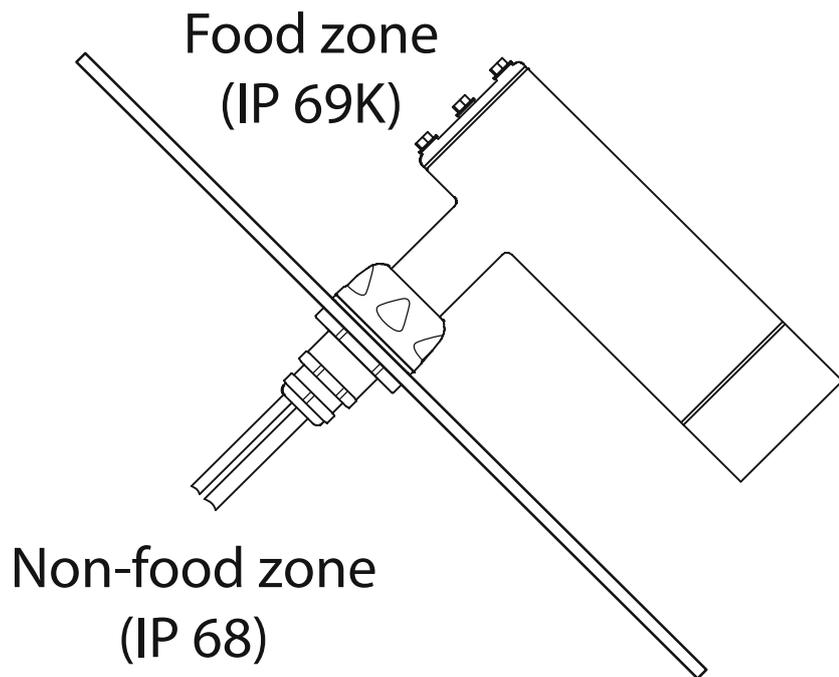
Camera, lens and cables not included.

## Dimensions

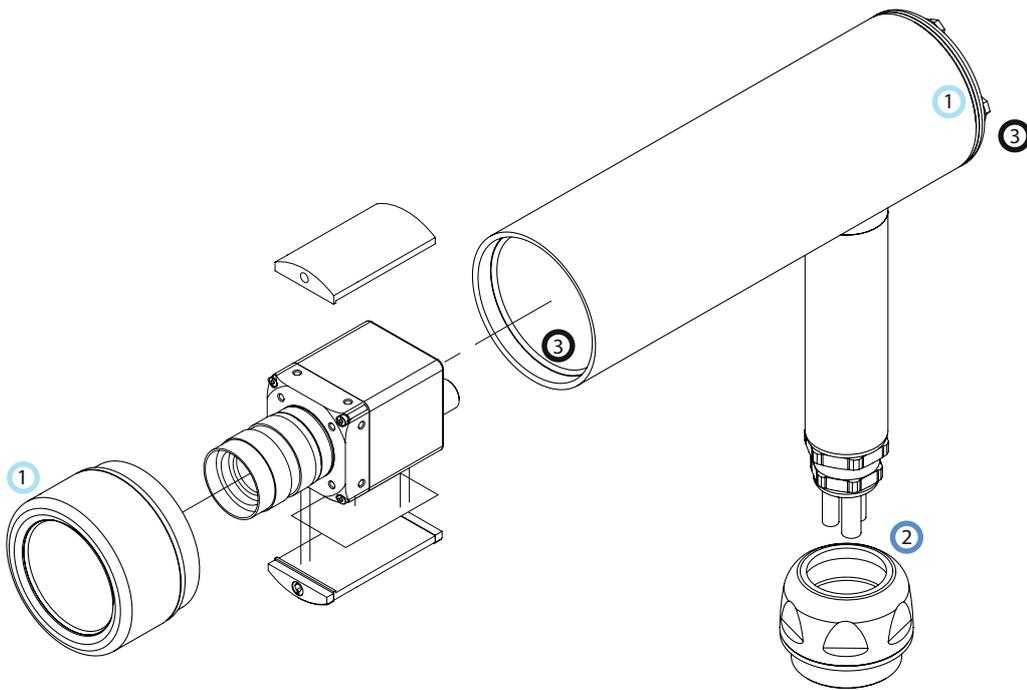


## Mounting and cable exit

Assembly on a machine with cable routing through handle.



## Sealing material



No.	Material
1	EPDM O-Ring
2	EPDM O-Ring
3	EPDM O-Ring

### 3.2.1 Environmental Requirements

Operating temperature                      -15 °C (-5 °F) ... 70 °C (158 °F)

Humidity    10 % ... 90 % non condensing

Ambient temperature above 50 °C (122 °F) requires heat dissipation measures.

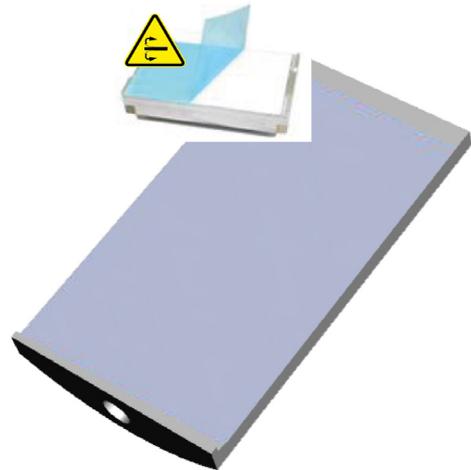
#### Notice

The housing improves the temperature management for the camera in use, the environmental temperature may be 5 K higher than in applications without housing.

### 3.2.2 Clamp elements assembly

The mounting with clamp elements ensures flexible camera positioning and good heat dissipation. Follow these steps for a vibration proof camera positioning.

1. Remove the blue cover foil from the double sided adhesive heat conductive tape.

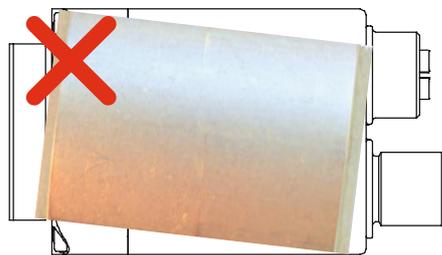


2. Place the clamp element with the adhesive tape on the top side of the camera.

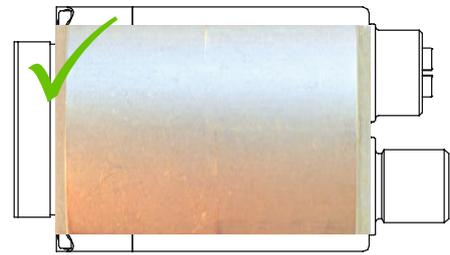
#### Notice

The alignment of the clamp element (straight and in the centre of the camera) determines the orientation of the camera inside the enclosure.

The more accurate the positioning of the clamp element, the more accurate the camera positioning later inside the enclosure.



Clamp element misaligned



Clamp element correctly placed (straight and centred)

3. Place the quick-lock element loose onto the opposite side of the camera body.

No adhesive tape is required here, as the clamp element block already determines the camera orientation.



