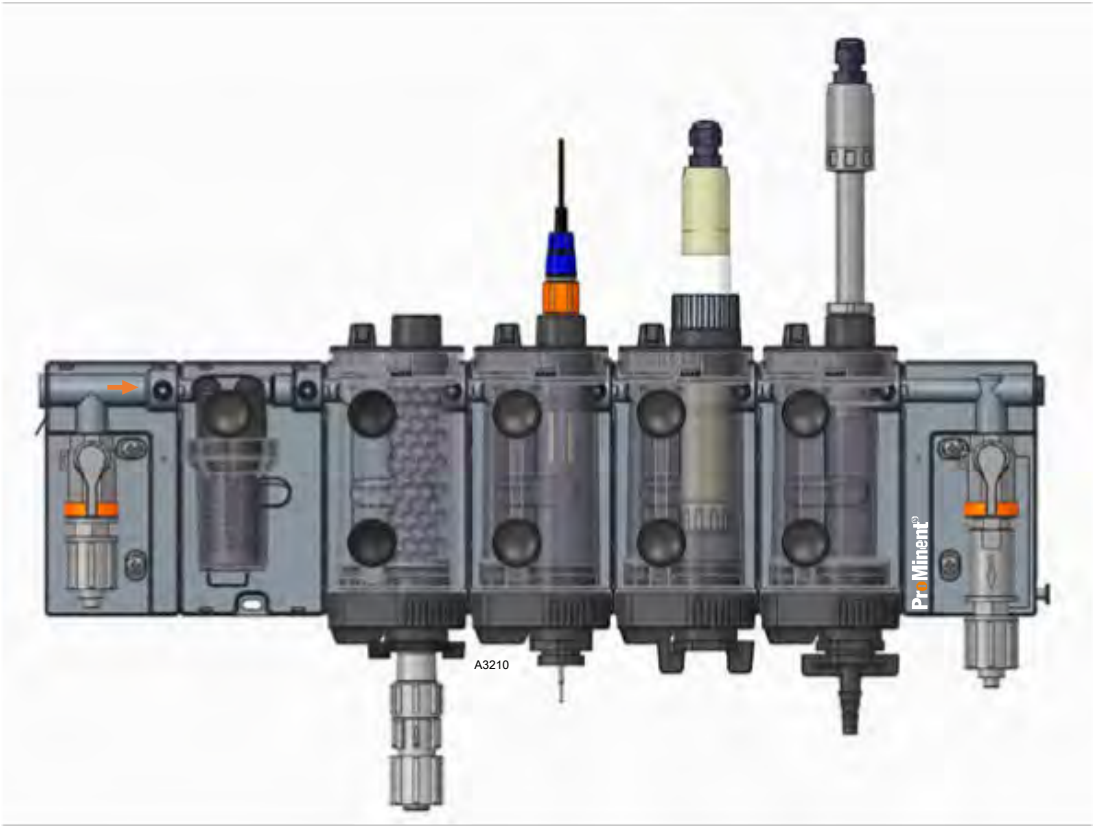
Assembly and operating instructions

Modular sensor bypass fitting

Type BAMa

EN



Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. The document is always aimed equally at women, men and gender-neutral persons. We kindly ask readers for their understanding in this simplification of the text.

Supplementary information

→ Please read the supplementary information in its entirety.

Information

This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Warning information

Warning information includes detailed descriptions of the hazardous situation, see ↬ *Chapter 3.1 'Labelling of Warning Information' on page 11*.

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

Tab. 1: More symbols

Symbol	Description
1. →	Action, step by step.
⇨	Outcome of an action.
↬	Links to elements or sections of these instructions or other applicable documents.
■	List without set order.
[Button]	Display element (e.g. indicators). Operating element (e.g. button, switch).
'Display/GUI'	Screen elements (e.g. buttons, assignment of function keys).
`CODE`	Presentation of software elements and/or texts.

Table of contents

1 Overview and functions

The bypass fitting BAMa is used for the installation of online sensors, which are used in water treatment processes to detect substances in water. The bypass fitting enables these sensors to be calibrated and maintained.

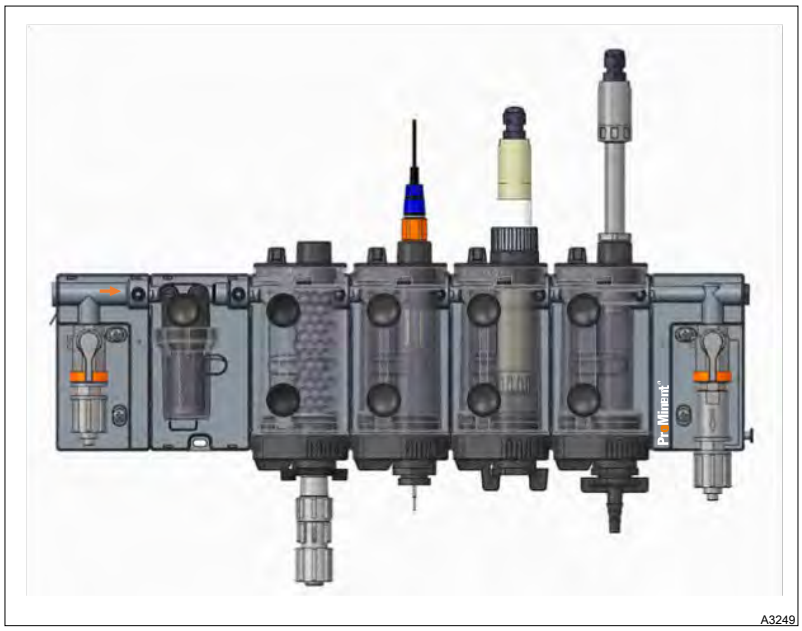


Fig. 1: Bypass fitting BAMa

The bypass fitting, which has a modular design, is installed in a bypass line of the main process line. The specifications of the bypass fitting, such as pressure, temperature and flow of the sample water, need to be taken into account. The sample water passes through the bypass line to the bypass fitting and flows through the various sensor modules. The sample water can be drained into the waste water from the sensor modules or, if permitted by the regulations, the specifications of the bypass fitting and the components fitted, it can be returned to the process. The bypass fitting includes ball valves, acting as a shut-off at the inlet side, and for the manual adjustment of the flow at the outlet side. Aside from the sensor modules, the bypass fitting includes a sensor module for flow control and a sample valve.

A particle filter, a flow limiter, an earthing and potential equalisation set, as well as a mixing module for the metering of chemicals, can optionally be fitted.

The bypass fitting is solely designed to be wall-mounted.

Optional extension: metering module with mixing zone

Used as an injection point and mixing zone for the metering of auxiliary chemicals for sample water treatment, e.g. pH correction.

Optional extension: flow limiter

Used to limit the maximum flow rate through the bypass fitting in the event of fluctuating process water operating pressures.

Optional extension: CLO sensor cleaning

Used for the continuous, hydrodynamic cleaning of the measuring electrode of the diaphragm-free sensor CLO.

Optional extension: vent valve

Used for pressure compensation in the event of negative pressure at the hydraulic outlet of the bypass fitting.

1.1 Identity code

BAMa	**Modular bypass sensor fitting**							
	Regional design							
	EU	Europe (Standard)						
	US	North America						
		Application						
		1	5 … 25 l/h, max. 60 °C (3.5 bar) (e.g. Drinking water or water similar to clear water saving the consumption of sample water)					
		2	20 … 60 l/h, max. 60 °C (3.5 bar) (e.g. Pool&Wellness or similarly treated water with return of the sample water)					
		3	20 … 100 l/h, max. 70 °C (3.0 bar) (e.g. Industrial water or similar with a solids content and higher temperature requirements)					
			Flow measurement module					
			X	none				
			1	float flow meter + scale [l/h], [gph]				
			2	float flow meter + scale + reed switch				
			3	thermal flow control				
				Number of modules, PG13.5 e.g. sensors for pH, ORP, conductivity: LF(T) line.				
				X	no module			
				1	one module + sensor adapter PG13.5			
				2	two modules + sensor adapter PG13.5			
				3	three modules + sensor adapter PG13.5			
				4	four modules + sensor adapter PG13.5			
					Number of modules, G1 inch e.g. amperometric sensors, oxygen sensor DO3.			
					X	no module		
					1	one module + sensor adapter G1"		
					2	two modules + sensor adapter G1"		
					3	three modules + sensor adapter. G1"		
					4	four modules + sensor adapter G1"		
					5	five modules + sensor adapter G1"		
						Number of modules, G3/4 inch e.g. conductivity sensors LM(P) line		
						X	none	
						1	one module + sensor adapter G 3/4”	
							Metering module	
							X	none
							D	with metering module

BAMa	Modular bypass sensor fitting																					
									Sample water conditioning													
									0	none												
									F	with filter, 300 µm, stainless steel												
									D	with filter + flow limiter												
										Sensor cleaning												
										0	none											
										C	hydrodynamic cleaning for type CLO											
											Hydraulic connector											
											1	hose 8x5 + 12x6 mm										
											2	hose 1/2x3/8 + 3/8x1/4 inch										
											4	pipe DN10 horizontal										
											5	pipe 1/2 inch horizontal										
												Status illuminated indicator										
												X	none									
													Design									
													00	with PM logo								
													01	without PM logo								
														Accessories								
														00	none							
														01	potential equalisation + electrical earthing							
															Approvals							
															00	none						
															01	CE						
															14	CE + UKCA						
																Operating instructions language*						
																DE	German					
																EN	English					
																FR	French					
																ES	Spanish					
																...	...					

* Other languages are available on request.

2 Construction

2.1 Construction of the bypass fitting

The sample water flows through the bypass fitting from left to right. The number of sensor modules can be selected using the identity code. There is a hydraulic connector on the inlet and outlet module.

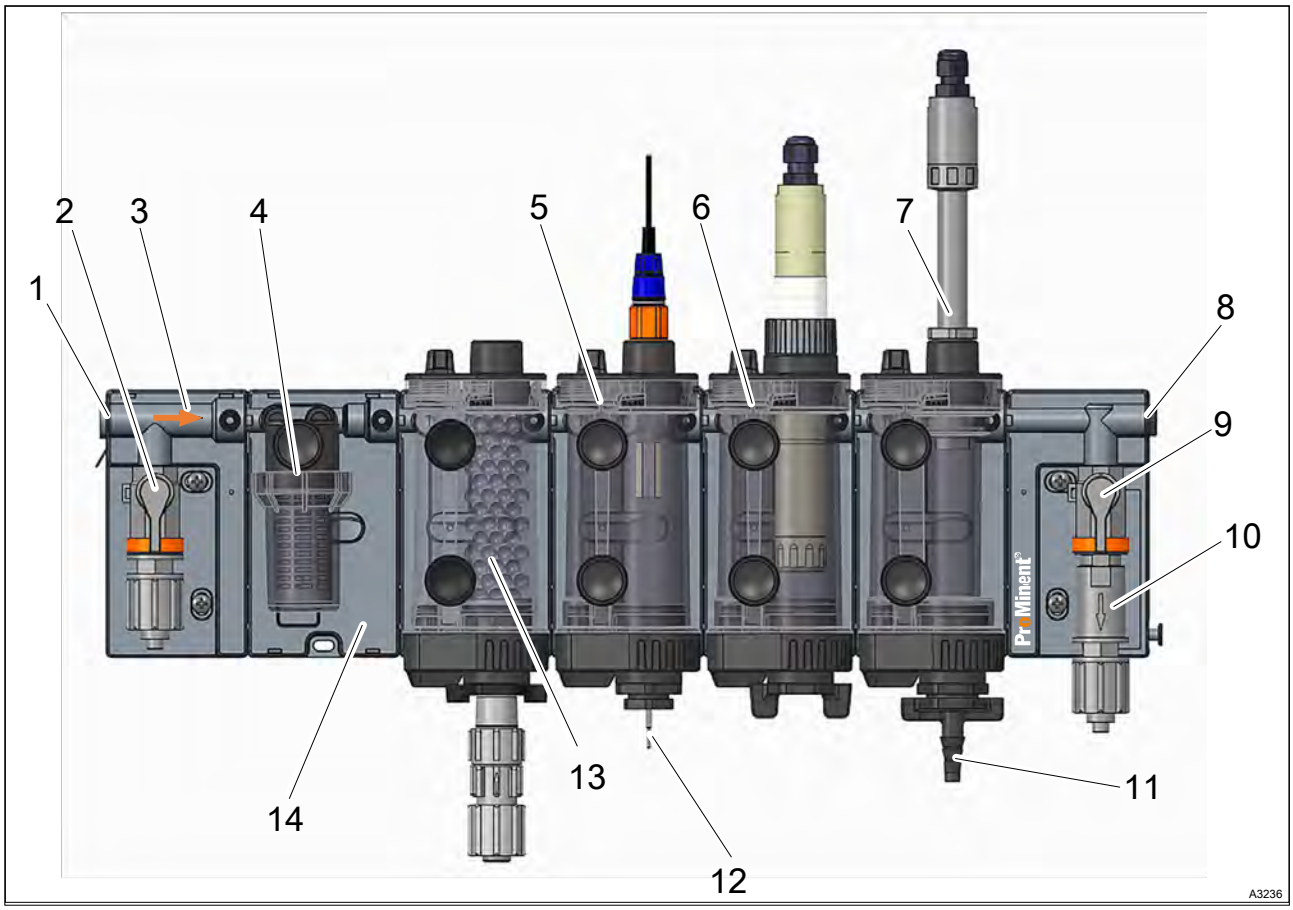


Fig. 2: A complete bypass fitting typically consists of:

