HACH LANGE

UNITED FOR WATER QUALITY

Operating instructions
Water sampler

BÜHLER
BU 4010/3010//4210/4410/6010/1031



Remarks

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Subject to changes!

Access code for programming, system settings, key lock

Password:	6299
Your password:	

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General information

We are glad that you have chosen this product.
When developing this device, we combined approved technique with innovative detail solutions. Greatest importance has also been attached to the design of an apparatus which provides easy access for connection and maintenance works.

Safety remarks

Disconnect the mains power connections before carrying out any connection, maintenance or repair works.

Before putting into service

- Please read these operating instructions and special remarks thoroughly before putting the device into service.
- Familiarize yourself with the safety and operating requirements in order to safeguard personnel and equipment.
- The apparatus has been subjected to exhaustive quality inspections before dispatch.
- Any service and maintenance works required may only be carried out by trained service personnel.
- Observe the local safety regulations and the rules for prevention of accidents.
- Observe the rules concerning the handling of hazardous substances.
- Do only use original spare parts or spare parts authorised by the manufacturer.
- No liability or claims under guarantee will be accepted in respect of any modifications or conversions of the apparatus, other than those carried out by us or by persons authorised by us or for which we have given express permission (in a written form)! This also refers to any damage due to incorrect operation and/or improper use of the equipment.

Permissible application

The permissible application of the water sampler consists in the extraction of liquid, aqueous substances, temperature range 0°C to 40°C. The device must only be installed in areas free from explosion hazard and must only be used for sampling of non-explosive substances. Please refer to the technical specifications in chapter “Specifications”. Other applications are not allowed!

Permissible operating and ambient conditions

- Sample extraction of liquid aqueous substances, temperature range: 0°C to 40°C.
- The sampler is designed for operation in non-hazardous areas (no explosion risk).
- The sampler can be operated at ambient temperatures from -20°C to +43°C.
- Sampling from pressurised lines is not possible without optional accessories.
- The device is weather-proof and suitable for outside operation.

Redelivery for repair

Before returning any appliances to us, please pay attention to the following to avoid unnecessary cost and repair delays:

- Redeliveries only after agreement by the supplier
- All appliances or parts returned to us for repair must be cleaned and free of any hazardous substances whatsoever (acids, alkaline solutions, solvents, etc.) as in Germany official regulations regarding waste stipulate that persons in possession of hazardous waste are responsible for its disposal and that, at the same time, employers are responsible for protecting their employees against hazardous materials.
- Any cleaning or disposal required to be carried out by us will be charged for accordingly.

All packing materials can be disposed of as usual.
Packing materials are: cardboard, wood, PS and PE.
If the packing is returned free of cost, we will take care of its disposal.

General Information

Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.
To ensure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

Use of Hazard Information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: Information that requires special emphasis.

Note: Information that supplements points in the main text.

Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists.
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground).
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. **Note:** For all electrical products (marked or unmarked) which are supplied or produced by Hach-Lange, please contact the local Hach-Lange sales office for instructions for proper disposal.

Device designation	**4010**
Housing	Stainless steel with 40 mm insulation, (material 1.4301/ SS304) / PS / PC (GF10) Option: (material 1.4571/ SS316Ti; SS304 EPOXY-coated; SS316Ti EPOXY-coated)
Thermostatic control	Self-contained cooling / heating with 4 settings, no-frost. Temperature in sample compartment: 4°C (setting range: 0,0-9,9°C)
Control	Microprocessor control, foil keyboard, graphical display (128*64 Pixel), back lit
Data memory	Non-volatile data memory: storage of sampling and malfunction data like sample extractions, bottle changes, messages, external signals
Programming	12 user programs (can be edited freely)
Program start options	Immediately, at a certain time, by an external signal
Program stop options	End of sampling program after one program run, continuous operation or x runs
Pause mode	Interruption of program at any time
Overfilling protection	Adjustable from 1–999 samples/bottle
Interval setting	1 min. to 99 h 59 min. in steps of 1 minute
Pulse setting	1 to 9999 pulses/sample
Manual sample extraction	Possible at any time without interrupting the current program run
Program protection	Up to 5 years after voltage loss
Interface	Mini-USB, RS422/485, RS 232
Communication	Optional: TCP/IP RJ45 WEB board, 4-32GB SD/SDHC memory card Optional: Modbus or DP PROFIBUS connection
Languages	Multi-language, selectable
Signal inputs	• 2 x analog: 0/4-20 mA, • 8 x digital (flow, event, 1 x freely programmable) Option: expandable by 4 x digital inputs (3 of them can be freely programmed) and 8 x analog inputs 0-20mA / 0-10 V. Pulse length min. 60 ms and switch-level 7-24V, max. working restistance 500 Ohm, signal length max. 30 m
Signal outputs / status messages	Max. 8 digital outputs, 1x collective message Option: expandable by 8 digital outputs, 5 are freely programmable
Sampling method	-Vacuum system 20-350 ml, plastic vessel -Vacuum system 20-500 ml, optional -Vacuum flow-proportional 5-350 ml, optional -Bypass system 20-250 ml optional
Single sample volume accuracy	< 2,8 % at standard vacuum system
Suction height	Max. 8 m (at 1013 hPa and stagnant medium)
Pumping speed	>0,5 m/s at a suction height up to at least 7,8 m (at 1013 hPa); pump capacity can be adjusted electronically.
Suction hose	PVC, L=7,5 m, ID=12 mm (ID 16 mm at flow-proportional option) Max. hose length 30 m
Sampling modes	Time-related, flow-dependent, flow-proportional (option), event-related, manual sample extraction
Bottle variants	Plastic 1 x 25 L, 1 x 50 L, 2 x 10 L 4 x 6,0 L, 4 x 10 L, 4 x 14 L, 4 x 20 L, 4 x 25 L 12 x 2,9 L, 24 x 1,0 L, 24 x 2,9 L Glass 12 x 2,0 L, 24 x 1,0 L, 24 x 2 L
Overall dimensions	(Hxwxd) 1.290 (1.890*)x 690 x 645 mm for bottle variants: 1x25 L, 1x50 L, 2x10 L, 2x22 L, 4x6 L, 4x10 L, 4x14 L, 12x2 L, 12x2,9 L, 24x1 L