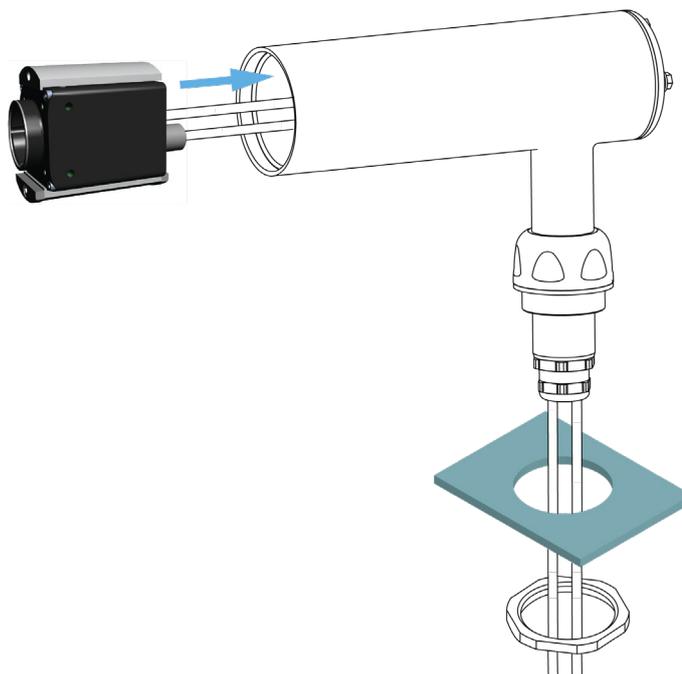
4. The dot mark on the two eccentric screws should face the camera, prior to insertion of this assembly into the enclosure profile (otherwise the camera assembly is too high to fit into the enclosure).



5. Insert the camera assembly into the enclosure. At this point, the camera cables should already be attached to the camera.

#### Notice

The rubber cable gland seal insert can be mounted later – this makes it easier to mount the camera into the enclosure! Do not forget to feed the cables through the cable gland nut first!

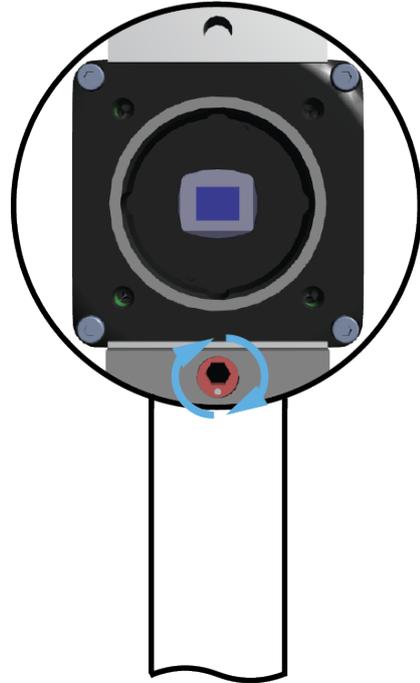


6. In order to secure the camera assembly in position, turn the eccentric screw at the front clockwise or anti-clockwise!

The clamp elements are fully extended, if the dot mark points to the enclosure wall.

However, depending on the camera tolerances, it might not be required to fully extend the clamp elements – a quarter turn might be sufficient. A fastening torque of 2Nm is sufficient in order to reach a clamping force of 900N, so a firm but not excessive tightening is recommended.

Position the lens so that it protrudes no more than 23 mm from the edge of the Housing Base Set B, otherwise the tube will not fit!

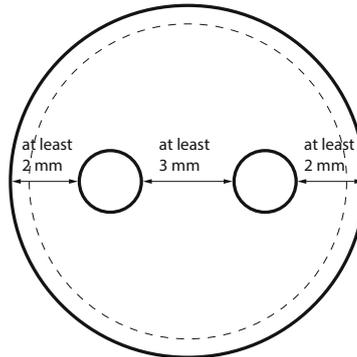


### 3.2.3 Cable gland

#### Notice

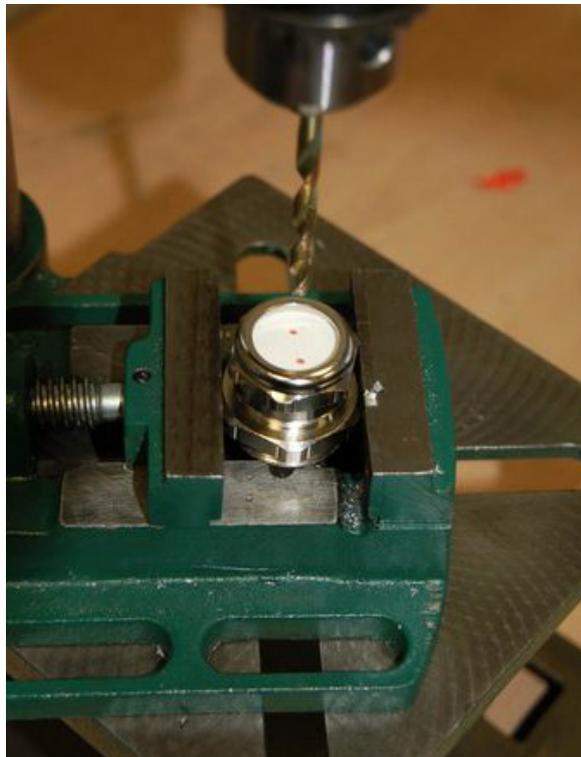
The cable gland maintains the high IP68 rating if done carefully!

1. Position the holes evenly across the seal insert with at least 2 mm distance to the rim of the cable gland and 3 mm distance between the holes.



2. Drill the holes with a vertical axis drilling machine - no hand held ones!

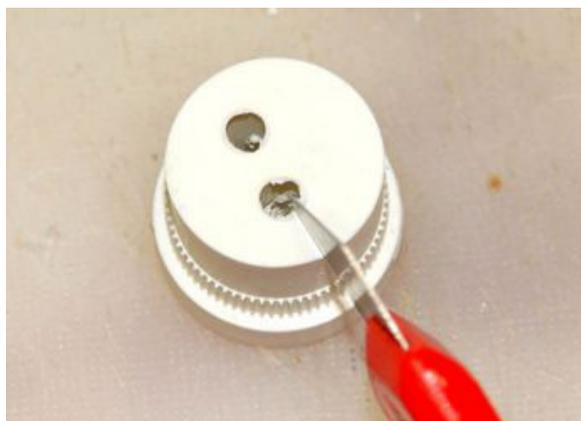
Use a normal HSS drill bit, with diameter about 0,5 mm larger than the cable diameter (this makes an exact hole with the soft material).