1 Earthing connector
2 Hydraulic inlet with shut-off valve, horizontal or vertical connector (inlet), factory-fitted as vertical, but may be converted by the operator to horizontal.
3 Direction of flow/arrow
4 Particle filter, 300 µm
5 Sensor modules for pH and ORP sensors (PG13.5 connector)
6 Sensor modules for amperometric sensors (G1" connector)
7 Flow measurement / control by means of float and reed switch or thermal flow sensor.
8 G 1/4 connector for venting
9 Hydraulic outlet with shut-off valve, horizontal or vertical connector (outlet), factory-fitted as vertical, but may be converted by the operator to horizontal.
10 flow limiter
11 Sample valve
12 Potential equalisation connector
13 Metering module with injection valve
14 Module holder

2.2 Construction of the sensor module

The knurled head screws (10) do not need to be loosened when working on the sensor module. The sensor module always remains in its place, except when being replaced, repaired or undergoing thorough cleaning.

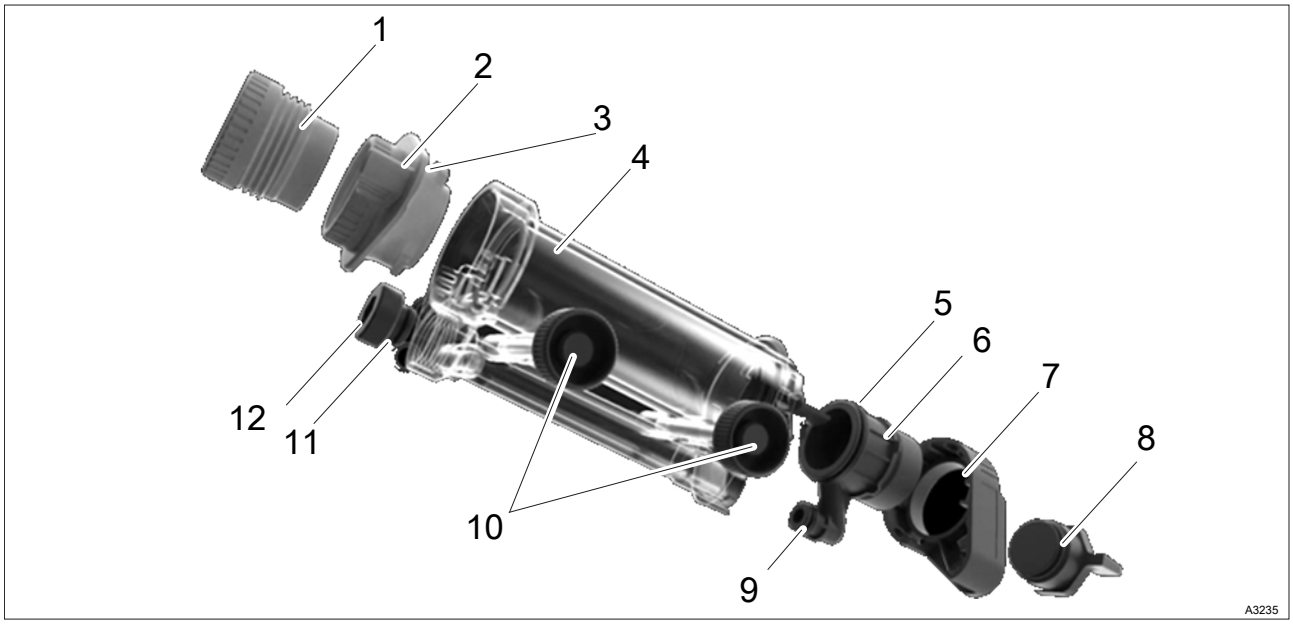


Fig. 3: Construction, sensor module

1 Threaded sleeve G1
2 Sensor adapter, either G1/G3/4/PG13.5 or blind seal
3 O-ring
4 Sensor module
5 O-ring
6 Flow element
7 Flow element bracket
8 Sealing stopper M30x4 P2
9 O-ring
10 Knurled head screws (2 no.)
11 O-ring
12 Plug M20

The bypass fitting has a modular construction. The module carrier and sensor module are assembled in series. The module carriers are connected to each other hydraulically and mechanically. The module carriers are connected to each other by screws on the back of the module carriers. The number of sensor modules is selected using the identity code.

For reasons of strength and stability, the maximum number of possible sensor modules is limited to 7 sensor modules + 1 filter + 1 flow control, resulting in 9 module positions. The sensor modules are attached (hydraulically connected) to the module carrier and mechanically fastened using screws. The liquid flows through the sensor modules one after the other in the direction of the arrow. The sensor modules are configured and combined using the identity code. The sensor modules are fundamentally supplied with a sensor adapter in the form of a blanking plug, so that a bypass fitting can also be used when not all the sensors are fitted. The corresponding sensor adapters 13.5, G1, G3/4 are supplied with the bypass fitting.

2.3 Construction of the flow module

If you order a flow control, a float flow meter with a reed switch is used with the BAMa _ _ 1, e.g. Drinking water and BAMa _ _ 2, e.g. Pool + Wellness “applications”. A thermal flow sensor is used with the BAMa _ _ 3, e.g. Industrial water “application”.

2.4 Labelling

2.4.1 Nameplate

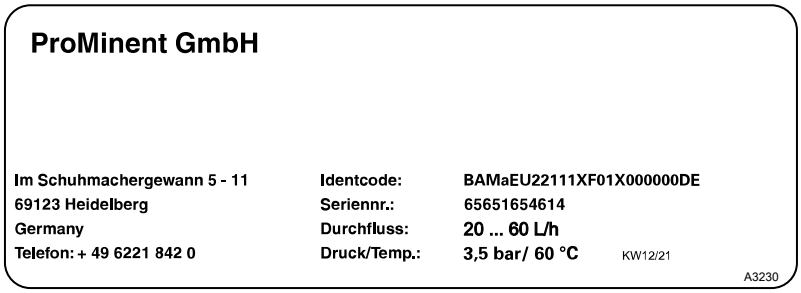


Fig. 4: Nameplate

“Identity code”	Identity code
“Serial no.”	Serial number of the unit
“Flow”	Flow range in litres per hour
“Pressure/Temp.”	Maximum operating pressure / maximum operating temperature

2.4.2 QR code

The QR code on the bypass fitting gives the part number and serial number of the product.

2.4.3 Pictograms and label

Pictogram	Meaning
	Mixing section, static mixer. A metering module with a mixing zone is fitted. The metering module serves , among other things, as an injection point for pH-independent chlorine measurement.
	Shut-off valve. The flow can be switched on or off at this shut-off valve.
	Adjustment of the flow. The flow can be adjusted at this shut-off valve.
	The sensor type CLO with integral hydrodynamic cleaning is located in the sensor module marked with this label.

2.5 Scope of delivery

The scope of delivery is determined by the components selected by means of the identity code, ↳ *Chapter 1.1 ‘Identity code’ on page 6*.

The sensor bypass fitting is supplied in an expansion stage of up to 8 modules in 1 single package. A sensor bypass fitting with 9 modules is supplied in 2 connected packages. Each of these packages contains 1 partial version of the sensor bypass fitting, which you then need to assemble in accordance with steps 9 to 12 of the description in ↳ *Chapter 9.4 ‘Replacing or retrofitting the module holder’ on page 34*. You can then continue with assembly and installation, ↳ *Chapter 5 ‘Assembly and installation’ on page 17*.

3 Safety

3.1 Labelling of Warning Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed warning information and are provided as clear step-by-step instructions.

The warning information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Description of hazard

– Denotes an immediate threatening danger. If the situation is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

– Denotes a possibly damaging situation. If the situation is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information.

Source of the information. Additional measures.

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

3.2 User qualification

WARNING!

Danger of injury with inadequately qualified personnel

The operator of the system / equipment is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

- All work on the unit should therefore only be conducted by qualified personnel.
- Unqualified personnel should be kept away from the hazard zone.

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to.

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from the manufacturer or another authorised distribution partner.
Trained, qualified personnel	A trained, qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his training, knowledge and experience, as well as knowledge of pertinent regulations. A trained, qualified employee must be able to perform the tasks assigned to him independently with the assistance of drawing documentation and parts lists. The assessment of a person's technical training can also be based on several years of work in the relevant field.
Electrical technician	An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his technical training and experience as well as knowledge of pertinent standards and regulations. An electrical technician must be able to perform the tasks assigned to him independently with the assistance of drawing documentation, parts lists, terminal and circuit diagrams. The electrical technician must be specifically trained for the working environment in which the electrical technician is employed and be conversant with the relevant standards and regulations.
Service	The Service department refers to service technicians, who have received proven training and have been authorised by the manufacturer to work on the system.

3.3 Intended use

Intended use:

- Only use the bypass fitting for the installation of the sensors listed below and only for applications in water treatment, in accordance with the technical data and specifications in these operating instructions.
- For the mounting of conductivity, Pt 100, Pt 1000, pH or ORP sensors with a PG 13.5 screw-in thread.
- For the mounting of amperometric sensors with a G 1" threaded sleeve.
- Use adapter G1-3/4 NPT to assemble sensor types CTFS, RHEIC and PHEI.
- To mount conductivity sensors with a G ¾ thread.
- The bypass fitting is only intended for use with liquids, the vapour pressure of which is no more than 0.5 bar above normal atmospheric pressure (1013 mbar) at the permissible maximum temperature.
- Only use the bypass fitting with float in the flow module for drinking water or swimming pool water or water of a similar quality that does not contain solids.
- The suitability of the bypass fitting for media containing solids generally needs to be checked. Specification: particle mobility of model particles < 1 mm. Use a suitable filter or separator, if necessary and possible.
- Do not use the bypass fitting for gases, liquefied gases, gases dissolved under pressure, and vapours and liquids, the vapour pressure of which is more than 0.5 bar above normal atmospheric pressure (1013 mbar) at the permissible maximum temperature.

3.4 General safety information

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

WARNING!

Hazardous media / contamination of persons and equipment

Possible consequence: fatal or very serious injuries. Material damage.

- Ensure that the equipment is resistant to the medium flowing through it.
- Always refer to the material safety data sheet for the medium flowing through the fitting.
- The material safety data sheet for the medium flowing through the fitting is always essential when it comes to initiating countermeasures in the event of leakage of the flowing medium.
- Note the general limitations regarding viscosity limits, chemical resistance and density.

Operation in the open air and outdoors

- *Take suitable measures to protect the equipment from environmental influences when operating in the open air and outdoors, such as:*
  - *UV radiation,*
  - *Humidity,*
  - *Frost*
  - *etc.*

4 Storage and transport

- **User qualifications, storage and transport:** trained personnel
  ↳ *Chapter 3.2 'User qualification' on page 13*

Store the unit fully drained.