	1400 (2015*) x 930 x 850 mm for bottle variants: 4x20 L, 4x25 L, 24x2,9 L, 24x2 L, 36x1 L *) with opened top
Weight	100 kg with composite container; higher weight when using several bottles and/or glass bottles
Power supply	230 V 50Hz optional 115 V 50/60Hz
Power requirement	Approx. 350 VA (with cooling)
Ambient temperature	-20 - +43°C
Sample temperature	0 – 40°C
Standards	Device meets ISO 5667 standard
Wetted materials	PVC, Silicone, PS, PE, EPDM (optional: glass (Duran50) metering vessel, sinker weight SS304)

Device designation	**4210** (like 4010, with the following modifications)
Device type	Fixed site sampler for sampling of faecal matter
Rinsing water inlet Rinsing water outlet	Union nut R 3/4" (max. 2 bar) Hose connector 25 mm
Sampling method	Vacuum system 20-500 ml
Sampling modes	Time-related, flow-dependent, event-related, manual sample extraction
Bottle variants	Plastic 1 x 25 L, 4 x 14 L, 4 x 20 L 12 x 1 L, 23 x 1,0 L Glass 12 x 1,0 L, 23 x 1,0 L
Sample distribution	Direct distribution with additional position for rinsing water. When using the rinsing function, the customer has to make sure that the rinsing water can drain off freely
Overall dimensions	1.290 (1.890*) x 690 x 645 mm for bottle variants: 1x25 L, 4x14 L, 12x1 L 1400 (2015*) x 930 x 850 mm for bottle variants: 4x20 L, 23x1 L *) with opened top
Weight	105 kg with composite container; higher weight when using several bottles and/or glass bottles

Device designation	**4410** (like 4010, with the following modifications)
Device type	Self-emptying fixed site sampler for continuous operation without the need of personnel (monitoring applications)
Emptying/rinsing	Bottles are emptied, rinsed and re-filled on the same bottle position. The rinsing head is installed above the bottle.
Bottle emptying for sample collection	According to the device version: manual bottle emptying at 12 and 24-bottle version or menu-driven emptying at 2 and 4-bottle version
Hose inlet	Hose connection at dosing unit (top) Union nut R 3/4", hose ID 12 mm
Hose outlet	Hose connection at dosing unit Silicone hose 12x2, is only slipped over
Rinsing water inlet	Union nut R 3/4" (max. 2 bar)
Rinsing water outlet	Union nut R 1 1/4". When using the rinsing function, the customer has to make sure that the rinsing water can drain off freely
Bottle variants	Plastic 2 x 10 L, 4 x 5 L, 4 x 10 L, 24 x 2 L (PPH) Glass 12 x 1,6 L, 24 x 1,0 L, 24 x 2 L
Overall dimensions	(Hxwxd) • 1.290 (1930*) x 690 x 645 mm for bottle variants: 2 x 10 L, 4 x 5 L, 12 x 1,6 L • 1400 (2175*) x 800 x 850 mm for bottle variants: 4 x 10 L, 24 x 1 L, 24 x 2 L *) with opened top

Weight	115 kg with bottle option 2x10 L PE; higher weight when using other bottle or glass bottle options

Device designation	**6010** (like 4010, with the following modifications)
Device type	Fixed site sampler in **double-housing** (measuring station)
Measuring pot inlet	Hose nozzle ½“, hose ID 12 mm
Measuring pot outlet	Hose nozzle ID 40 mm. The customer has to make sure that the water in the measuring pot can drain off freely
Bottle variants	Plastic 1 x 25 L, 1 x 50 L, 2 x 10 L 4 x 6,0 L, 4 x 10 L, 4 x 14 L, 12 x 2,9 L, 24 x 1,0 L Glass 12 x 2,0 L, 24 x 1,0 L
Overall dimensions	(Hxwxd) 1.690 (2290*) x 1280 x 645 mm *) with opened top
Weight	Approx. 250 kg with composite container; higher weight when using several bottles and/or glass bottles
Power requirement	Approx. 450 VA (with cooling + SC1000 controller), higher requirement when using the optional spiral pump

Device designation	**3010** (like 4010, with the following modifications)
Device type	Compact device in plastic housing, especially suitable for high ambient temperatures. Material: PE with 50 mm insulation / Styrosun / PC (GF10)
Suction height	Max. 7,5 m (at 1013 hPa and stagnant medium)
Pumping speed	>0,5 m/s at suction height up to at least 6 m (at 1013h Pa); pump capacity can be adjusted electronically
Suction hose	PVC, L=7,5 m, ID=10 mm (ID 16 mm at flow-proportional option). Max. hose length 30 m
Bottle variants	Plastic 1 x 25 L, 4 x 14 L, 12 x 2,9 L, 24 x 1,0 L Glass 12 x 2,0 L, 24 x 1,0 L
Sampling method	Vacuum system 20-350 ml with plastic metering vessel
Installation conditions	-30 to + 50°C
Operating temperature	-20°C to +43°C
Overall dimensions	(Hxwxd) 1.100 (1.640*) x 760 x 745 mm *) with opened top
Weight	Approx. 70 kg with composite container, higher weight when using several bottles and/or glass bottles