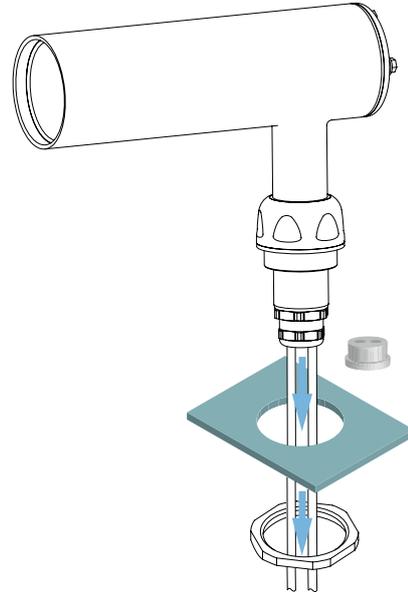
3. After drilling, slit the seal insert radial from the holes to the outside, using a sharp cutting knife.

#### Notice

Do not use a sawing motion, but rather cut straight through for a cleaner cut.



4. Feed the cables through the nut and the cable gland.



5. After cable and camera positioning insert the cables from the side into the seal insert. These special pliers are helpful – alternatively use a screwdriver to open up the cut in the cable gland seal.



**Notice**

Take care not to damage the cable gland seal during this process!

6. Push the seal insert with the cables into the cable gland.

Tighten the cable gland nut with the recommended fastening torque (15 Nm).



**⚠ Caution**



Tighten the cable glands with the recommended fastening torque. Excessive fastening torque may damage the sealing O-rings.

Insufficient tightening torques may reduce the protective rating (i.e. from IP67 to IP54).

### 3.2.4 Rear wall assembly

The rear wall preparation is done ex works from Baumer. However – please note these steps in case the rear wall has been dismantled.

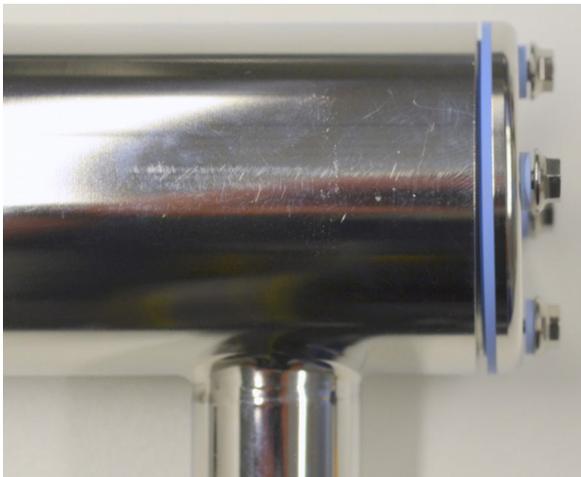


Housing Base Set B with bayonet rear wall

1. Place the rear wall on the back of the housing. To do this, insert the protruding noses into the grooves.



To do this, loosen the 4 screws by approx. 1.5 mm (2 turns).



3. Turn the rear wall clockwise one eighth turn (45°) until it stops.

**Notice**

If no stop is noticeable, then you must tighten the screws a little.

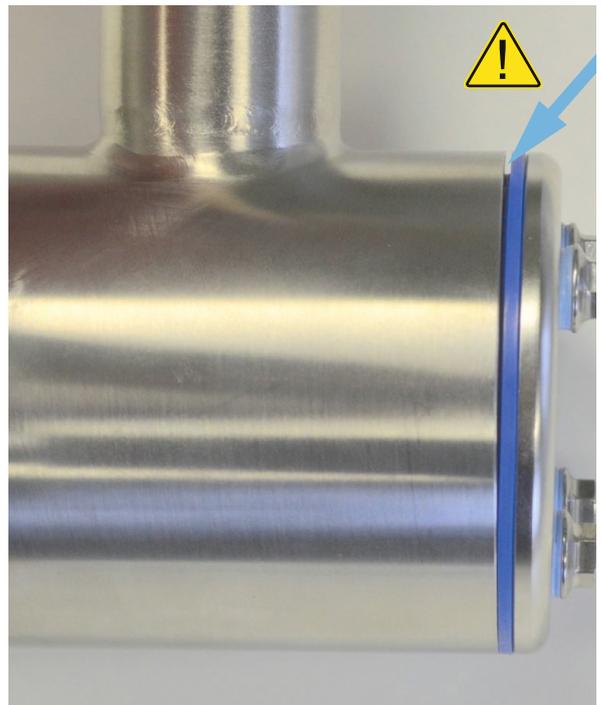


4. Tighten the screws crosswise only so far that the light blue cover seal is flush with the surface of the housing.

Do not tighten the lid so tight that the seal forms a bead and protrudes over the housing!



Avoid gaps between seal and enclosure!



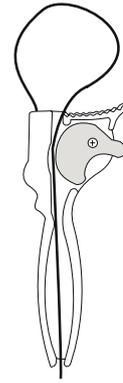
5. After assembly, the internal view should look like this.



### 3.2.5 Tube assembly

#### Optional Tool

Housing Mounting Tool  
(Art. No.K11208719)



After positioning the camera, mount the Tube M60.

Check the sealing surfaces for possible damages and scratches.

Feed the mounting tool over the enclosure lid at the round hole end.

Slide the tool over the lid in a way that it sits between the jaws of the tool. Insert the enclosure completely and straight into the tool in order to avoid scratching the enclosure lid!

Tighten the lid firmly until no gaps are visible at the seal.