Tab. 2: Permissible storage conditions:

Storage temperature:	- 10 °C ... +70 °C
Air humidity:	< 90 % relative humidity, non-condensing

5 Assembly and installation

5.1 Requirements

- **User qualification, mechanical installation:** trained and qualified personnel *Chapter 3.2 'User qualification' on page 13*
- **User qualification, hydraulic installation:** trained and qualified personnel *Chapter 3.2 'User qualification' on page 13*
- **User qualification, installation of the sensors:** trained and qualified personnel *Chapter 3.2 'User qualification' on page 13*

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

The bypass fitting is solely designed to be wall-mounted. It is installed on the wall using screws. The fitting is fastened to the wall with the inlet and outlet module directly adjacent to the wall. The modules in between are offset from the wall to avoid tension during installation caused by unevenness of the wall. Damping elements can be mounted on the back of the bypass fitting to combat vibration. Allow 300 mm above and 100 mm below the bypass fitting to work on the bypass fitting.

The sensor modules have already been configured and combined using the identity code. The sensor modules are fundamentally supplied with blanking plugs so that a bypass fitting can also be used when not all of the sensors are fitted. The corresponding sensor adapters 13.5, G1 and G3/4 are supplied with the bypass fitting.

5.2 Mechanical installation

Conditions:

- Allow 300 mm above and 100 mm below the bypass fitting to work on the bypass fitting.
- When installing the sample water line, pay particular attention to the direction arrow on the bypass fitting.
- Assemble the bypass fitting horizontally and upright.

The mounting kit supplied consists of:

- 4 screws
- 4 washers
- 4 universal rawlplugs. Check that these universal rawlplugs are suitable and replace them with special rawlplugs if necessary.
- 12 damping elements

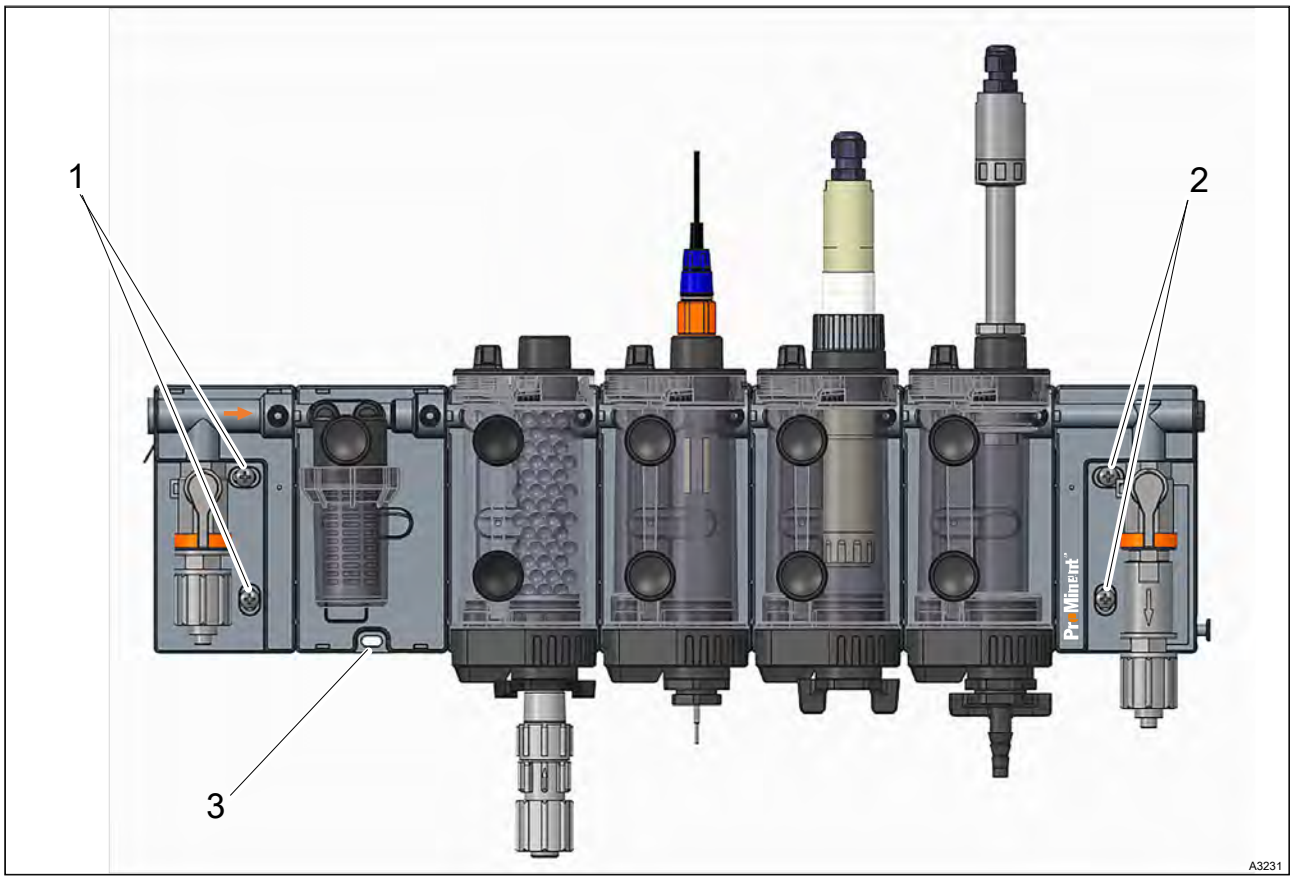


Fig. 5: Installing the mounting plate

1. Use the bypass fitting as a template and mark the drill holes on the wall.

Damping elements

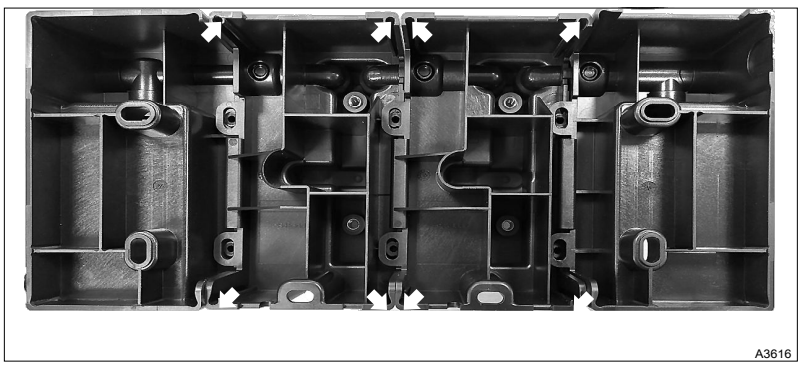


Fig. 6: Slots for the damping elements

2. Fit the number of damping elements (supplied) you require.
3. Drill 4 fixing holes (1) and (2) into a flat and load-bearing wall.

   If you need to, use the fixing hole (3) on the bottom edge of the module holder as an additional fixing.
4. Fix the bypass fitting to the wall using the mounting material supplied.

5.3 Hydraulic installation

- Note the maximum permissible operating parameters for the entire installation of the bypass fitting (e.g. pressure, temperature, flow). Consider the lowest maximum permissible operating parameters for the parts of the bypass fitting and the built-in sensors. Note the temperature dependence of the maximum pressure, ↳ *Chapter 1 'Overview and functions' on page 5*.
- Turn all bayonet fittings hand-tight to their end stop for adequate leak-tightness.
- Fit the bypass fitting in such a way that the modules cannot run dry or fill with air even when no sample water is flowing through it. Depending on the requirements on site, the factory alignment of the inlets and outlets can be changed from vertical to horizontal.
- Fit appropriate shut-off valves in the supply and drain lines of the bypass fitting.
- Fit the bypass fitting to prevent negative pressure in the bypass fitting or use the vent valve, which is available as an accessory, ↳ *Chapter 11.3 'Accessories' on page 42*.
- When free draining the sample water, route the discharge line of the bypass fitting to ensure that the outlet line runs in an S-shape.
- With contaminated sample water: Fit a dirt filter into the supply line to the bypass fitting. In doing so, note that the filter can consume your feed chemical. You will therefore have a lower value in the sample water flow than in the process water flow.
- With installation in fixed pipework: Install the bypass fitting to prevent it from coming under tension.

1. Use the connector kit supplied to connect the supply line to the bypass fitting.
2. Connect the drainage line to the bypass fitting.

   ⇨ The bypass fitting is now hydraulically installed.

5.4 Assembly of the flow sensor

5.4.1 Assembly of the float flow sensor with reed switch

1. Remove the upper blanking plug of the flow module.
2. Push the flow sensor into the flow module.
3. Tighten the transition joint.
4. Tighten the clamp connection.

5.4.1.1 Electrical installation of the float flow sensor with reed switch

Only connect protective low voltage to the flow sensor, in accordance with EN 60335-1.

Use a cable with a diameter of 4 mm, so that the cable connector achieves IP 65 degree of protection.

1. Turn the top part of the sensor a quarter turn counterclockwise and remove it (bayonet fitting).
2. Loosen the clamping nut of the M12 threaded connector and feed the measuring line through the clamping nut.
3. Remove 2 cm from the end of the cable sleeve.
4. Strip the cable ends by approx. 0.5 cm and fit cable end sleeves (⌀ max. = 0.5 mm^2) to the cable ends.
5. Connect the flow sensor to an alarm device as per the table:

Tab. 3: Terminals, float flow sensor with reed switch:

Terminal	Contact
1	Normally closing contact (N/C)
2	Root (C)
3	Normally open contact (N/O)

Tab. 4: Technical data, reed switch, potential-free:

Parameter	Value
Switching power:	max. 3 W
Switching voltage:	max. 42 V protective low voltage
Switching current:	max. 0.25 A

6. Fully push the top part of the flow sensor onto the housing and carefully tighten the top part of the sensor clockwise as far as the stop.
7. Push the measuring line as far as possible into the top part of the flow sensor to relieve tension.
8. Tighten the clamping nut of the M12 threaded connector.

5.4.2 Assembly of the thermal flow sensor (optional)

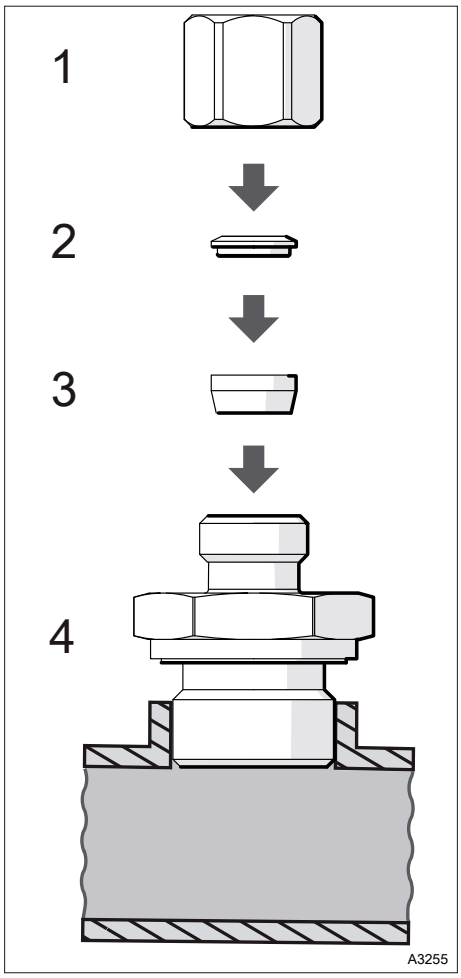


Fig. 7: The cutting ring fitting

The cutting ring fitting consists of 4 parts:

- Union nut (1)
- Rear clamp ring (2)
- Front clamp ring (3)
- Threaded connector (4)

Initial assembly

1. Insert the threaded connector (4) into the sensor adapter and tighten the threaded connector.
2. Insert the front clamp ring (3). The tapered end of the front clamp ring needs to point into the cone.
3. Attach the rear clamp ring (2), as shown in the figure.
4. Slightly screw in the union nut (1), but do not fully tighten it.
5. Insert the thermal flow sensor. Align the sensor so that the spanner surface of the upper nut (1) faces the direction of flow (curled arrow).