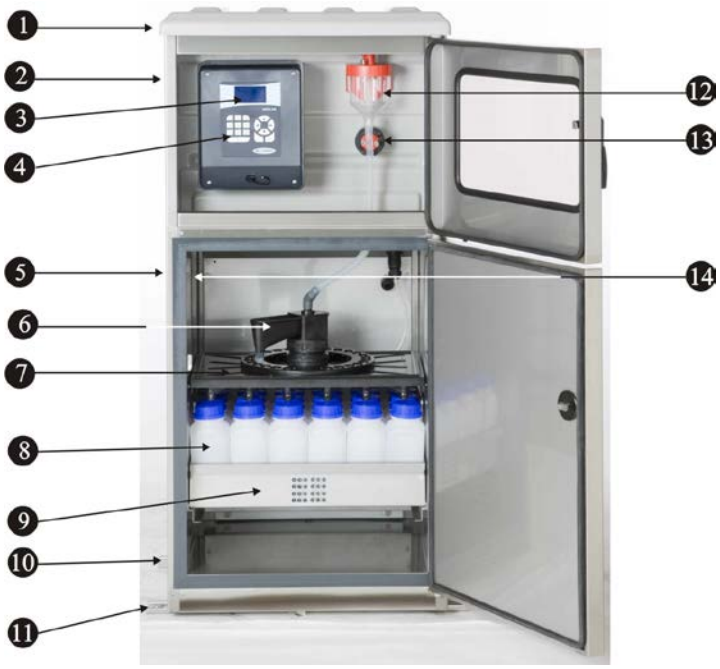
Device designation	**BU 1031** (like BU 4010, with the following modifications)
Housing:	Wall mounted version without housing (PVC/stainless steel). Option: Stainless steel housing with cooling/heating (materials: 1.4571/SS316Ti; SS304 EPOXYcoated; SS316 Ti EPOXY-coated)
Type	Fixed site sampler for sample medium with high solids content (sludge sampler) and for sampling from pressurised lines
Suction hose	Inlet: inside thread 1 1/4” Outlet: hose nozzle DN40 other dimensions are possible with small volumes
Bottle variants:	1 x 25 L PE **In stainless steel housing:** 1 x 25 L PE; 4 x 14 L PE; 4 x 6,3 L PE; 12 x 2,9 L PE
Dosingsystem	Double ball valve system with dosing tube mounted between the two valves (up to 16 bar). Standard volume 100 ml, other volumes available upon request
Ambient temperature	0 to 45°C (wall-mounted version) -20 to + 40°C (with stainless steel housing)
Overall dimensions	<u>Wall-mounted version:</u> control unit (hxwxd) 350 x 450 x 170 mm dosing unit (hxwxd) 570 x 120 x 200 mm <u>Version with stainless steel housing (hxwxd)</u> 1.290 (1.890*) x 690 x 645 mm *) with opened top
Weight	Wall-mounted version: approx. 15 kg Version with stainless steel housing: min. 100 kg

CE

Characteristics: sampler 4010

The device consists of the following component parts:

1. Protective top (can be opened)
2. Upper part of housing
3. Back lit LC-display
4. Keyboard
5. Lower part of housing (cooled sample compartment)
6. Motor-driven distributor
7. Distributor plate
8. Sample bottles
9. Carrying tray for bottles
10. Fixing bar
11. Fixing bar
12. Dosing unit
13. Pinch valve
14. Type plate



Remark: The illustrated sampler corresponds to a standard version with 12 bottles and distributor plate.
According to the sampler version, some components such as dosing unit or distributor/bottles can be different!

Remark: Please read the entire manual before unpacking, installing and operating this device. Observe all danger and safety regulations. Non-observance can lead to serious personal injury or to damage to the instrument.

DANGER The workings described in this chapter of the manual must only be carried our by qualified personnel.

Characteristics: sampler 4210

Compared to the standard samplers, the special sampler for sampling of faecal matter is equipped with a rinsing unit in the metering vessel and an additional outlet. Furthermore the sample is filled directly into the bottles. The section from the metering vessel to the distributor outlet is rinsed.

Method of operation: The metering vessel is rinsed automatically after each sample extraction. To do this, the distributor arm first moves on the discharge position and then back on the bottle. Thus a sample contamination is avoided.

The picture shows the metering vessel with additional rinsing water connection.

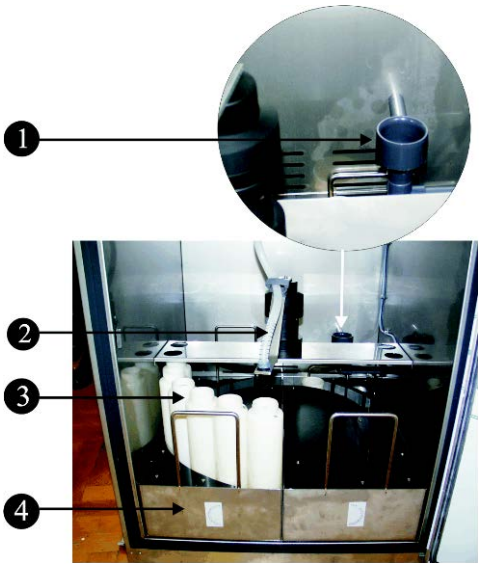


The rinsing head (arrow) can be seen after having removed the metering vessel.