**Do not tighten the lid so tight that the seal forms a bead and protrudes over the housing!**

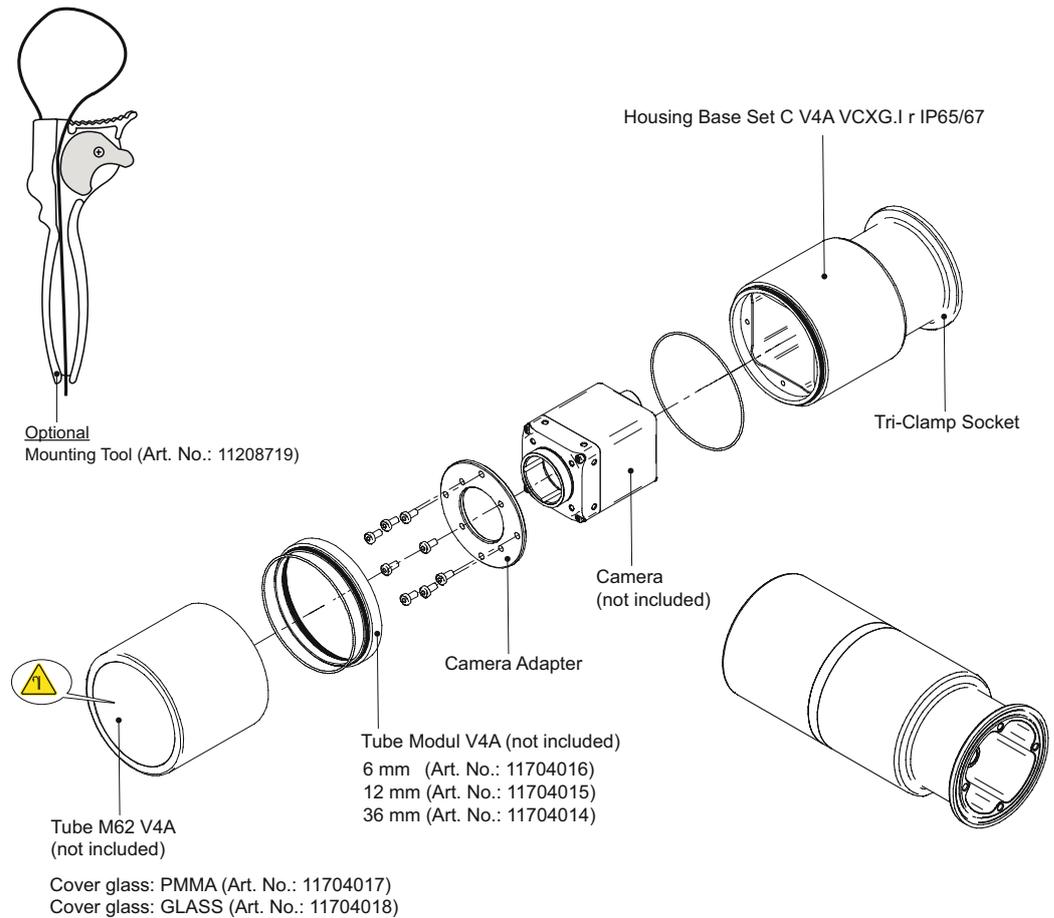


### 3.2.6 Approved cables

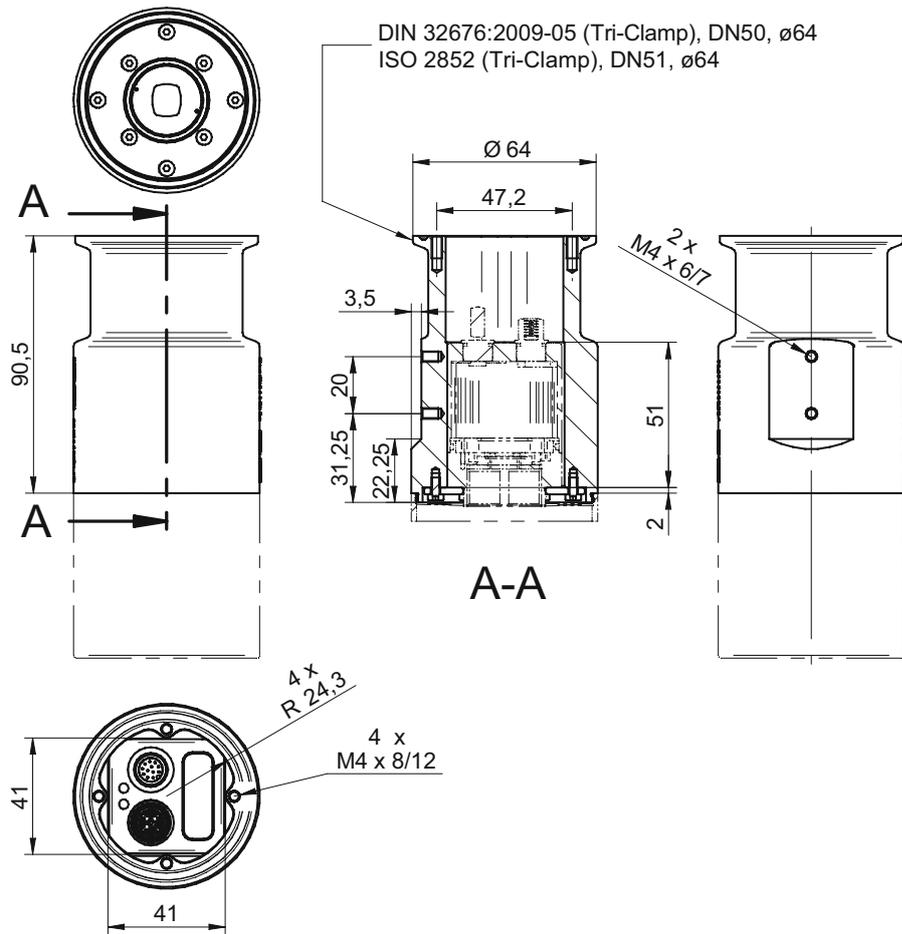
Article number	Designation	Smallest bending radius, fixed installation	Suitability @ IObj ≤ 50mm
<b>VCXG.I(.XT)</b>			
11185139	Cable GigE M12X/RJ45, 2.0m, STP, flex	35.34mm	no
11195760	Cable GigE M12X/RJ45, 5.0m, STP, flex		
11195761	Cable GigE M12X/RJ45, 10.0m, STP, flex		
11195762	Cable GigE M12X/RJ45, 15.0m, STP, flex		
11196995	Cable GigE M12X/RJ45, 20.0m, STP, flex		
11185190	Cable GigE M12X/RJ45, 30.0m, STP, flex		
11201118	ESG 34JP0200GS	30 mm	yes
11195097	ESG 34JP0500GS		
11195098	ESG 34JP1000GS		
11195099	ESG 34JP2000GS		
11201128	ESW 33JP0200GS		
11195094	ESW 33JP0500GS		
11195095	ESW 33JP1000GS		
11195096	ESW 33JP2000GS		
<b>VCXG</b>			
11150185	Cable GigE RJ45s/RJ45, 5.0 m, chain	39.6 mm	yes
11150302	Cable GigE RJ45s/RJ45, 10.0 m, chain		
11150186	Cable GigE RJ45s/RJ45, 15.0 m, chain		
11150188	Cable GigE RJ45s/RJ45, 20.0 m, chain		
11173256	Cable GigE RJ45s/RJ45, 10.0m, flex v2	42 mm	yes
11173257	Cable GigE RJ45s/RJ45, 20.0m, flex v2		
11173258	Cable GigE RJ45s/RJ45, 30.0m, flex v2		
11232597	CAM8.A8-11232597	29.5 mm	yes
11232598	CAM8.A8-11232598		
11232605	CAM8.A8-11232605	33 mm	yes
<b>VCXU</b>			
11702660	KSG U2/KSGU6GC0300G	62 mm	yes
11702816	KSG U2/KSGU6GC0500G	62 mm	no

### 3.3 Housing Base Set C V4A VCXG.I r IP65/67

- For VCXG.I (.XT) cameras
- Stainless steel 1.4404
- Compact size
- Robust construction
- Vibration-proof mounting
- IP 65/67 rating
- Design according to EHEDG guidelines: Hygienic design with 3 mm radii (washdown design) and hygienic surface (roughness < 0.8 µm, electropolished)
- Excellent heat dissipation