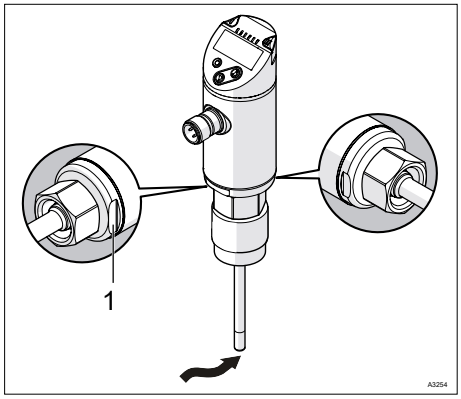


Fig. 8: Spanner surface (1)

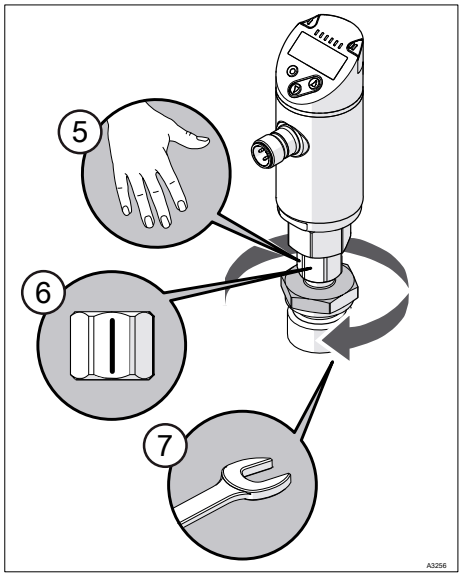


Fig. 9: Tightening the union nut

6. Manually tighten the union nut (5) and draw a mark (6). The line will help you when you come to reassemble.

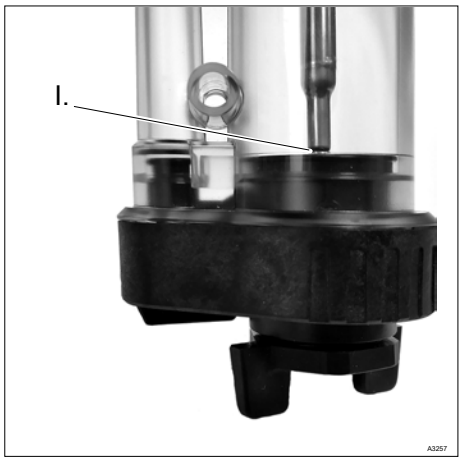


Fig. 10: Sensor tip immersion depth I.

7. Push the sensor to the specified immersion depth (I.): the sensor tip must be flush with the top edge of the flow element.
8. Hold the sensor firmly and use a tool to tighten the union nut by 1 ¼ turns (7).
   ⇨ The cutting ring is now tightly connected to the sensor rod. You can now no longer change the immersion depth.
9. Electrically connect the sensor.

   Specification: strip the cable, cable end sleeves 0.5 mm² x 10 mm with insulation collar.

Recurring assembly

10. You can dismantle the sensor to clean the sensor tip, among other things. Then reinsert the sensor and tighten the union nut without using excessive force. Make sure that the mark (6) is in the same position as it was before disassembly.
11. Remove the plug M30 on the flow module
12. **INFORMATION!** You need to fit the sample valve supplied together with the M30/G1/4 adapter with the "Industrial media with solids content" version in conjunction with the thermal flow control.

    Fit the M30/G1/4 adapter with O-ring and the sample valve
13. Tighten the components until the operating lever is pointing forwards. For the torque, refer to *Chapter 12.9 'Torque' on page 48*

INFORMATION! Refer to the operating instructions provided by the sensor manufacturer.

5.5 Installation of the sensors to determine the water quality

Electrically install the sensors, as described in the operating instructions for the relevant controller and sensor.

Turn all bayonet fittings hand-tight to their end stop for adequate leak-tightness.

Tab. 5: There are 4 designs of sensor adapter available:

Sensor adapter and labelling	Compatible sensor series / types
Sensor adapter PG 13.5	All pH sensors, ORP sensors, temperature sensors Pt100 and Pt1000 as well as conductivity sensors LF(T), all with a PG 13.5 thread,
Sensor adapter G 1"	All ProMinent amperometric sensors, oxygen sensor DO3, conductivity sensor CCT
Sensor adapter G 1" with adapter G1-3/4 NPT PVDF, part number 1113353	■ Conductivity sensor ■ Temperature sensor ■ Flow sensor CTFS ■ pH sensor PHEI, ■ ORP sensor RHEIC
Sensor adapter G ¾"	Conductivity sensors LMP
Blind sensor adapter	without sensor connector

Sensors with an NPT thread are installed using a G1" adapter or G1-3/4 NPT PVDF adapter, depending on the sensor.

5.5.1 Assembly of the sensor adapter on the sensor (example shows G1” sensor adapter)

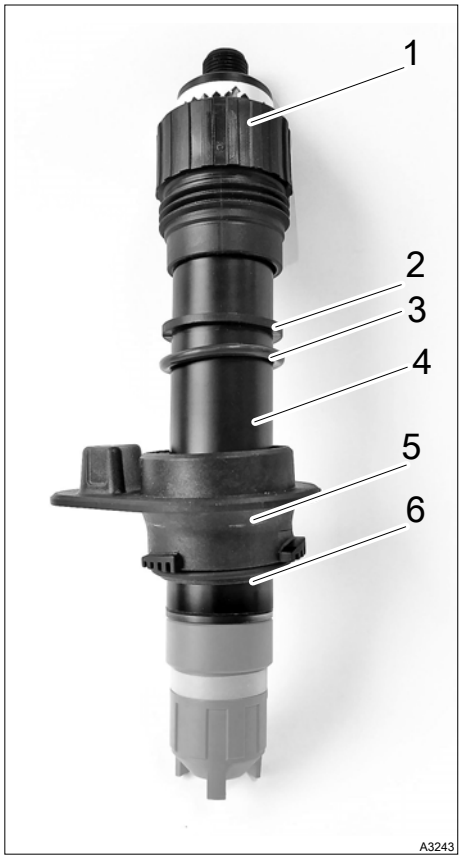


Fig. 11: Assembly of the sensor adapter and sensor components

1. Guide the O-ring (3) from below over the sensor shaft as far as the clamp disc (2). Retrofit kit "Measuring module BAMa", order no. 1113795.
2. Guide the sensor adapter (5) from below over the sensor shaft (4) as far as the clamp disc (2).
3. Pay particular attention to the fitting and correct seating of the upper (3) and lower (6) O-ring.
4. Guide the threaded sleeve (1) from above over the sensor shaft.
5. Screw the threaded sleeve (1) together with the sensor adapter (5).

5.5.2 Assembly of the sensor in the sensor module

Fig. 12: Assembling the sensor in the sensor module

1. Attach the sensor to the sensor module with the sensor adapter, as shown in the figure.
2. Close the bayonet fitting clockwise with your thumb on the finger grip of the sensor adapter.

   Turn all bayonet fittings hand-tight to their end stop for adequate leak-tightness.

   Do not grease the O-ring if the bayonet fitting is hard to close! The grease could falsify the measurement. Stir a little fragrance-free detergent in water and wet the O-ring with it.

5.6 Hydrodynamic cleaning (optional in conjunction with sensor type CLO)

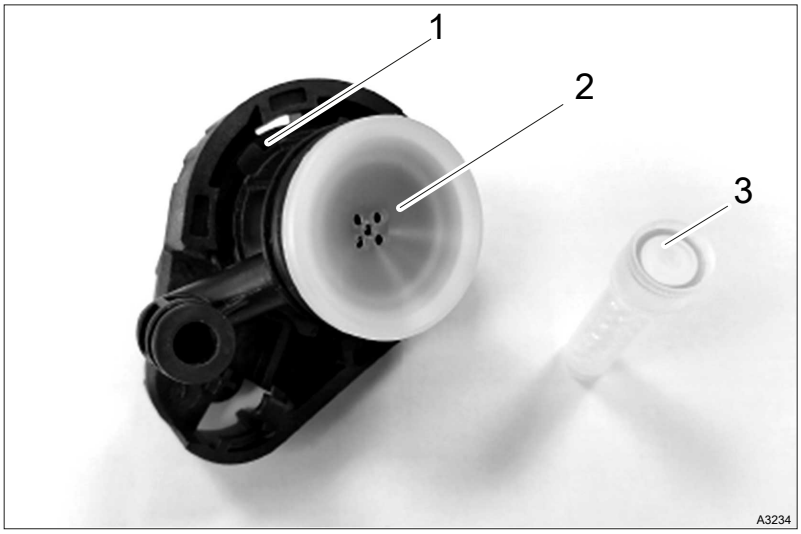


Fig. 13: Hydrodynamic cleaning

“Hydrodynamic cleaning” is used to clean the electrodes of the sensor type CLO.

1. Place the ball funnel (2) into the flow element (1) (to collect the balls added in the next step). (The ball funnel is already pre-assembled in the sensor module “Sensor type CLO”.)
2. Fit the flow element (1) into the sensor module.
3. Pour in 20 ... 25 balls from the tube (3) from above into the sensor module.
4. Fit the sensor, as described in *Chapter 5.5 ‘Installation of the sensors to determine the water quality’ on page 23*.
5. Adjust the flow rate. The optimum cleaning effect is achieved at approx. 60 l/h.

5.7 Assembly of the flow limiter (optional)

1. The flow limiter is assembled between the shut-off valve and the hose connector, see Fig. 2
2. Remove the hose connector at the shut-off valve.
3. Assemble the O-rings supplied on the double connector G1/4-G1/4.
4. Screw the double connector into the shut-off valve.
5. Screw the flow limiter onto the double connector, noting the direction of flow (arrow).
6. Assemble the hose connector on the flow limiter.

5.8 Assembly of the vent valve (optional)

Fit the vent valve (lip valve) on the hydraulic outlet on the threaded connector not used, see Fig. 2

1. Remove the blanking plug, G1/4 at the hydraulic outlet.
2. Fit the vent valve (lip valve) with the O-ring on the hydraulic outlet.

5.9 Assembly of the potential equalisation and earthing connector (optional accessories)

INFORMATION! Make sure that the earthing connector is properly connected to a suitable building earth via an earthing line provided by the customer.

5.9.1 Mounting kit

The "Potential equalisation and PE connector BAMa" package includes:

Required for potential equalisation:

- 1 potential plug, M30x4, P2, PVC
- 1 connecting cable, 2 metres with spring socket Ø2

required for the earthing connector:

- 1 blanking plug G1/4 stainless steel
- 1 O-ring 10x2
- 1 earthing ring with tongue

5.9.2 Assembly of the potential equalisation

Assembly of the potential equalisation

The potential equalisation is assembled on the sensor module for pH, ORP and fluoride sensors.

1. Unscrew the blanking plug from the bottom of the sensor module.

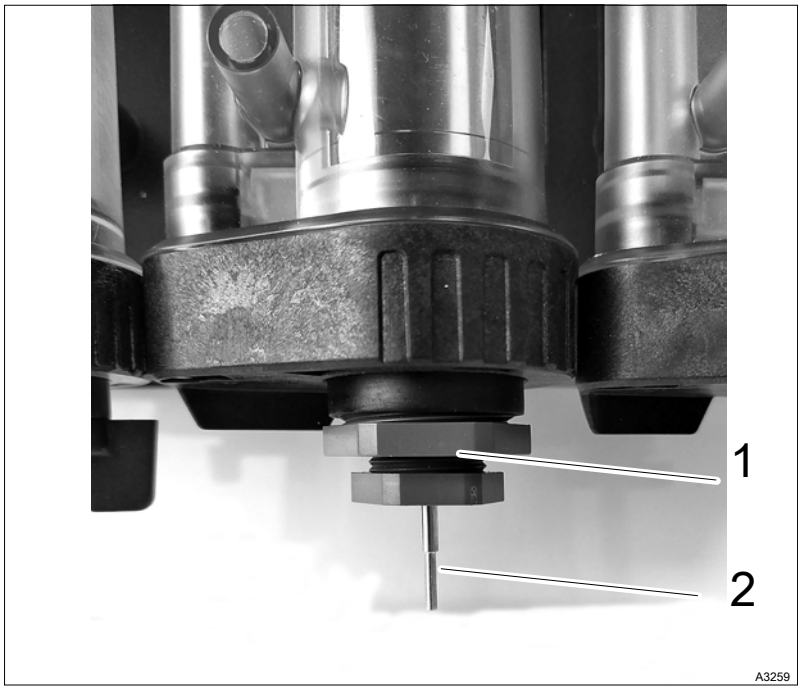


Fig. 14: Potential equalisation plug (1) and metal pin (2)

2. Screw the potential equalisation plug (1) in the position of the blanking plug.
3. Push the cable with the contact sleeve over the metal pin (2) of the potential equalisation plug.
4. Connect the open end of the cable, as per the operating instructions for the measuring / control unit.