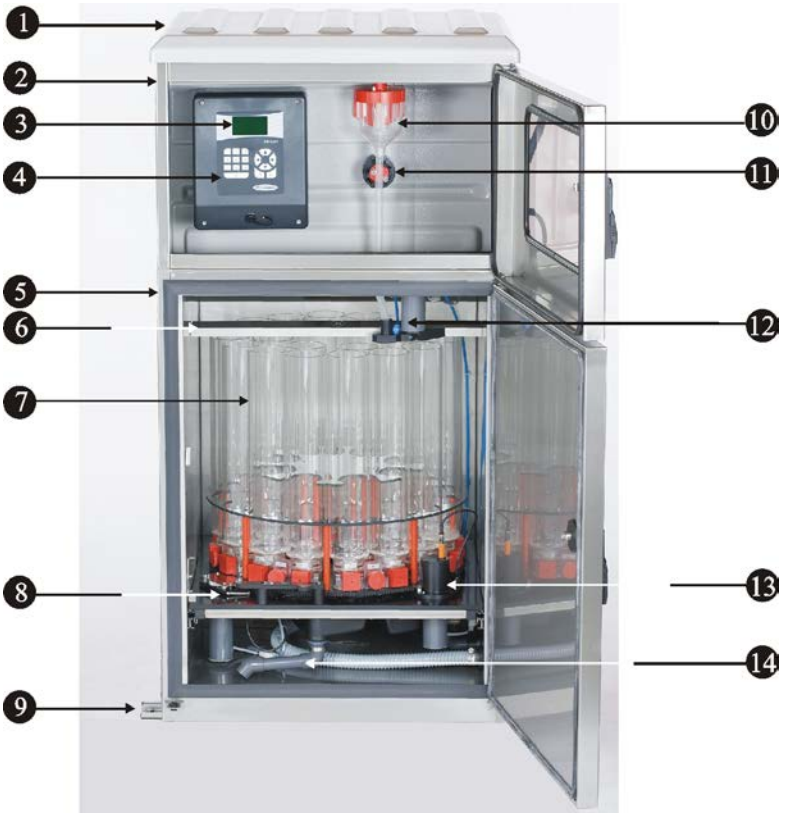
The picture shows the distributor unit:

1. Detailed view of discharge position when rinsing.
2. Distributor arm with direct dosing.
3. Sample bottles.
4. Bottle carrying tray.



Characteristics: sampler 4410

1. Protective top (can be opened)
2. Upper part of housing
3. Back lit LC-display
4. Keyboard
5. Lower part of housing (cooled sample compartment)
6. Type plate
7. Glass sample bottles
8. Distributor drive
9. Fixing bar
10. Dosing unit
11. Pinch valve
12. Combined dosing and rinsing head
13. Automatic discharge valve
14. Swivelling sample discharge tube



Remark: The illustrated sampler corresponds to a standard version with 24 bottles. According to the sampler version, some components such as dosing unit or distributor/bottles can be different!

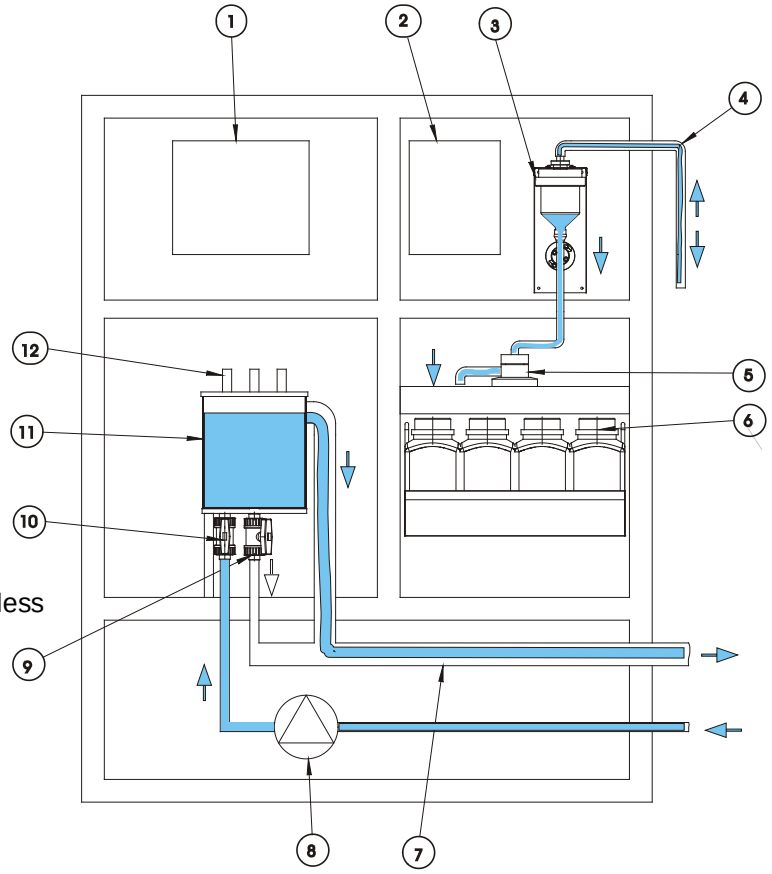
Characteristics: sampler 6010

1. Measuring unit with transducers and display
2. Control
3. Dosing unit
4. Distributor
5. Cable feed through (opt.: left side)
6. Main switch
7. Display of protection against dry running
8. Water inlet and outlet connection (opt.: left side)
9. Pump switch I/O
10. Terminal box
11. Pump (eccentric spiral pump)
12. Water inlet and outlet of measuring pot
13. Measuring pot
14. Fixture of electrodes/ measuring probes