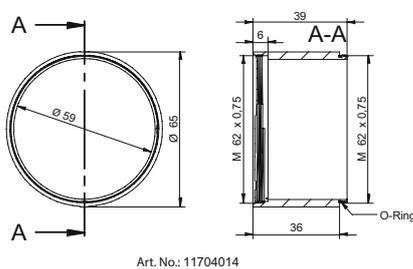
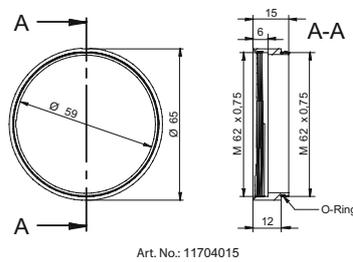
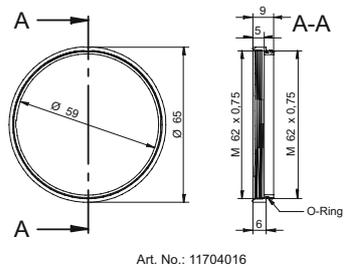


## Dimensions

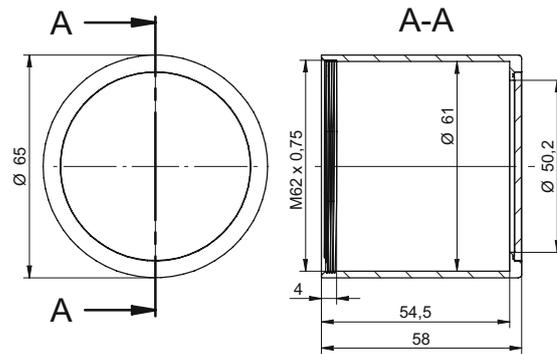


## Tube Moduls

For the installation of longer lenses, Tube Moduls with different lengths are available.



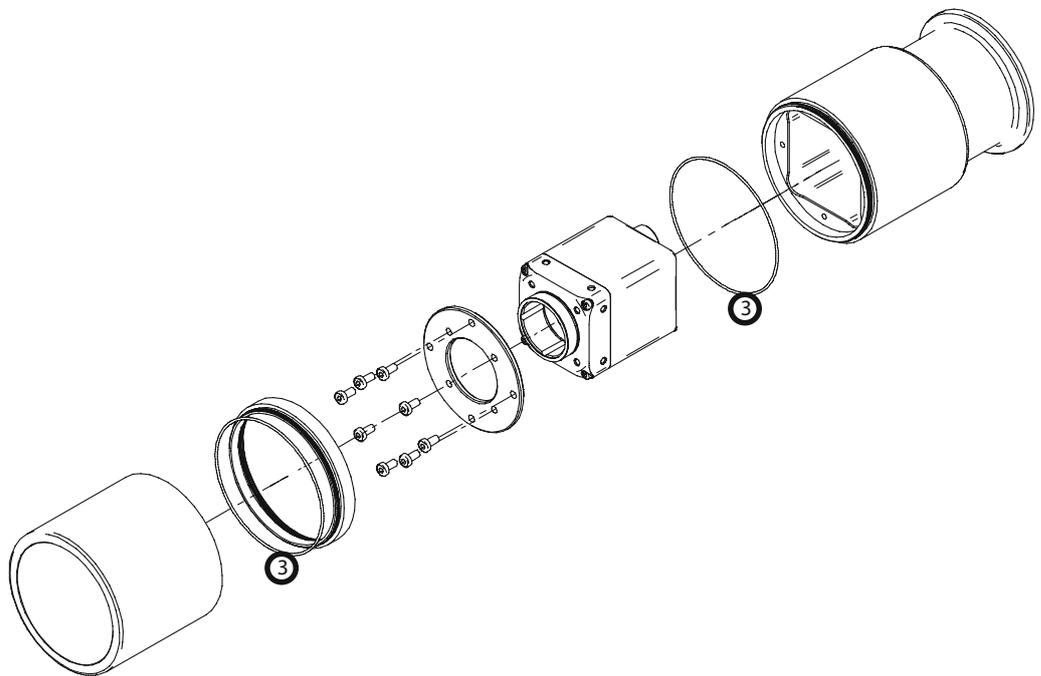
## Tube



Cover Glass: PMMA (Art. No.: 11704017)

Cover Glass: Glass (Art. No.: 11704018)

## Sealing material



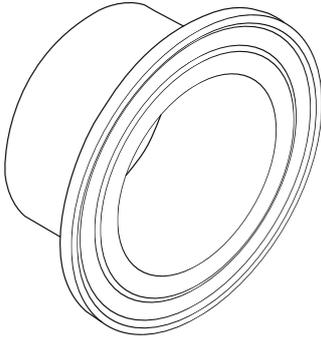
No.	Material
-----	----------

3	EPDM
---	------

## Mounting aids for hygienic connections

Weld-in flange  
DIN 32676 (Tri-Clamp), DN50, Ø64  
(not available from Baumer)

ZPX3-7262 EPDM (Art. No.: 10306266)

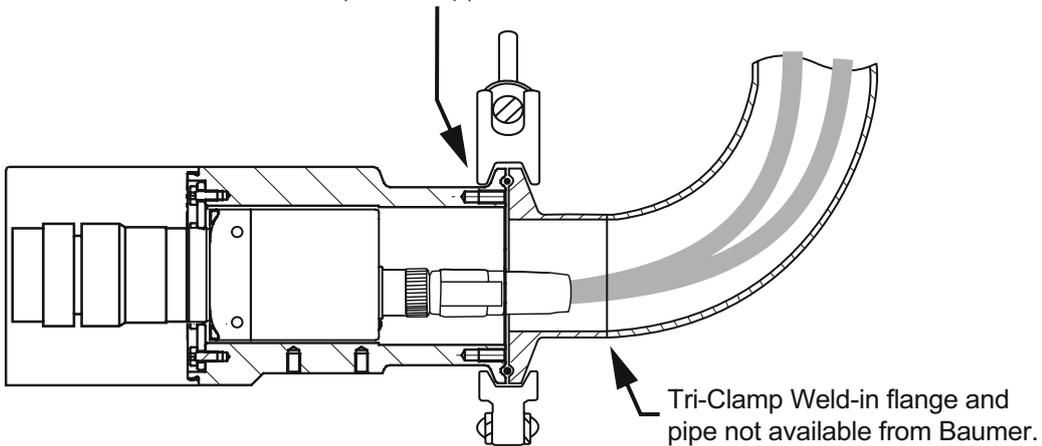


ZPX4-610 (Art. No.: 11109162)