5.9.3 Assembly of the earthing cable

The earthing cable is fitted at the hydraulic inlet of the bypass fitting, see Fig. 2

1. Unscrew the blanking plug G1/4".
2. Fit the stainless steel blanking plug complete with O-ring and the earthing ring.
3. Fit the cable (by others) with a cable cross-section of 1.5 ... 2.5 mm² to the earthing connector.
4. Fit the other end of the cable in an appropriate manner to, for instance, the system, building earthing.

5.10 Hydraulic short circuit module (accessory)

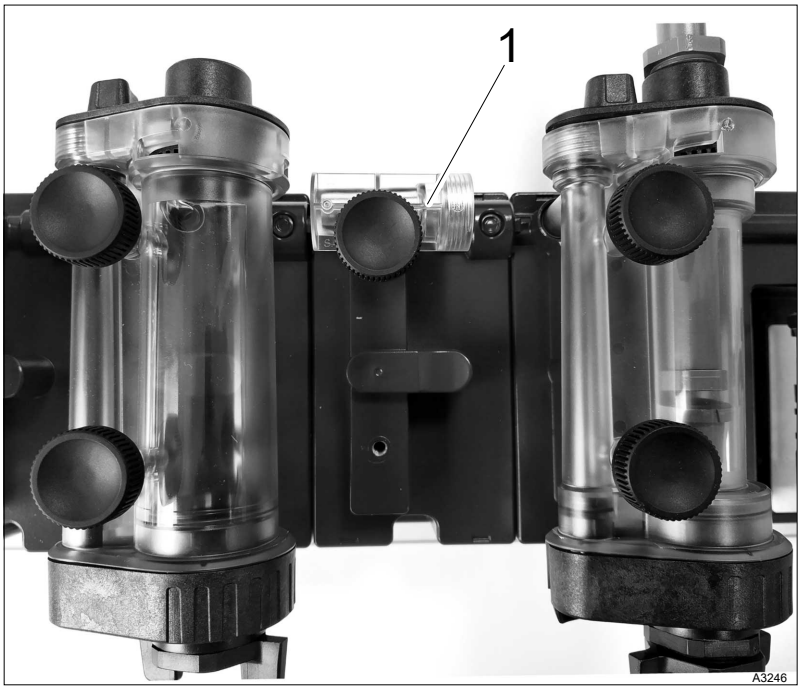


Fig. 15: Hydraulic short circuit module (1)

The hydraulic short circuit module (1) is used for the hydraulic short circuiting of a module holder if no sensor module is inserted, e.g. on module holders not used during the respective operating phase (e.g. cleaning).

1. Close the shut-off valve at the hydraulic inlet to shut off the flow.
2. Remove the 2 retaining screws on the respective sensor module.
3. Remove the sensor module fitted from the module holder.
4. Attach the hydraulic short circuit module to the module holder.
5. Screw 1 retaining screw onto the module holder.
6. Open the shut-off valve at the hydraulic inlet and check the tightness of all components.

6 Commissioning

- **User qualification, commissioning:** trained and qualified personnel *Chapter 3.2 'User qualification' on page 13*

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

Requirement: All components have been properly assembled.

1. Fully open the shut-off valve on the inlet side.
2. Slowly open the shut-off valve on the outlet side until you have the flow you require. Make sure that there is no negative pressure in the bypass fitting - open the sample valve to check that no sample water is escaping. If so, change the process parameters or install a vent valve (order no. 1113427).
3. If fitted: Position the reed switch of the flow sensor to the minimum permitted flow.

   In the application:

   - BAMa _ _1, e.g. Drinking water: 5 l/h
   - BAMa _ _2, e.g. Pool + Wellness: 30 l/h.
4. If fitted: Check the thermal flow control by gauging the factory-set lower switching point of 30 %. 30 % must correspond to a minimum flow of 25 l/h. If the value is below this level, you will need to raise the switching point in accordance with the operating instructions for the thermal flow sensor. You will need a measuring cup and a stopwatch for the gauging process.
5. Check all connections, threaded connectors and components for leak-tightness. Refer to the operating instructions for all sensors.
6. Calibrate and commission the sensors, as described in the operating instructions for the sensors.

7 Operation and calibration

- **User qualification, operating and calibration:** trained user
  ↳ *Chapter 3.2 'User qualification' on page 13*

Calibrate the units, as described in the operating instructions for the measuring / control unit and/or the respective sensor.

1. Close the shut-off valve on the inlet side when calibrating with standard solutions, e.g. with pH/ORP/fluoride sensors.

Fig. 16: Calibration beaker

1 Buffer mark
2 Potential equalisation pin

2. Use the calibration beaker supplied when calibrating with standard solutions, e.g. with pH/ORP/fluoride sensors.

   Position the calibration beaker at the adjacent sensor module of the sensor to be calibrated.

   Use a suitable buffer to fill the calibration beaker up to the mark (1).

3. Connect the potential equalisation cable to the potential equalisation pin on the calibration beaker during calibration if the potential equalisation switch of the controller is activated when the pH/ORP sensors are in measuring mode.

4. Carry out the necessary calibration.

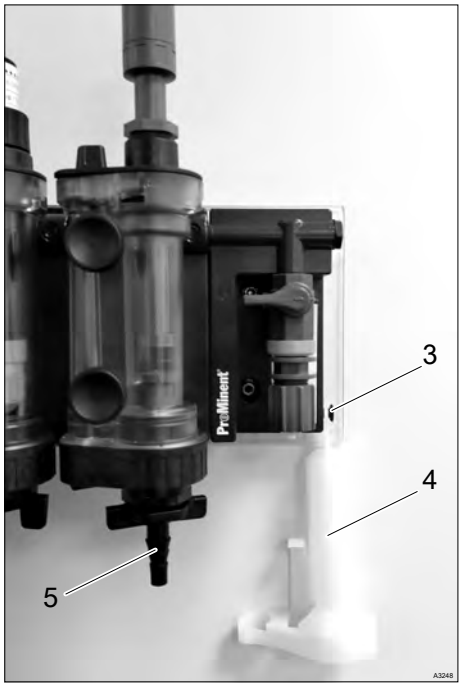


Fig. 17: Calibration beaker

3 Collector for calibration beaker
4 Calibration beaker
5 Sample valve

5. Open the shut-off valve on the inlet side and correctly adjust the flow rate on the ball valve at the outlet side.

6. Suspend the calibration beaker (4) on the collector (3) provided for this purpose.

You can take a sample at the sample valve (5) to calibrate measured variables that require a water sample.

8 Diagnostics and troubleshooting

- **User qualification, troubleshooting and fault rectification:**
  trained user ↳ *Chapter 3.2 'User qualification' on page 13*

Error:	Cause:	Remedy:
The float does not indicate the correct flow rate or is hanging down.	Dirt in the bypass fitting.	Clean the module and float, and fit a protective filter upstream.
	Flow meter module is not hanging vertically.	Fit the flow meter module vertically.
Flow sensor fails to trigger.	The reed switch has become stuck by excessive electrical voltage (even if the voltage is exceeded only briefly).	Use a series resistor to lower the voltage and replace the flow sensor.
The measured value of a pH or ORP sensor is not stable; the sensor cannot be calibrated.	No potential equalisation pin is connected although the controller is configured for this.	Connect the potential equalisation pin and earthing, using the potential plugs to do so.
	The controller is not configured for measurement with a potential equalisation pin, e.g. no jumper has been drawn in the unit.	Configure the controller for this type of measurement, e.g. bridge two terminals in the controller.
	The controller is not configured for measurement without a potential equalisation pin; refer to the operating instructions for your controller.	Configure the controller for this kind of measurement, e.g. connect a jumper in the controller.
	The sensor is dirty, faulty or needs to be regenerated.	Clean, replace or regenerate the sensor - refer to the operating instructions for the sensor.
There is air in the bypass fitting.	Bypass fitting is incorrectly installed.	Install the bypass fitting correctly. Fully open the shut-off valve and raise the flow rate to a maximum of 100 l/h until the air is expelled from the bypass fitting.
No water is emerging from the sample valve.	Negative pressure in the bypass fitting.	Correctly install the bypass fitting, e.g. install a vent valve.
The flow changes over several hours.	The priming pressure at the module is not constant.	Check that the pump upstream of the bypass fitting is working properly and check the installation of the pump. Fit a flow limiter, which is available as an accessory, with changes in flow caused by the process. A minimum priming pressure of 1.5 bar is needed for this. Refer to the sensors' pressure specification.

9 Maintenance/repair

- **User qualification, maintenance:** trained user *Chapter 3.2 'User qualification' on page 13*

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

9.1 Maintenance intervals

Maintenance interval	Maintenance work
daily ... monthly (depending on the application)	Clean the filter
daily ... monthly (depending on the application)	Check the sensor modules for dirt (deposits, sedimentation, biofilm)
monthly	Check the flow float for dirt
every 3 months	Check the leak-tightness of the bypass fitting

9.2 Cleaning dismantled sensor modules

INFORMATION!: To minimise disruption to operation, you can remove individual sensor modules from the bypass fitting and replace them with cleaned sensor modules or with the hydraulic short circuit module. You can then clean the sensor modules you have removed and keep them for the next cleaning cycle.

1. Dismantle the sensor module to be cleaned, ↳ *Chapter 9.3 'Replacing or retrofitting sensor modules' on page 34*

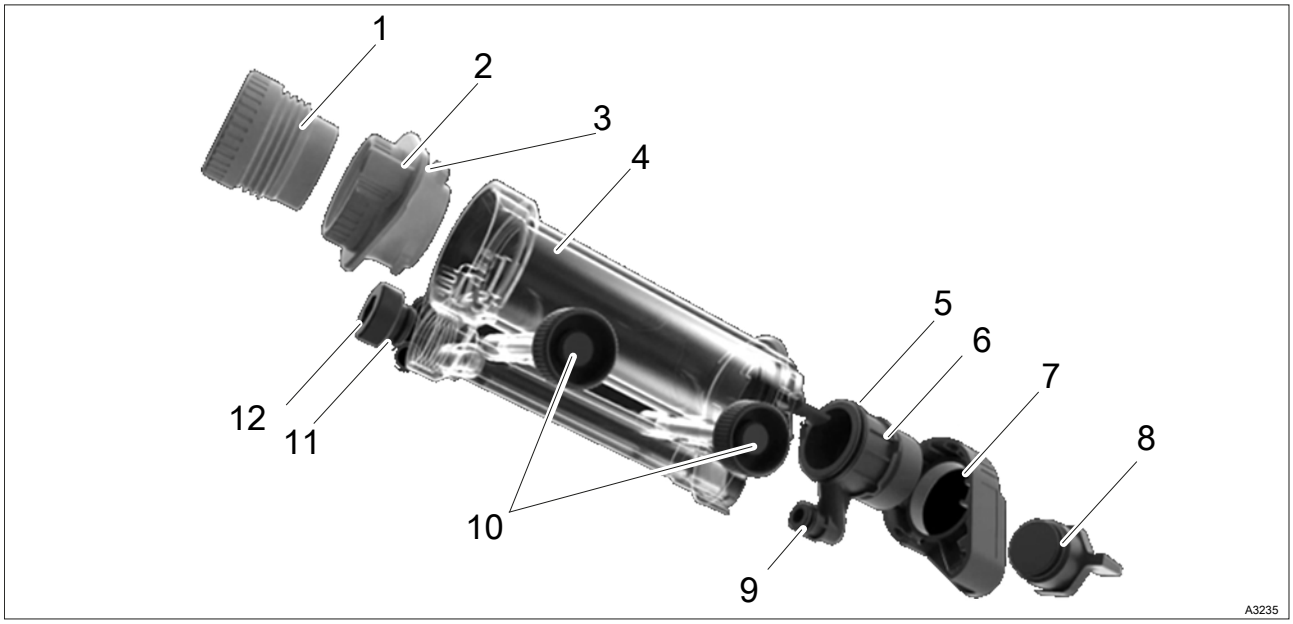


Fig. 18: Construction of the sensor module

1 Threaded sleeve G1
2 Sensor adapter
3 O-ring
4 Module
5 O-ring
6 Flow element
7 Flow element bracket
8 Sealing stopper M30x4 P2
9 O-ring
10 Knurled head screws (2x)
11 O-ring
12 Plug M20