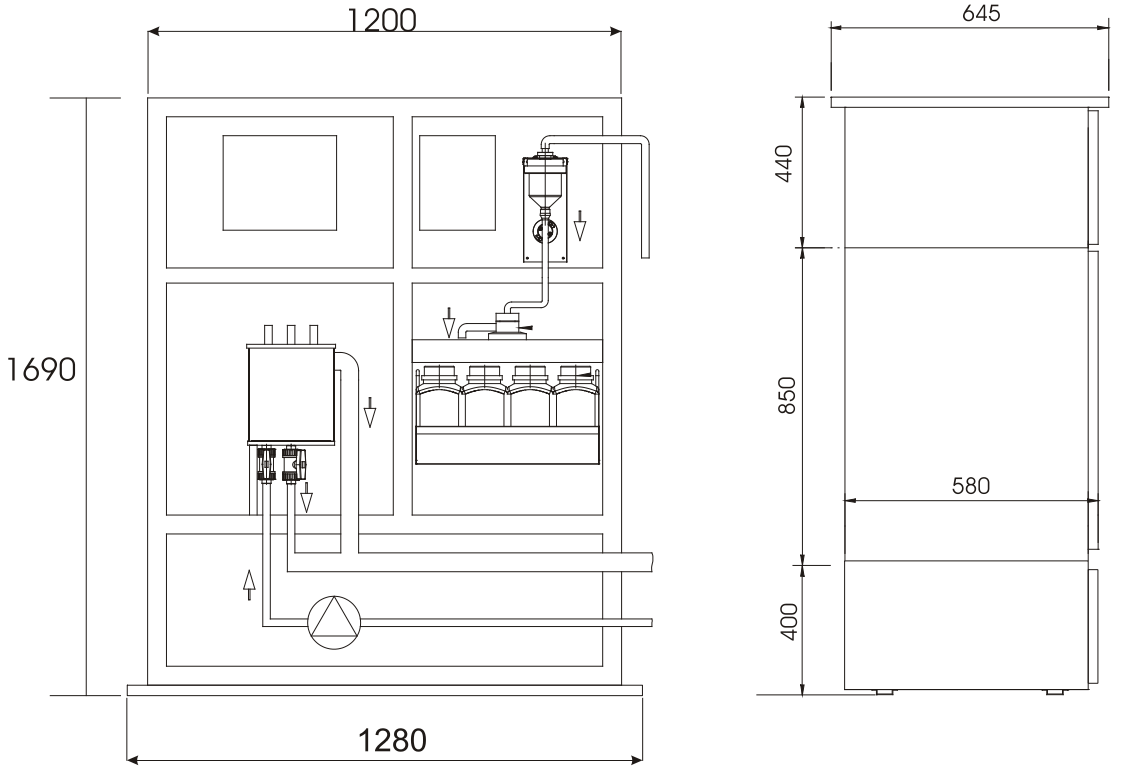


Schematic illustration
Water supply / water drain

1. Measuring transducer with display
2. Sampler control
3. Dosing system
4. Feed tube of dosing system
5. Distributor
6. Bottles with tray
7. Measuring pot drain pipe
8. Pump (e.g. eccentric spiral pump)
9. Outlet valve (manual/ automatic) for cleaning of measuring pot
10. Supply valve for measuring pot
11. Measuring pot with pressureless overflow
12. Fixture of electrodes/ measuring probes

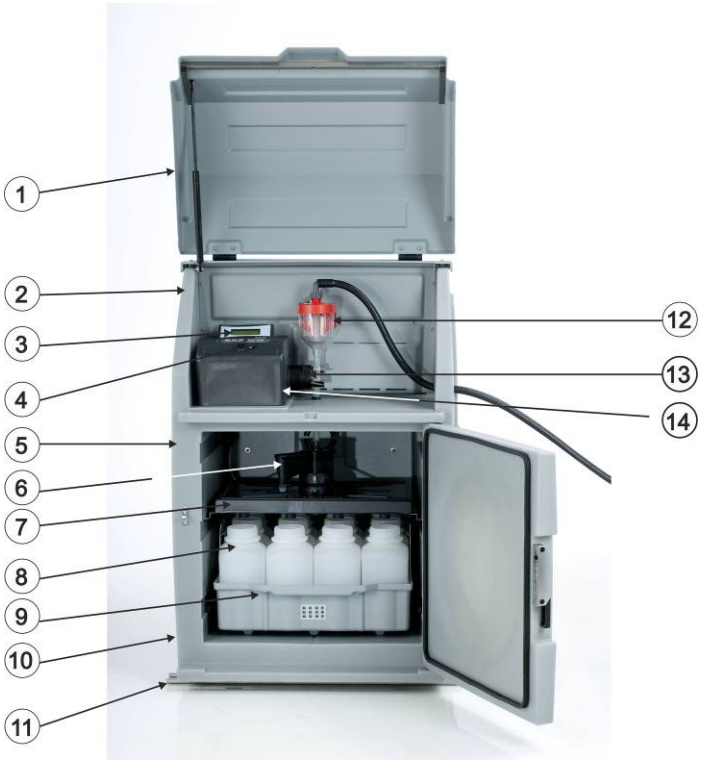


Overall dimensions: 1690 x 1280 x 645 mm (hxwxd)



Characteristics: sampler 3010

1. Protective top (can be opened)
2. Upper part of housing
3. Back-lit LC-display with keyboard
4. MiniUSB interface
5. Lower part of housing (cooled compartment)
6. Motor-driven distributor
7. Distributor plate
8. Sample bottles
9. Bottle tray
10. Fixing bar (illus. with option: mobile version)
11. Fixing bar
12. Dosing unit
13. Pinch valve
14. Type plate



Remark: The illustrated sampler corresponds to a standard version with 12 bottles and distributor plate.
According to the sampler version, some components such as dosing unit or distributor/bottles can be different!

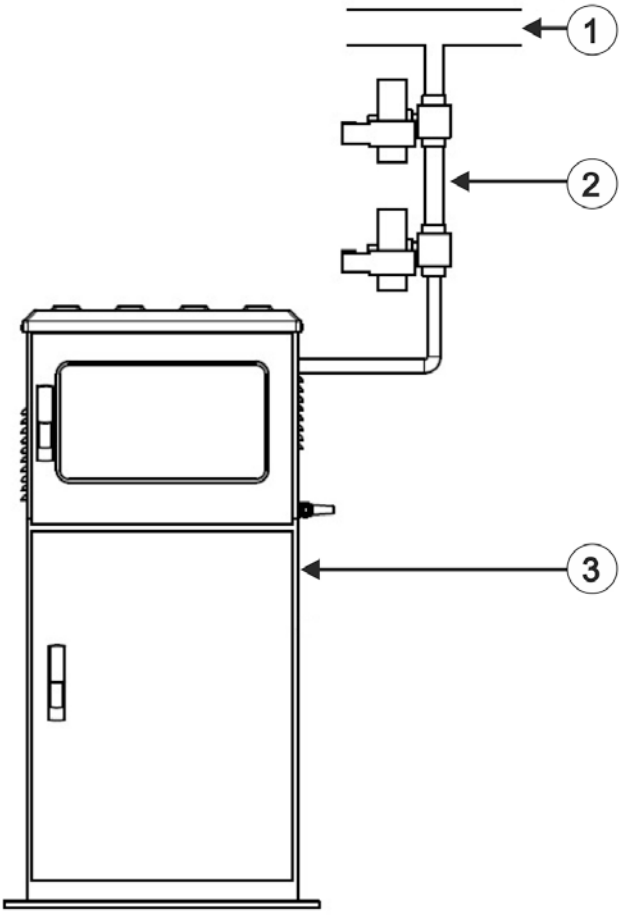
Characteristics: sampler 1031 (double ball valve system)