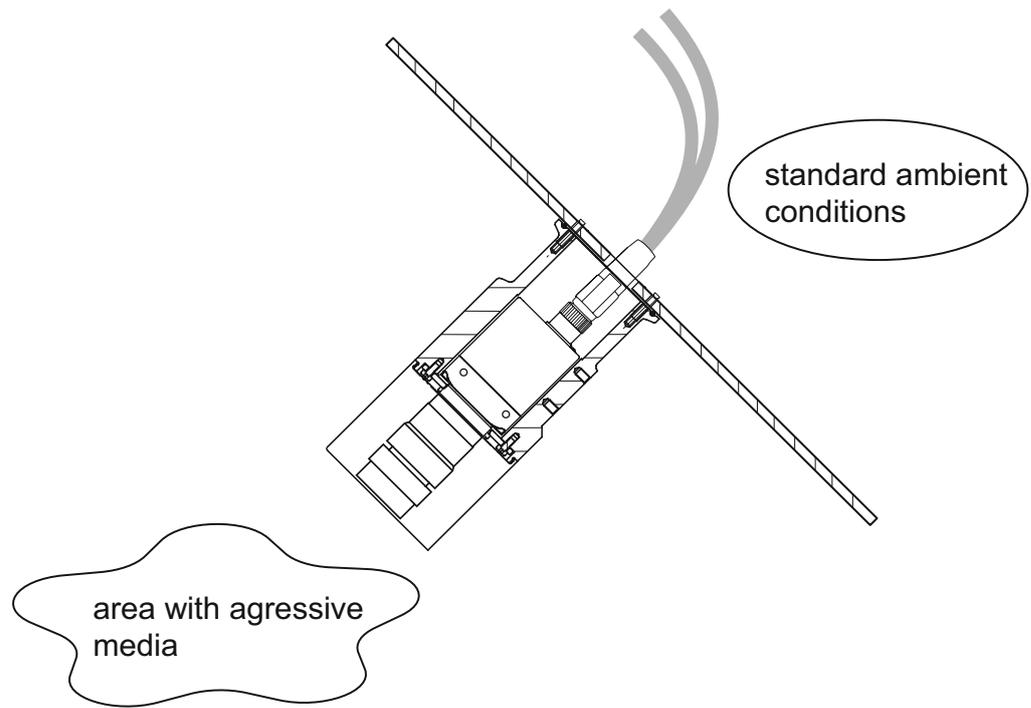


## Assembly with clamp

DIN 32676:2009-05 (Tri-Clamp), DN50, ø64  
ISO 2852 (Tri-Clamp), DN51, ø64



### Example of assembly using screws



### 3.3.1 Environmental Requirements

---

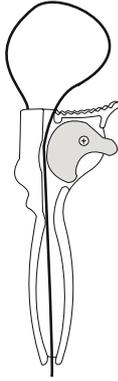
Storage temperature	-15 °C (-5 °F) ... +70 °C (+158 °F)
Operating temperature	-15 °C (-5 °F) ... 70 °C (158 °F)
Humidity	10 % ... 90 % non condensing

---

### 3.3.2 Tube assembly

#### Optional Tool

Housing Mounting Tool  
(Art. No.: 11208719)



After positioning the camera, mount the Tube M60.

Check the sealing surfaces for possible damages and scratches.

Feed the mounting tool over the enclosure lid at the round hole end.

Slide the tool over the lid in a way that it sits between the jaws of the tool. Insert the enclosure completely and straight into the tool in order to avoid scratching the enclosure lid!

Tighten the lid firmly until no gaps are visible at the seal.

Do not tighten the lid so tight that the seal forms a bead and protrudes over the housing!



## 4. IP rating and chemical resistance

⚠ Caution	
	As a large number of chemical substances are used, we ask for your understanding that we can not test them all.
	The chemical substances must be tested on a discreet area of the device under application conditions to evaluate if they are suitable.

### 4.1 IP Protection Classes (EN 60529)

#### Solid particle protection

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts.

Lower IP ratings are not automatically included in the higher classes, e.g. IP66 is not part of IP67 and IP68 / IP69K do not include any other ratings!

Testing time and depth of IP68 is specified by the manufacturer (not unlimited time!).

Suitable cables have to be used in combination with the cable glands to fulfil the IP protection class.

Level (1st digit)	Effective against	Description
5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment.
6	Dust tight	No ingress of dust; complete protection against contact (dust tight). A vacuum must be applied. Test duration of up to 8 hours based on air flow.

Level (2st digit)	Effective against	Description
4	Splashing of water	Water splashing against the enclosure from any direction shall have no harmful effect, utilizing either: a) an oscillating fixture, or b) A Spray nozzle with no shield, Test duration: 10 min.
5	Water jets	Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects. Test duration: 1 min/m <sup>2</sup> for at least 3 min, 12.5 l/min @30 kPa at 3 m distance.
6	Powerful water jets	Water projected powerful jets (12.5 mm nozzle) against the enclosure from any direction shall have no harmful effects. Test duration: 1 min/m <sup>2</sup> for at least 3 min, 100 l/min @30 kPa at 3 m distance.
6K	Powerful water jets with increased pressure	Water projected in powerful jets (6.3 mm nozzle) against the enclosure from any direction, under elevated pressure, shall have no harmful effects (DIN40050, not IEC 60529). Test duration: 3 min, 75 l/min @1000 kPa at 3 m distance.
7	Immersion up to 1 m depth	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time Test duration: 30 min, 1 m below water surface.
8	Immersion 1 m or more depth	The equipment is suitable for continuous immersion in water. Water can enter in such a manner that it produces no harmful effects. Manufacturer specified duration and water depth (> IPx7, 3 m typical).
9K	Powerful high temperature water jets	Protected against close-range high pressure / temperature spray downs. Test duration: 30 s each of four angles, spray nozzle with 80 °C water at 8 - 10 MPa (80 - 100 bar) and a flow rate of 14 - 16 l/min.

## 4.2 Chemical resistance of sealing materials

### 4.2.1 EPDM, TPE

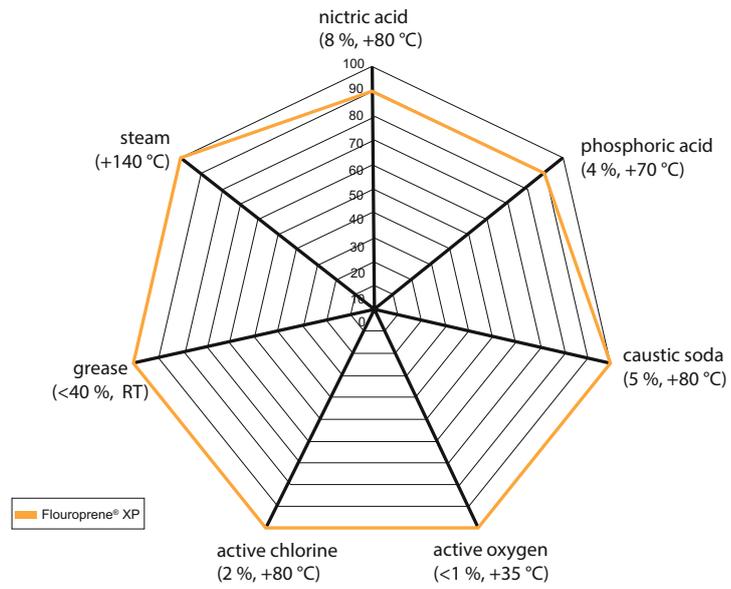
This table has been compiled from several sources, the classification may therefore vary and is a general guideline only!