2. Use a suitable cleaning agent and tools, such as commercially available bottle brushes, to clean all components of the sensor module.
3. If necessary, use an ultrasonic bath or other appropriate cleaning equipment to clean all components.
4. Also clean the collector in the module carrier.
5. Thoroughly rinse all components with water to prevent any residual cleaning agent and dirt from remaining in the components that could block the bypass fitting or damage the sensors.
6. Replace all damaged O-rings.
7. Fit the cleaned sensor module, ↳ *Chapter 9.3 'Replacing or retrofitting sensor modules' on page 34*

9.3 Replacing or retrofitting sensor modules

The bypass fitting can be extended. Appropriate retrofitting kits can be ordered and integrated into the fitting. ↳ *Chapter 11.1 'Retrofit kits' on page 37*

1. Close the shut-off valve in the feed of the bypass fitting.
2. Ensure that the bypass fitting is at atmospheric pressure.
3. Dismantle the sensor and store the sensor, as described in the operating instructions for the sensor.
4. Unscrew the sensor module (2 x knurled head screws).
5. Remove the sensor module from the module carrier.
6. Drain the sensor module.
7. Clean the collector in the module carrier.
8. Replace all O-rings removed.
9. Insert the sensor module or the hydraulic short circuit module into the module carrier.
10. Tighten the sensor module (2 x knurled head screws) or the hydraulic short circuit module (1x knurled head screw).
11. If required: Fit the sensor.
12. Open the shut-off valve a little and check the leak-tightness of all sensor modules before fully opening the shut-off valve.
13. Adjust the flow.
14. If required: Calibrate the sensor, referring to the operating instructions for the sensor.

9.4 Replacing or retrofitting the module holder

The bypass fitting can be extended. Appropriate retrofitting kits can be ordered and integrated into the fitting, ↳ *Chapter 11.1 'Retrofit kits' on page 37*

1. Close the shut-off valve in the feed of the bypass fitting.
2. Ensure that the bypass fitting is at atmospheric pressure.
3. Fully drain the bypass fitting through the lower threaded connectors.
4. Dismantle all sensors and store the sensors as described in the operating instructions for the sensors.
5. Dismantle all hoses and other fixed components from the bypass fitting.
6. Dismantle the bypass fitting.

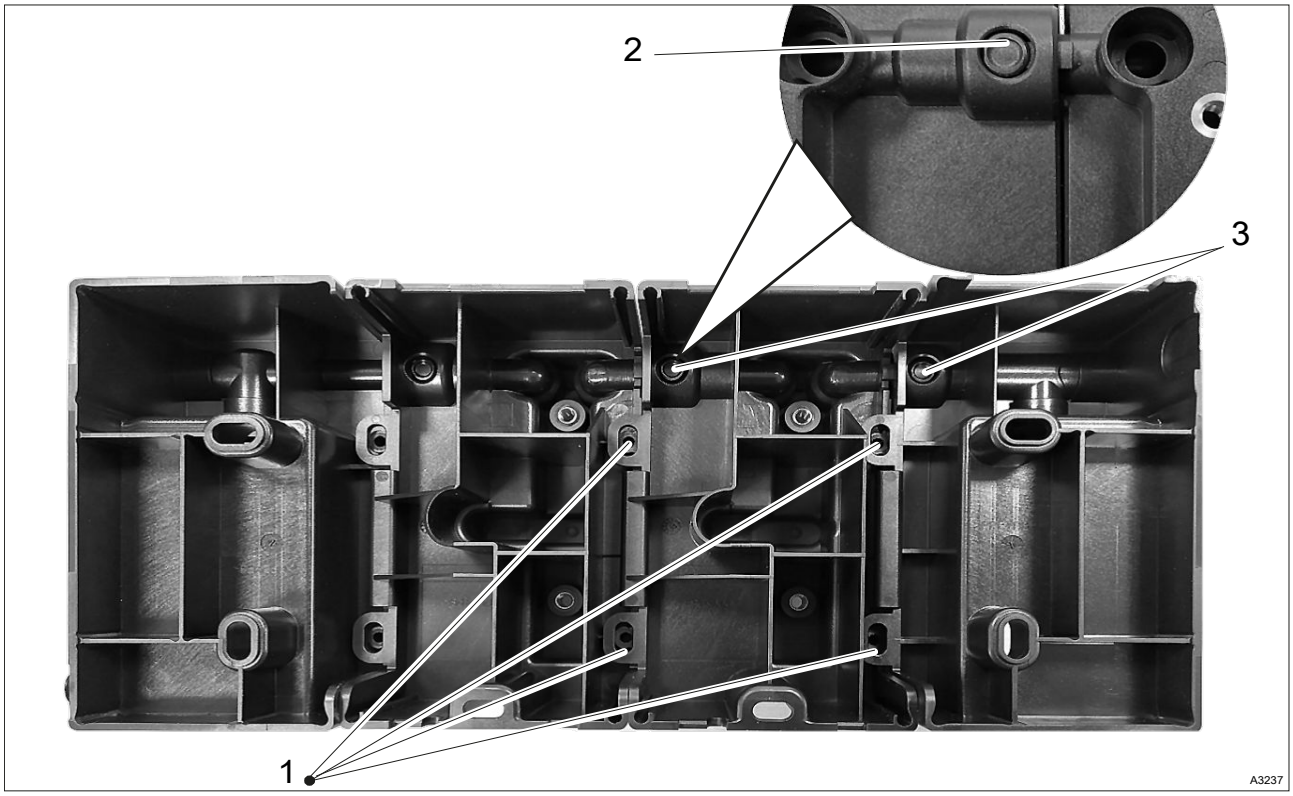


Fig. 19: Fixing bolts (1) and retaining lugs (2) and (3)

7. On the back of the bypass fitting, remove the fixing bolts (1) of the module holder that is to be removed or where the expansion module is to be fitted.
8. Unlock the retaining lugs (2) and (3) of the module holder and remove the module holder, rotating the modules approx. 90° away from each other, at the same time pulling them apart.
9. Clean the collectors in the remaining module holders.
10. Re-assemble all the O-rings removed.
11. When assembling the module holder, make sure that the snap hook is flush with the groove on the adjacent module.

    Fit the new module holder or additional module holder, making sure that the retaining lugs snap into place.
12. Move the module holders towards each other under pre-tension and screw the module holders together, approx. 2 Nm (hand-tight).
13. Refit the bypass fitting.

    Make new fixing holes if you have changed the number of modules.
14. If required: fit the sensors.
15. Fit all hoses and other fixed components to the bypass fitting.
16. Open the on-site feed to the bypass fitting.
17. Open the shut-off valve a little and check the leak-tightness of all modules before fully opening the shut-off valve.
18. Adjust the flow.
19. If required: calibrate the sensors, referring to the operating instructions for the sensors.

10 Disposal of used parts

- **User qualification:** instructed user ↳ *Chapter 3.2 'User qualification' on page 13*.

Regulations governing the disposal of used parts

– *Note the national regulations and legal standards that currently apply in your country*

The manufacturer will take back decontaminated used units providing they are covered by adequate postage.

Decontaminate the device before returning it for repair. To do so, remove all traces of hazardous substances. Always observe the material safety data sheets for the medium being pumped.

A current Declaration of Decontamination is available to download on the ProMinent GmbH website.

11 Retrofit kits, spare parts and accessories

11.1 Retrofit kits

Tab. 6: Retrofit kits

Designation	includes	Order no.
Sensor module	Sensor module, complete Module holder All sensor adapters Knurled head screws Small components box BAMa, 1117136	1113795
Filter module	Module holder Filter head 4 O-rings 8.90 x 1.90 Filter bowl Filter insert Seal Knurled head screw Small components box BAMa, 1117136	1113798
CLO, cleaning kit	Ball funnel O-ring, ID23.00 x 2.00 Pack of balls Label	1113881
Metering module	Sensor module, complete Module holder Knurled head screws Injection valve Ball Ø8 Small components box BAMa, 1117136	1113424

11.2 Spare parts

Designation	Contents	Order no.
Sensor module, set	Sensor module, complete All sensor adapters: ■ G3/4 ■ G1 ■ PG 13.5 Adapter G1-3/4 NPT. 2 knurled head screws.	1113796
Flow module, set, Pool	Flow module, complete 1 sensor adapter PG 13.5 2 knurled head screws Module holder 2 PT screws Small components box BAMa, 1117136	1113797
Flow module, set, Drinking water	Flow module, complete Sensor adapter PG 13.5 with O-ring 2 knurled head screws Module holder 2 PT screws Small components box BAMa, 1117136	1122792
Flow module, kit, Industrial water	Sensor module, complete 1 sensor adapter G3/4 2 knurled head screws Ball valve PVDF Adapter Thermal switch Module holder 2 PT screws Small components box BAMa, 1117136	1113349
Module holder with O-ring, set	Module holder 2 PT screws Small components box BAMa, 1117136	1124271
Hydraulic inlet, PVC, complete set	Hydraulic inlet Laboratory ball valve Ø10 DN6 1/4" PVC, complete Blanking plug G1/4 with O-ring 2 PT screws Small components box BAMa, 1117136	1124290

Designation	Contents	Order no.
Hydraulic outlet, PVC, complete set	Hydraulic outlet with logo Laboratory ball valve Ø10 DN6 1/4" PVC, complete Blanking plug G1/4 with O-ring 2 PT screws Small components box BAMa, 1117136	1124291
Hydraulic inlet, PVDF, complete set	Hydraulic inlet Laboratory ball valve Ø10 DN6 1/4" PVDF, complete Blanking plug G1/4 with O-ring 2 PT screws Small components box BAMa, 1117136	1124292
Hydraulic outlet, PVDF, complete set	Hydraulic outlet with logo Laboratory ball valve Ø10 DN6 1/4" PVDF, complete Blanking plug G1/4 with O-ring 2 PT screws Small components box BAMa, 1117136	1124293
Thermal flow sensor SA4300 set	1 thermal flow sensor SA4300 1 cutting ring threaded connector E40260 1 cable + plug, 2 metres	1122791
Hydraulic inlet, PVC	Hydraulic inlet PVC ball valve with O-ring Plug, G 1/4 with O-ring	1112594
Hydraulic outlet, PVC	Hydraulic outlet with logo PVC ball valve with O-ring S G 1/4 plug with O-ring	1112444
Hydraulic inlet, PVDF	Hydraulic inlet PVDF ball valve with O-ring G 1/4 plug with O-ring	1113884
Hydraulic outlet, PVDF	Hydraulic outlet with logo PVDF ball valve with O-ring G 1/4 plug with O-ring	1113883