In combination with stainless steel housing

1. Pressurised line
   (an appropriate connection has to be provided by the customer)

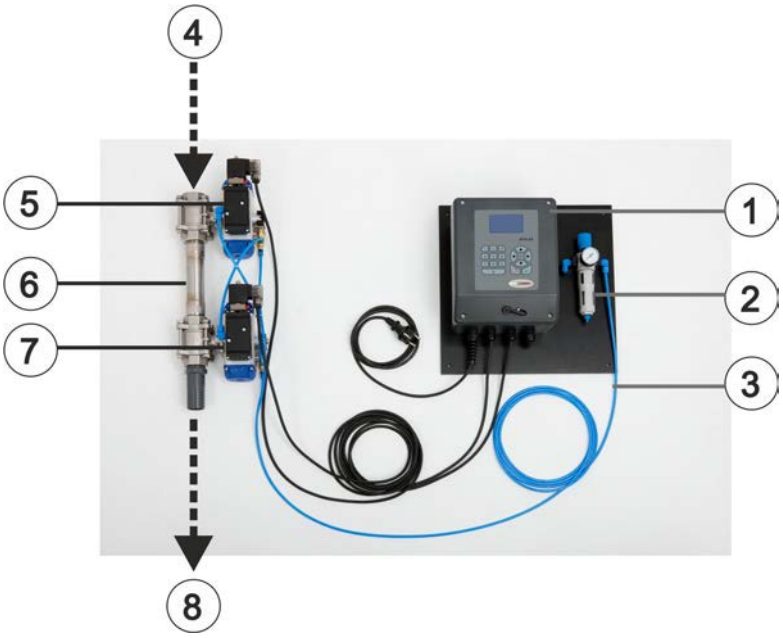
2. Double ball valve system with dosing tube mounted in between

3. Fixed site sampler



Wall-mounted version

1. Controller unit
2. Manometer
3. Pressurised line
4. Inlet
5. Ball valve 1 (inlet)
6. Dosing tube 100 ml (fixed volume)
7. Ball valve 2 (outlet)
8. Discharge



Operation

Installation:
The dosing system has to be installed directly at the sampling point.
The extraction point has to be chosen in such a way that the sampe can drain off with gravity from the dosing tube into the sampling bottle.

Operation principle:
- Both ball valves are normally closed.
- To take a sample the ball valve **1** (next to the pressure line) opens and the dosing tube between ball valve **1** and ball valve **2** is filled with sample medium.
- Ball valve **1** is closed again.
- Ball valve **2** opens.
- The sample can drain off into the sampling bottle.

If required, an air connection can be provided at the dosing tube to enable a purge of the tube section connected to the pressurised line.

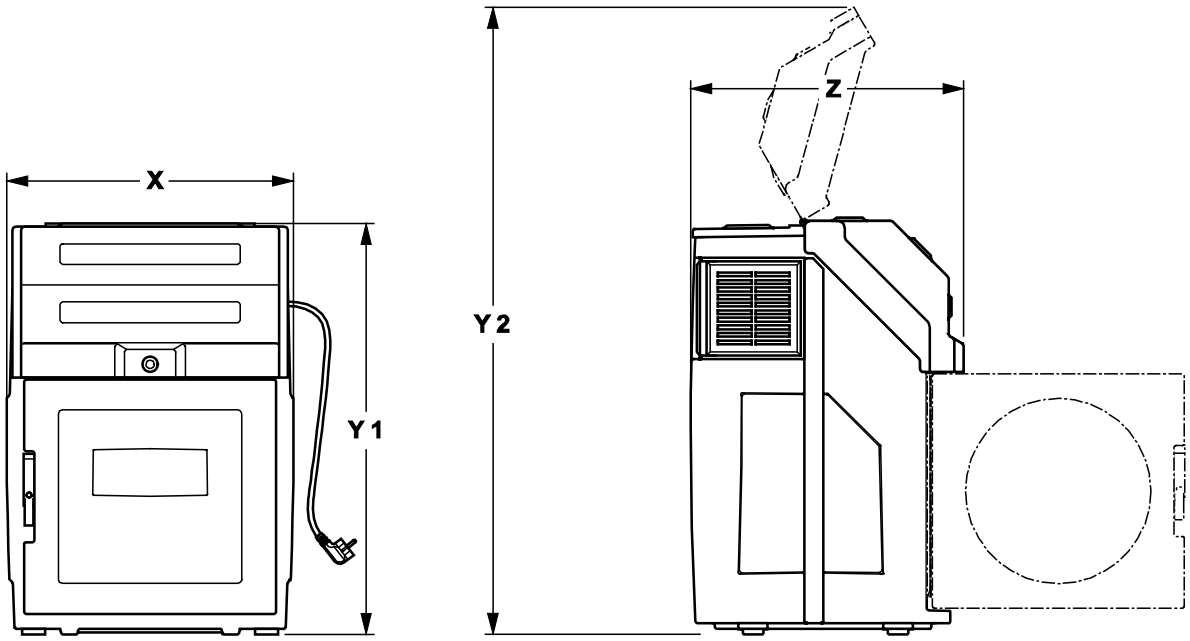
Remarks:
The unit requires compressed air.
The pressure for purging has to be <u>higher</u> than the line pressure!