1 = very good chemical resistance; 2 = good resistance; 3 - 4 = limited resistance; 5 - 6 not resistant

	EPDM	TPE
temperature (min.; max.)	-40; 120 (150)	-40; 130
ageing	1	1
ozone	1	1
gas permeability		
suitable for food appl.		
water	1	1
hot water (100 °C)	1	
see water	2	1
steam	1	
chlorine	3	
chlorine (gaseous, 20 °C)	3	3
<b>hydrocarbons:</b>	5	2
mineral oil	5	2
petrol	5	3
diesel	3	
alcohol		
ethanol (20 °C)	1	1
ketone	2	
acetone (100 %, 20 °C)		3
ammonia, diluted (10 %, 20 °C)		3
servo steering fluids		5
break fluids based on Glycol-ether	1	5
cyclohexane		
<b>Acids:</b>	2	
acetic acid 30 %	3	
acetic acid 50 %	3	
acetic acid (100 %, 20 °C)	5	2
silicic acid, diluted, (60 °C)	2	
phosphoric acid, diluted (20 °C)		up to 85 % 2
nitric acid, concentrated	5	
nitric acid, diluted (50 %, 20 °C)	3	up to 30 % 2
hydrochloric acid (20 °C)	2	
hydrochloric acid, diluted (30 %, 20 °C)	2	up to 10 % 1
sulfuric acid, concentrated (50 °C)	2	
sulfuric acid, diluted (20 °C)	2	up to 98 % 1
citric acid (up to 10 %, 40 °C)	1	2
<b>Bases:</b>	2	
caustic soda, diluted (10 %, 20 °C)	2	up to 50 % 2
bleaching lye (20 °C)		
potassium hydroxide, diluted (50 %, 20 °C)	5	up to 10 % 2
soap solution (20 °C)	1	1
suds		

## 4.2.2 Flouoprene® XP

The resistance of Flouoprene® XP to various chemicals is shown in the following figure.



### 4.2.3 Acrylic glass

Explanation of the characters and abbreviations of the following result lists:

Conc	=	concentration of the test chemical in max. possible chemical purity or aqueous solution
Mat	=	material, i.e. type of semi-finished product from which the test specimens were made
233	=	PLEXIGLAS® GS
SP	=	Stress crack resistance ("Röhms test method", bending test)
CB	=	Chemical resistance (similar to DIN 53476)
EZ	=	Contact time for chemical resistance test in days, for short time test (1 minute)
GB	=	Overall assessment, i.e. critical summary of visual assessments of stress cracking behaviour and chemical resistance

+ = resistant

o = conditionally resistant

- = not resistant

#### 4.2.3.1 Alcohols, mono- and polyhydric

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>1-butanol</b>							
100 %	233	-	-	28	crack formation, swollen	no change	-
<b>1-hexanol</b>							
98%	233	-	+	28	no change	no change	o
<b>1-methoxy- 2-propanol</b>							
99%	233	-	-	1	strongly swollen, dissolved	no change	-
<b>1-pentanol</b>							
100%	233	-	O	28	crack formation, swollen	no change	-
<b>2-propanol</b>							
100%	233	-	-	7	crack formation, swollen	no change	-
<b>cyclohexanol</b>							
99,5%	233	-	+	28	no change	no change	o
<b>ethanol</b>							
100%	233	-	-	7	soft, swollen	no change	-
50%	233	-	-	7	swollen	no change	-
<b>ethylenglykol (freeze protection)</b>							
50%	233	+	+	28	no change	no change	+
<b>glycerine</b>							
98%	233	+	+	28	no change	no change	+
<b>methanol</b>							
100%	233	-	-	1	soft, swollen	no change	-
<b>phenol (dissolved in water)</b>							
5%	233	-	-	1	white, sticky, swollen	no change	-

#### 4.2.3.2 Organic solvents, fuels

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>butyl acetate (acetic acid butyl ester)</b>							
99%	233	-	-	1	strong swollen, solved	no change	-
<b>vinegar ester (ethyl acetate)</b>							
99%	233	-	-	1	strong swollen, solved	no change	-
<b>pentyl acetate (amylacetat)</b>							
98%	233	-	-	28	swollen, solved	no change	-
<b>acetone</b>							
99%	233	-	-	28	strong swollen, solved	no change	-
<b>cyclohexanone</b>							
99%	233	-	-	7	sample strongly dissolved	no change	-
<b>diethyl ketone</b>							
99%	233	-	-	1	strong swollen, solved	no change	-
<b>ethyl methyl ketone</b>							
99,5%	233	-	-	1	strong swollen, solved	no change	-
<b>cyclohexane</b>							
99,5%	233	-	+	28	no change	no change	o
<b>iso-octane</b>							
99,5%	233	-	+	28	no change	no change	o
<b>n-heptane</b>							
99%	233	-	+	28	no change	no change	o
<b>n-hexane</b>							
99%	233	-	+	28	no change	no change	o
<b>formamid</b>							
99%	233	-	+	28	no change	no change	o
<b>N-methylformamide</b>							
99%	233	-	-	7	swollen, dull	no change	-
<b>perchlorethylene (tetrachlorethylene)</b>							
99%	233	-	-	28	matt, surface soft	no change	-
<b>shellsole T</b>							
	233	-	+	28	no change	no change	o
<b>Turpentine replacement</b>							
	233	-	+	28	no change	no change	o
<b>turpentine oil (DAB 7)</b>							
	233	-	+	28	no change	no change	o

<b>carbon tetrachloride</b>							
99%	233	-	-	1	swollen, slightly solved	no change	-
<b>diesel fuel (DIN 51601)</b>							
	233	-	+	28	no change	no change	o
<b>FAM test fuel (DIN 51604 A)</b>							
	233	-	-	1	strong swollen, sticky	no change	-
<b>FAM test fuel (DIN 51604 B)</b>							
	233	-	-	1	swollen, solved	slightly dull	-
<b>FAM test fuel (DIN 51604 C)</b>							
	233	-	-	1	swollen, solved	no change	-
<b>Fuel no. 1 (DIN 53521)</b>							
	233	-	+	28	no change	no change	o
<b>Fuel no. 2 (DIN 53521)</b>							
	233	-	+	28	no change	no change	o
<b>Gasoline Normal (unleaded)</b>							
	233	-	-	28	swollen, yellow	no change	-
<b>Gasoline Normal (leaded)</b>							
	233	-	-	28	light brown discoloured	no change	-
<b>Gasoline Super (unleaded)</b>							
	233	-	-	28	swollen, yellow	no change	-
<b>Gasoline Super (leaded)</b>							
	233	-	-	7	swollen, soft, yellow	no change	-
<b>petroleum</b>							
	233	-	+	28	no change	no change	o