Designation	Contents	Order no.
Sealing kit	4 O-rings, 29.00 - 2.00, FKM 2 O-rings, 25.00 - 3.00, FKM 2 O-rings, 30.00 - 2.00, FKM 10 O-rings, 9.00 - 2.00, FKM 5 O-rings, 9.00 - 2.50, FKM/F 1 blanking plug, M20x1.5, PPE, GF20, MT 1 blanking plug, G1/4 with O-ring 1 blanking plug, M30x4 P2, PVDF 1 seal for filter cup, FKM	1113721
Mounting kit, G1, sensor, 25 mm	Threaded sleeve G1" O-ring, 2.00 x 3.00	1113807
Mounting kit, G1, sensor DO3,	Threaded sleeve G1" short with O-ring 25.00 - 3.00 FKM	1117395
Hose connector, set, 12x6, PCB	2 hose sleeves,12 x 6, P 2 clamping rings, Ø12, PVDF 2 union nuts, M20x1.5x25, PVC 2 O-rings, 9.00 - 2.50, FKM	817052
Hose connector, kit, 8x5	2 hose sleeves, 8 x 5, P 2 clamping rings Ø8, PVDF 2 union nuts, M20x1.5x25, PVC 2 O-rings/M, 9.00 - 2.50, FKM	817053
Hose connector, set, 12x6, USA	2 hose sleeves, 12 x 9, PVC 2 clamping rings, Ø12, USA, PVDF 2 union nuts, M20x1.5x25, PVC 2 O-rings/M, 9.00 - 2.50, FKM	817055
Hose connector, set, 12x6, PVT	2 hose sleeves, 12 x 6 PVDF 2 clamping rings, Ø12, PVDF 2 union nuts, M20x1.5x25, unfinished, PVDF 2 flat seals, 17.8x6.5x1, PTFE 2 flat seals, 18x6.5x1, EPDM/P 2 flat seals, 18x6.5x1, FPM-A	1024586
Threaded connector kit, complete, DN10, PC1	Adapter, M20x1.5-G3/4, P Insert, Ø16, DN10, PVC Union nut, G 3/4, DN10, PVC O-ring, 13.00 - 2.50, FKM/HR O-ring, 9.00 - 2.50, FKM/F	791665
Sensor adapter, kit	1 of each sensor adapter: ■ PG 13.5, ■ G1, ■ G3/4.	1117492

Designation	Contents	Order no.
Flow limiter, 12 litres, complete, f/f PVC	Flow limiter, 12 l/h, G1/4 female/female 2 O-rings, 10.00 - 2.00, FKM Double nipple, G1/4, PVC	1117504
Flow limiter, 54 litres, complete, f/f PVC	Flow limiter, 54 l/h, G1/4 female/female 2 O-rings, 10.00 - 2.00, FKM Double nipple, G1/4, PVC	1117493
Reed switch PVC, flow module	Reed switch, complete	1118867
Blanking plug, M30x4, P2, PVDF	with O-ring, 22.00 - 2.00, FKM	1123211
Calibration beaker with potential equalisation	Calibration beaker with potential equalisation	1113878
Drain nozzle, set, PG13.5, PVDF	Drain nozzle, PG13.5, PVDF Adapter M30/PG13.5	1007665
Mounting material	4 screws 4 universal rawlplugs 4 washers 12 PE plugs	1113794
Mounting material, mounting kit, G1, sensor DO3	1 threaded sleeve G1 1 O-ring, 25.00 - 3.00, FKM	1117395
Sample valve M30x4P2	1 laboratory ball valve, Ø10 DN6, 1/4" ,PVC / FPM 1 adapter, M30x4P2, G1/4, complete, PVDF 1 O-ring, 22.00-2.00, FKM	1004737
Potential equalisation, complete	1 potential plug, M30x4 /P2, complete, PVC 1 earthing ring with tongue 1 blade receptacle, insulated, 6.3x0.8, blue 1 potential equalisation cable 1 sealing screw, G 1/4, stainless steel, DIN 908 1 O-ring	1113409
Hydraulic short circuit, complete	Hydraulic short circuit, assembled Knurled head screw	1117462
Adapter with O-ring, G1-3/4 NPT PVDF	1 adapter, M30x4P2, G1/4, complete, PVDF 1 O-ring, 22.00-2.00, FKM	1113353
Lip valve, G 1/4, 6x4, PVC	1 lip valve, G 1/4, 6x4, PVC	1113427
Laboratory ball valve Ø10, DN6 ¼", PVC	1 laboratory ball valve Ø10 DN6-1/4" PVDF 1 connecting nipple G1/4xM20x1.5 PVDF 1 O-ring	1116688
Laboratory ball valve, Ø10, DN6 ¼", PVDF	1 laboratory ball valve, Ø10, DN6-1/4", PVDF 1 connection nipple, G1 4xM20x1.5, PVDF 1 O-ring	1116689
Flow element with O-rings		1113369
Filter insert, 300 µm		1105632

Designation	Contents	Order no.
Glass sphere filling for metering module		1122617
Cleaning balls for CLO, complete		1104267
Calibration beaker, complete		1113878
Knurled head screw, M5 x 54		1106742

11.3 Accessories

Tab. 7: Accessories

Designation	Order no.
Hose connector set, 8x5, PVDF	1075939
Thermal flow control (SA 4300)	1116684
Connection cable with socket	1116687
Cutting ring threaded connector	1116686
Sensor for flow meter float (reed switch)	791635

12 Technical data

12.1 Flow and operating pressure

12.1.1 Flow through the fitting

Application	BAMa _ _ 1, e.g. Drinking water	BAMa _ _ 2, e.g. Pool + Wellness	BAMa _ _ 3, e.g. Industrial water
Flow	5 … 25 l/h	20 … 60 l/h	20 … 100 l/h

12.1.2 Operating pressure / Operating temperature / Particle mobility

Application Specification	BAMa _ _ 1, e.g. Drinking water at max. 25 l/h	BAMa _ _ 2, e.g. Pool + Wellness at max. 60 l/h	BAMa _ _ 3, e.g. Industrial water at max. 100 l/h
Minimum priming pressure, without flow limiter and with clean filter, for a total of 9 modules.	0.025 bar	0.050 bar	0.500 bar
Minimum priming pressure with flow limiter and with clean filter, for a total of 9 modules.	1.5 bar		2.0 bar
Maximum operating pressure, ↳ *Chapter 12.7 'Pressure / temperature characteristic curve' on page 47*:	7.0 bar at 20 °C	7.0 bar at 20 °C	7.0 bar at 20 °C
Maximum operating temperature, ↳ *Chapter 12.7 'Pressure / temperature characteristic curve' on page 47*:	60 °C at 3.5 bar	60 °C at 3.5 bar	70 °C at 3.0 bar
Particle mobility is proven, with non-agglomerating, non-sedimenting model particles.	< 300 µm	< 300 µm	< 1 mm

12.2 List of materials

Take into account the resistance of the wetted materials when selecting the feed chemical - refer to the Resistance List in the Product Catalogue or on our website.

Tab. 8: Materials, wetted

Components	Application: BAMa _ _ 1, e.g. Drinking water, BAMa _ _ 2, e.g. Pool + Wellness	Application: BAMa _ _ 3, e.g. Industry
Measuring module, flow module, flow element, filter housing	SAN	SAN
Module carrier, hydraulic inlet/outlet	PPE+PS+GF 10 %	PPE+PS+GF 10 %
Sensor adapter, flow element bracket	PPE+PS+GF 30 %	PPE+PS+GF 30 %
Threaded connectors, sample valve	PVDF	PVDF
ball funnel	PVDF	PVDF
Sample valve	PVC	PVDF
Potential equalisation pin	1.4404	1.4404
Shut-off valve	PVC	PVDF
Filter insert	1.4404	1.4404
Filter cup	PA	PA
Flow sensor	PVC	1.4404
Flow limiter	PVC	---
Cleaning balls, balls in the metering module	glass	glass
Calibration beaker	PE	PE
Screws	1.4404	1.4404
O-rings, seals	Fluorine rubber	Fluorine rubber

12.3 Hydraulic connectors

Component	Dimensions
Hose “EU”	8x5 and 12x6 mm
Hose “USA”	1/2x3/8 and 3/8x1/4 inch
Pipe “EU”	DN10 horizontal
Pipe “USA”	1/2 inch MPT horizontal

12.4 Float flow meter

Parameter	Value
Flow range:	
Application: BAMa _ _ 1, e.g. Drinking water	5 … 25 l/h
Application: BAMa _ _ 2, e.g. Pool + Wellness	20 … 60 l/h
Output signal	Switching signal
Max. switching power	3 W
Max. switching voltage	42 V
Max. switching current	0.25 A
Max. constant current	1.2 A
Max. contact resistance	150 mOhm
Degree of protection of the reed switch	IP 65
Wetted materials	PVC, fluorine rubber

12.5 Thermal flow meter

Parameter	Value
Flow range	20…100 l/h
Accuracy at the switching point 30 l/h	better than ± 10 %
Output signal	Switching signal; Analogue signal; Frequency signal; IO link.
Electrical design	PNP, NPN
Max. load	300 Ohm
Continuous current load of the switching output	200 mA DC
Max. voltage drop at switching output	2.5 V DC
Degree of protection	IP 65
Wetted materials	Stainless steel: 1.4404

12.6 Flow limiter

Parameter	Value
Minimum pressure drop	1.4 bar
Maximum pressure drop	10 bar
Flow limiter:	
Application BAMa _ _ 1, e.g. Drinking water	max. 12 l/h
Application BAMa _ _ 2, e.g. Pool + Wellness	max. 54 l/h
Application	only suitable for use with filtered water of < 300 µm

Only use the flow limiter with clean water, which explains why the flow limiter is only supplied as standard for the “Drinking water” (order number 1113408) and “Pool + Wellness” (order number 1112443) applications, together with the filter module. The flow limiter can be ordered in conjunction with the filter module using the identity code and is factory-installed at the hydraulic outlet downstream of the filter to prevent blockages.

When using sensors with a maximum operating pressure of ≦ 1.0 bar, the flow limiter can be ordered as an accessory and installed on site at the hydraulic inlet module, provided that the system is handling filtered, clean sample water with no detectable solids content with a maximum particle size of 300 µm. Due to the pressure drop of 1.4 bar at the outlet of the pressure limiter, the permitted operating pressure of 1.0 bar is not exceeded further through the bypass fitting.

An additional priming pressure of 0.5 bar is to be expected when using a filter due to the ongoing contamination of the filter. Add the additional priming pressure to the above values for the minimum priming pressure.

12.7 Pressure / temperature characteristic curve

Note the maximum permitted operating pressure at the operating temperature for the “application” selected in the identity code. The permitted pressure stage can be reduced if pressure-reducing components, such as sensors, are built into the fitting:

- Range for BAMa _ _ 1, e.g. Drinking water: ≦ 3.5 bar at 60 °C
- Range for BAMa _ _ 2, e.g. Pool + Wellness: ≦ 3.5 bar at 60 °C
- Range for BAMa _ _ 3, e.g. Industry: ≦ 7.0 bar at 20 °C
- Range for BAMa _ _ 3, e.g. Industry: ≦ 3.0 bar at 70 °C

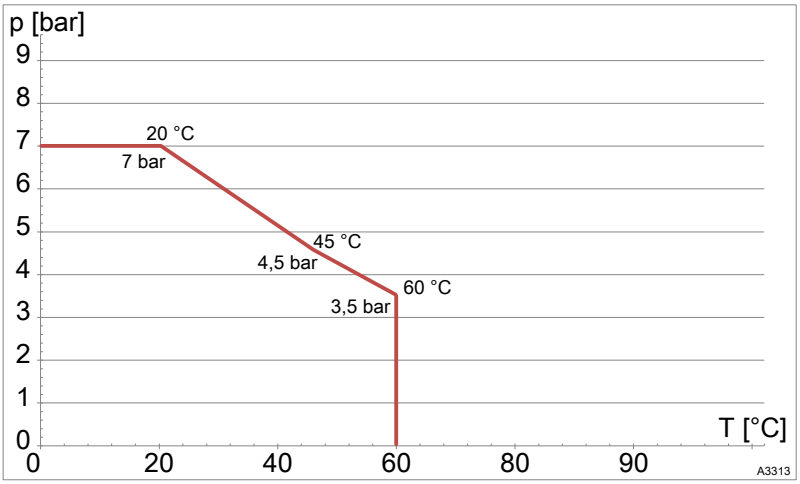


Fig. 20: Pressure / temperature characteristic curve, “Drinking water” / “Pool + Wellness”

p Pressure within the bypass fitting
T Liquid temperature

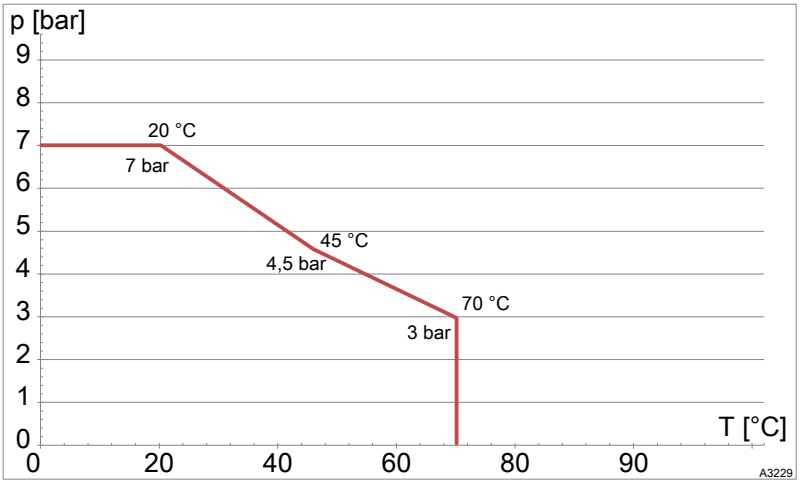


Fig. 21: Pressure / temperature characteristic line, “Industrial water”

p Pressure within the bypass fitting
T Liquid temperature

Pressure p and temperature T mutually influence each other. As the temperature of the liquid inside the bypass fitting rises, the permitted operating pressure of the bypass fitting simultaneously drops.