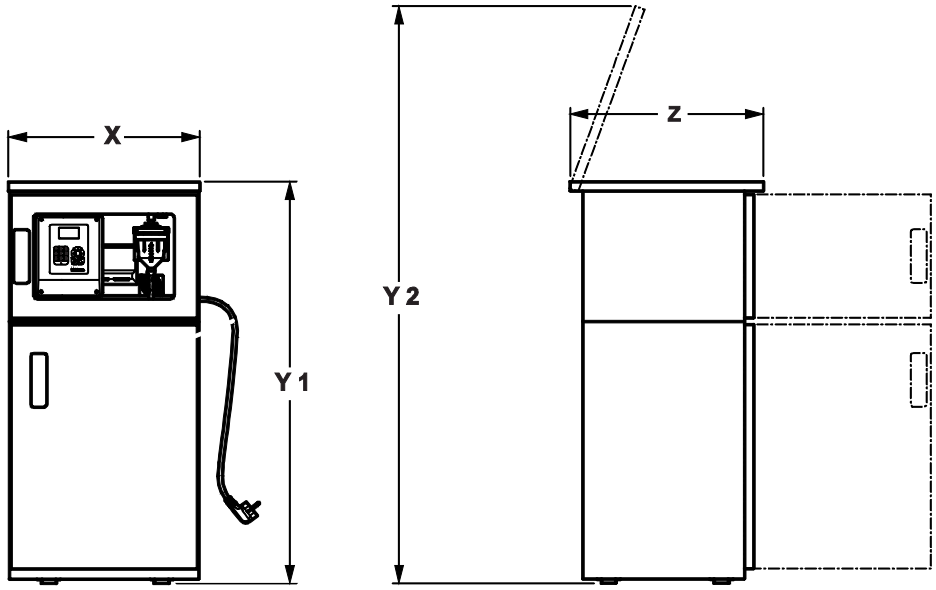
The single dosing volume depends on the length and the diameter of the volume tube. The standard volume is 100 ml. Other volumes are available on request. For connection of the dosing system at the pressurised line, the customer has to provide a pipe nozzle with external thread [1 ¼ “]. The size of the pipe nozzle varies according to the size of the volume tube.

For maintenance and safety a manual stop valve should be installed between the pressurised line and the dosing system.

<u>Important!</u>
The sampling unit is operated pneumatically and thus can also be used in hazardous areas.
The used electric solenoid valves are not approved for hazardous areas.
The controller and the terminal box must be installed in a non-hazardous area.
The connecting cable between the controller and the dosing unit has a length of 5 m.
Longer cables are available on request.

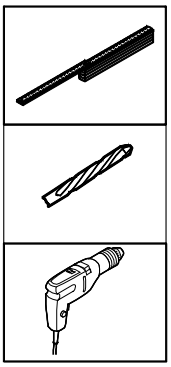
Dimensions of devices



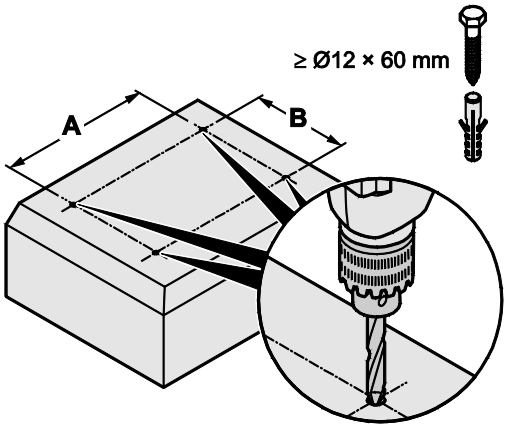


	X mm	Y 1 mm	Y 2 mm	Z mm
BÜHLER 3010	760	1100	1640	775
BÜHLER 4010	605	1320	1870	645
BÜHLER 4110	605	1490	2040	645
BÜHLER 4210	605	1320	1870	645
BÜHLER 4210 (23 Flaschen)	715	1430	2120	805
BÜHLER 4410 (2–12 Flaschen)	605	1320	1870	645
BÜHLER 4410 (24 Flaschen)	715	1430	2120	805
BÜHLER 6010	1377	1785	2450	796

Prepare installation site



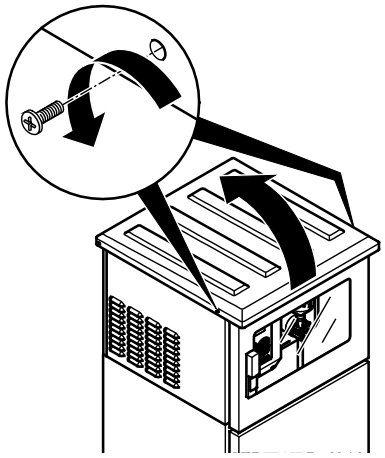
	A mm	B mm
BÜHLER 3010	730	384
BÜHLER 4010	660	383
BÜHLER 4110	660	383
BÜHLER 4210	660	383
BÜHLER 4410 (23 Flaschen)	770	500
BÜHLER 4410 (2–12 Flaschen)	660	383
BÜHLER 4410 (24 Flaschen)	770	500
BÜHLER 6010	1260	383



Installing the apparatus

- The workings described in this chapter of the manual must only be carried out by qualified personnel.
- We recommend installing the apparatus as near as possible to the point of extraction. If installed outside, the device should be fixed on a solid flat base (e.g. plinth). The fixing bars do already have the necessary fixing holes.
- If the device is equipped with castors (mobile version), please make sure that the two lock-type castors are locked during operation.
- For better deaeration / ventilation install the apparatus with a distance of approx. 10 cm to the wall.
- The hose has to be laid with a continuous fall from the apparatus to the point of extraction, without fail. Lower lying points can lead to deposits in the hose which may freeze up in winter.
- To fix the suction hose, we recommend to use the extraction unit available as accessory.
- Fix the hose in such a way that the suction aperture lies in the direction of flow, so that coarse matter and fibres cannot be forced into the suction aperture.