#### 4.2.3.3 Acids (organic and inorganic)

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>citric acid</b>							
10%	233	+	+	28	no change	no change	+
38%	233	+	+	28	no change	no change	+
<b>formic acid</b>							
5%	233		+	28	no change	no change	
<b>acetic acid</b>							
100%	233	-	-	1	samples dissolved	no change	-
5%	233	+	+	28	no change	no change	+
<b>hydrofluoric acid</b>							
40%	233	-	-	1	swollen, soft, white	slightly swollen	-
<b>lactic acid</b>							
20%	233	-	+	28	no change	no change	o
90%	233	-	-	7	strong swollen, white, soft	no change	-
<b>oxalic acid</b>							
8,7%	233	+	+	28	no change	no change	+
<b>Phosphoric acid</b>							
50%	233	-	+	28	no change	no change	o
85%	233	-	-	1	strong swollen	no change	-
<b>nitric acid</b>							
10%	233	+	+	28	no change	no change	+
40%	233	-	+	28	no change	no change	o
65%	233	-	-	1	very strong swollen, soft	matt, white, swollen	-
<b>hydrochloric acid</b>							
10%	233	+	+	28	no change	no change	+
32%	233	+	+	28	no change	no change	+
<b>sulphuric acid</b>							
3%	233	+	+	28	no change	no change	+
30%	233	+	+	28	no change	no change	+
98%	233	-	-	1	strong swollen	matt, white, swollen	-
<b>sulphamic acid (amidosulphonic acid)</b>							
18%	233	+	+	28	no change	no change	+
<b>tartaric acid</b>							
50%	233	+	+	28	no change	no change	+
<b>oleic acid</b>							
99%	233	-	+	28	no change	no change	o

#### 4.2.3.4 Leach

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>Ammonia solution</b>							
10%	233	+	+	28	no change	no change	+
25%	233	+	+	28	no change	no change	+
<b>Caustic soda</b>							
1%	233	+	+	28	no change	no change	+
10%	233	+	+	28	no change	no change	+
30%	233	+	+	28	no change	no change	+

#### 4.2.3.5 Salts, inorganic and organic (saturated solutions)

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>aluminium chloride</b>							
42%	233	+	+	28	no change	no change	+
<b>iron(II) sulphate</b>							
21%	233	+	+	28	no change	no change	+
<b>iron(III) chloride</b>							
48%	233	+	o	28	slightly brown	no change	o
<b>potassium aluminium sulphate (alum)</b>							
5%	233	+	+	28	no change	no change	+
<b>potassium carbonate</b>							
50%	233	+	+	28	no change	no change	+
<b>potassium chloride</b>							
25%	233	+	+	28	no change	no change	+
<b>potassium nitrate</b>							
24%	233	+	+	28	no change	no change	+
<b>potassium permanganate</b>							
6%	233	+	+	28	matt, surface brown	no change	+
<b>potassium sulphate</b>							
10%	233	+	+	28	no change	no change	+
<b>copper sulphate</b>							
17%	233	+	+	28	no change	no change	+
<b>magnesium sulphate</b>							
21%	233	+	+	28	no change	no change	+
<b>sodium acetate</b>							
32%	233	+	+	28	no change	no change	+
<b>sodium carbonate (soda)</b>							
2%	233	+	+	28	no change	no change	+
20%	233	+	+	28	no change	no change	+
<b>sodium chloride (common salt)</b>							
10%	233	+	+	28	no change	no change	+
<b>sodium phosphate</b>							
20%	233	+	+	28	no change	no change	+
<b>sodium dihydrogen phosphate</b>							
50%	233	+	+	28	no change	no change	+
<b>disodium hydrogen phosphate</b>							
8,5%	233	+	+	28	no change	no change	+
<b>sodium hydrogen sulphate</b>							

40%	233	+	+	28	no change	no change	+
<b>sodium nitrate</b>							
45%	233	+	+	28	no change	no change	+
<b>sodium sulphate (Glauber's salt)</b>							
25%	233	+	+	28	no change	no change	+
<b>sodium chlorate</b>							
49%	233	+	+	28	no change	no change	+
<b>sodium thiosulfate</b>							
41%	233	+	+	28	no change	no change	+
<b>zinc chloride</b>							
50%	233	o	+	28	no change	no change	o
<b>zinc sulphate</b>							
35%	233	+	+	28	no change	no change	+
<b>urea</b>							
51%	233	+	+	28	no change	no change	+
<b>hydroquinone</b>							
6,7%	233	-	o	28	brown discoloured	no change	-

#### 4.2.3.6 Inorganic compounds

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>hydrazine</b>							
15%	233	+	+	28	no change	no change	+
<b>hydrogen peroxide (hydrogen superoxide, perhydrol)</b>							
3%	233	+	+	28	no change	no change	+
30%	233	+	+	28	no change	no change	+
<b>sodium hypochloride</b>							
12%	233	+	+	28	no change	no change	+
<b>water, fully desalinated</b>							
	233	+	+	28	no change	no change	+

#### 4.2.3.7 Organic compounds

Chemical Conc	Mat	SP	CB	EZ	CB-assessment	CB-short term check	GB
<b>dibutylphthalate</b>							
99%	233	-	-	28	solved	no change	-
<b>diisobutylphthalate</b>							
97%	233		+	28	no change	no change	
<b>paraffin, thin liquid</b>							
100%	233	+	+	28	no change	no change	+
<b>sebacic acid bis-2-ethyl hexyl ester (dioctylsebacate)</b>							
	233	-	+	28	no change	no change	o
<b>tricresyl phosphate</b>							
	233	-	+	28	no change	no change	o
<b>castor oil</b>							
	233	-	+	28	no change	no change	+
<b>Soya bean oil</b>							
	233	-	+	28	no change	no change	o
<b>triethanolamine</b>							
98%	233	+	+	28	no change	no change	+

## 5. Cleaning

### 5.1 Cleaning and care of acrylic glass (Tube M60 / M62)

Acrylic glass must not come into contact with organic solvents such as diluents, alcohols, fuels, etc. Also normal window cleaners usually contain alcohol.

Dilution fumes in workshops are also harmful. These substances react with acrylic glass and cause the material to become brittle and build up internal stresses. These can remain invisible for a longer period of time.

#### Acrylic glass will not forget anything!

First remove most of the dust with a rubber bellows. Never blow with your mouth. This causes saliva particles on the glass that leave difficult to remove stains.

Next, remove the dust on the glass with a very soft brush. Do not touch the brush bristles with your fingers, as this will cause grease and smudges. Do not exert too much pressure.

As long as the disc is only contaminated with loose dirt, it should be cleaned with a bellows as available from the photo area for cleaning lenses and sensors.



For heavier dirt wash the glass first with plenty of water from dust and sand grains. In the case of solid dirt, a thin soapy solution can then be used to reinforce the cleaning action. For this purpose household dishwashing detergents or special acrylic cleaners can be used.

Never use cleaners for true glass windows! These contain alcohol and other solvents and can lead to lasting damage even after one-time use. Use a sponge or polishing cloth and clean carefully. Care must be taken to ensure that there is no scratching dirt particles!

Special acrylic cleaners also contain solvents. These are dosed so that they do not damage on smooth surfaces and edges. However, if the glass is already damaged, the cleaner penetrates into small cracks and holes and acts longer there, tensions can also occur. It is therefore necessary to rinse with water. Finally, acrylic cleaner can be applied evenly to the surface with a soft cloth. This makes the cover glass dirt-repellent and antistatic.



#### Caution!



Ensure that no residues of the cleaning agent or scratches remain on the glass. These can permanently damage the reproducibility of the results from the camera inside.