INFORMATION!: Note that if no liquid is flowing through the bypass fitting (blockage, ball valves closed etc.), the liquid will assume the ambient temperature of the bypass fitting. This can lower the permitted operating pressure. If necessary, lower the pressure or ensure that there is sufficient flow through the bypass fitting.

12.8 Weights

Tab. 9: Weight of the fittings - depending on the number of modules

Number of modules	1	2	3	4	5	6	7	8	9
Approx. weight in g excluding sensors	547	842	1137	1432	1727	2022	2317	2612	2907

Tab. 10: Approx. weight of individual components in grammes

Hydraulic inlet	124
Hydraulic outlet	128
Module holder	120
Measuring module	175
Flow module	230
Filter	75
Lip valve	44
Hose connector set	35
IFM SA4300	583

12.9 Torque

Component	Nm
PT screw, Torx 40x8	1.0 ... 1.2
G 1/4 plug with O-ring	1.5 ... 2.0
M20x1.5 plug with O-ring	5.0
Ball valve with O-ring	2.0
Knurled head screw	1.5
Drain nozzle	1.5 ... 2.0
Blanking plug M30	2.0

12.10 Ambient conditions

Parameter	Value
Ambient temperature:	-10 … 60 °C
Storage temperature:	10 … 70 °C
Vibration:	complies with IEC 68, Part 2 ... 6
EMC:	in accordance with the data for the electrical components
UV radiation:	not long-term stable in direct sunlight when used outdoors
Air humidity when using flow sensors and other electrical components:	Max. 90 %, non-condensing

12.11 Dimensional drawings

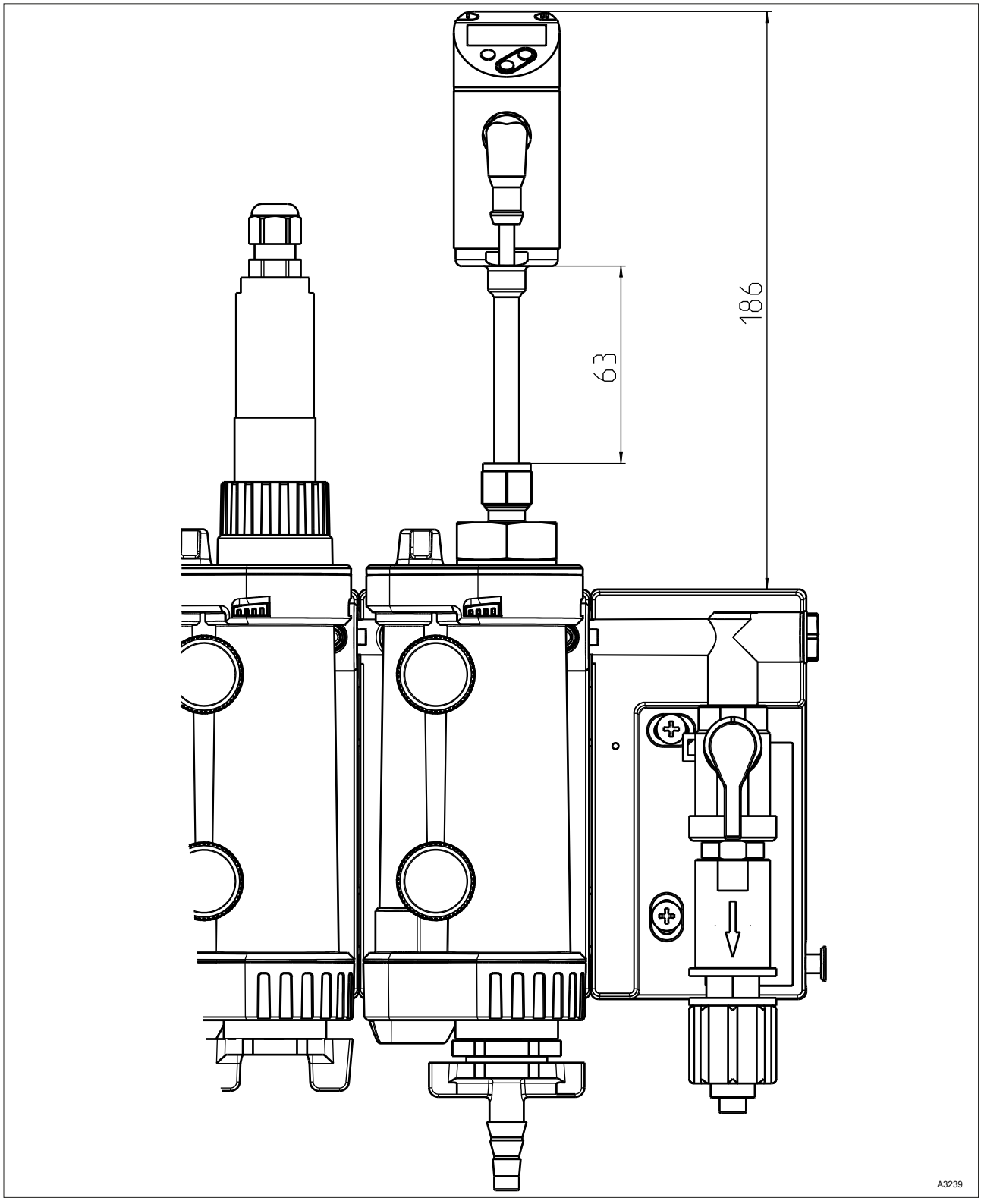


Fig. 22: Bypass fitting with thermal flow sensor

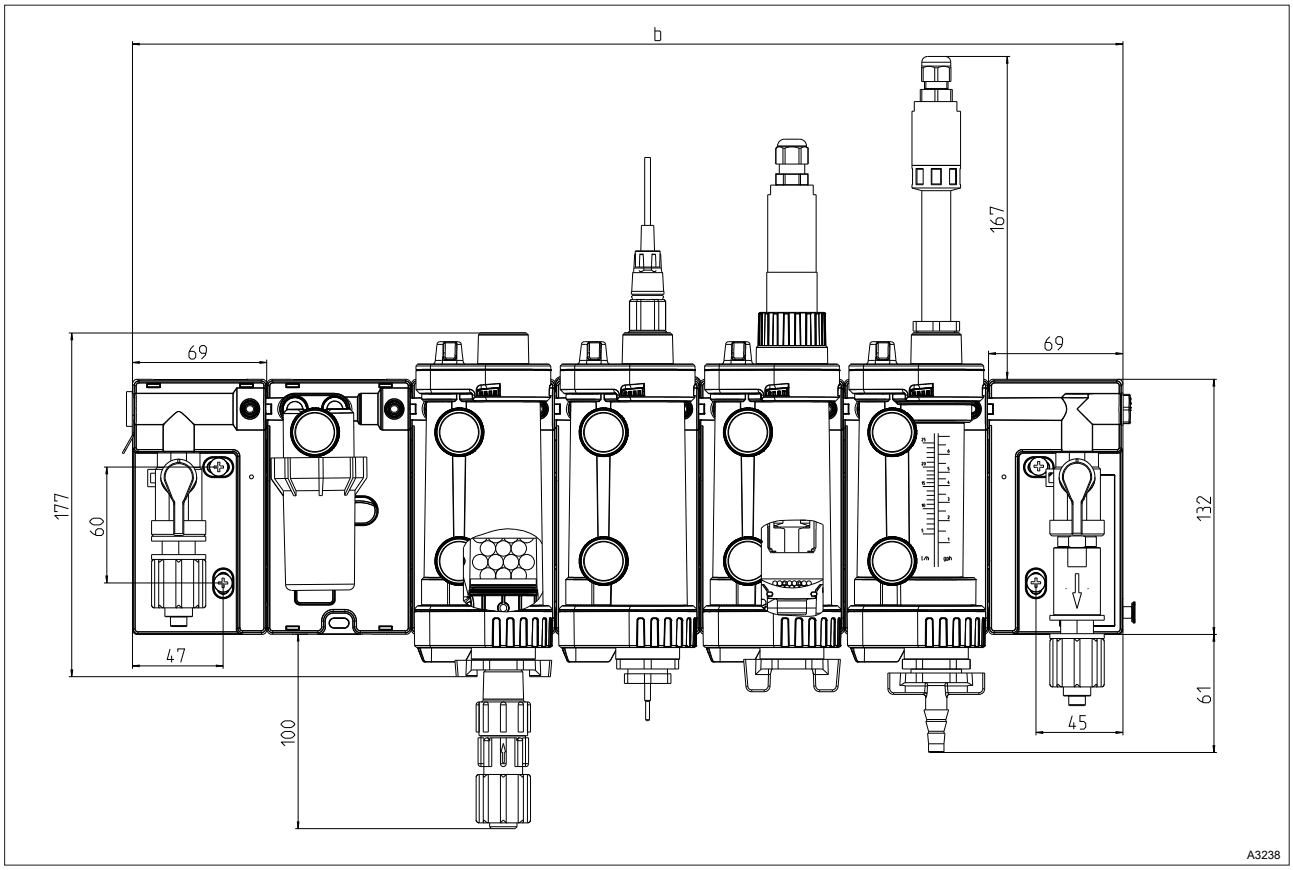


Fig. 23: Example with filter, mixer, pH, CLE and flow sensor

Tab. 11: Width b - depending on the number of modules

Number of modules	1	2	3	4	5 *	6	7	8	9
Width b in mm, approx.	213	288	362	437	**511**	586	660	735	809

* frequent configuration with, for example, filter, pH, RH, CLE and flow sensor

12.12 Standards

With correct and proper use (DN 35, maximum permitted pressure 7 bar), the bypass fitting meets the requirements of Article 4 Section 3 of the Pressure Equipment Directive 2014/68/EU. The bypass fitting has been designed and produced in accordance with the applicable good engineering practice. This guarantees that this bypass fitting can be safely used. The bypass fitting does not carry a CE mark in accordance with Article 4 Section 3 of the Pressure Equipment Directive 2014/68/EU.

In the event of “Accessory = 01 Potential equalisation”, then the bypass fitting will be governed by the RoHS Directive 2011/65/EU. The requirements are met. The bypass fitting then carries the CE mark. In all other cases, the bypass fitting meets the requirements of the RoHS Directive, even if the bypass fitting itself is not governed by the Directive. The bypass fitting then carries no CE mark.

The bypass fitting also complies with the following additional harmonised standards:

DIN EN 60947-5-9

DIN EN IEC 63000

The Declaration of Conformity is available to download on the manufacturer’s homepage.

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