Remark: To open the top cover both front screws (left + right) have to be removed. Then the top cover can be lifted up to the point where the retention bars snap-in. To close the cover again, the two retention bars have to be lifted slightly.
After having closed the cover, the two screws (left + right) have to be screwed in again.



Mains connection The device is equipped with a power supply lead.
The connecting data can be found in chapter “Technical Data”.

Connect/disconnect The device is connected/disconnected by means of the mains plug (except devices with main switch).

Hose routing The apertures for the suction hose are on the left and on the right at the front.

Signal inputs The signal inputs (e.g. for flow meter) are located on the „fold-out“ plate and can be connected according to the plan of terminal connections shown there.

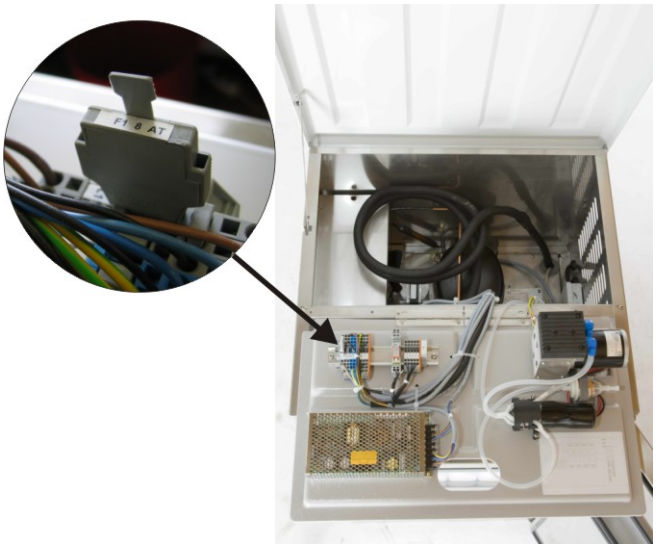
Messages The relays required for messages (up to 4) can be fixed on the top hat rail. For details please see the circuit diagram

Remark:
The apparatus ***must be*** cleaned regularly in accordance with the degree of contamination present. In view of the quality of samples, we recommend to clean thoroughly especially the wetted parts like dosing unit, electrodes, distributor, bottles and inlet hose. Failure to do so could result in damage or destruction to the equipment, device that are not covered by warranty.

Replacement of fuses

1. Main fuse of device
(is installed on fold-out plate)
Fine-wire fuse 230V/T8A 5x20
To replace the fuse, pull out fuse holder, open the cover and remove the fuse.

2. Fuse protection of CPU board
by an automatic fuse. The fuse is reactivated by disconnecting the device from the mains.



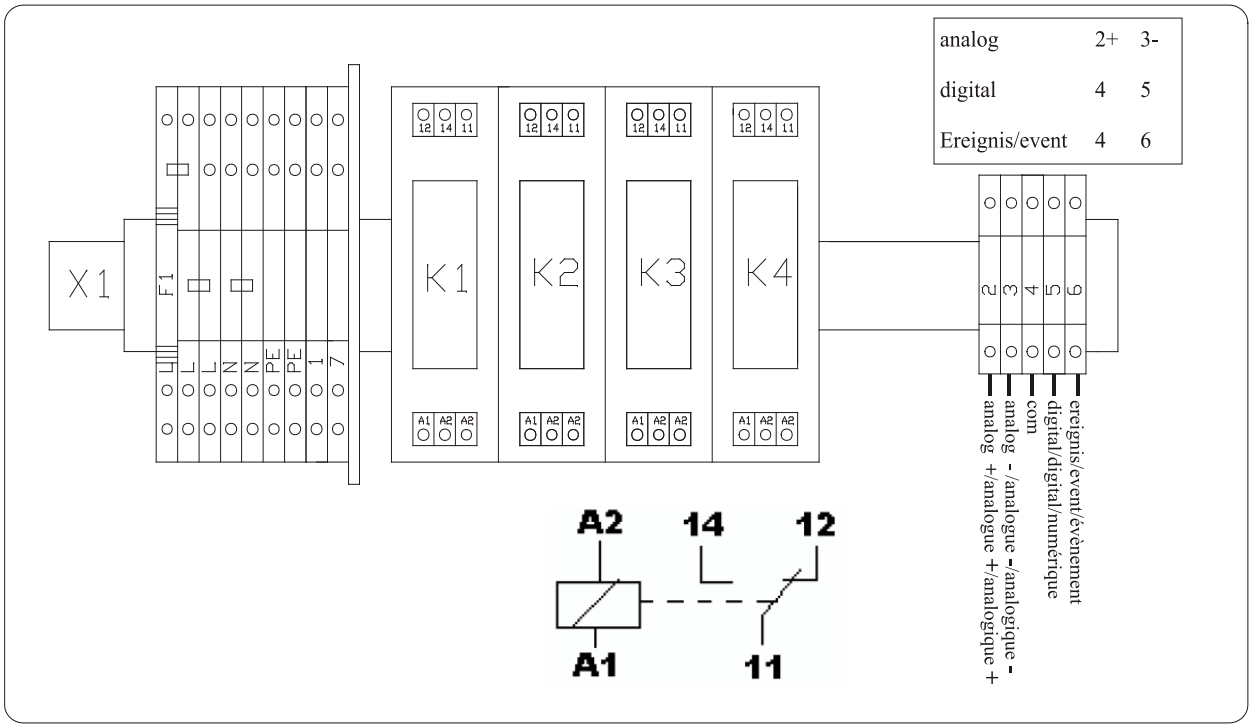
Troubleshooting

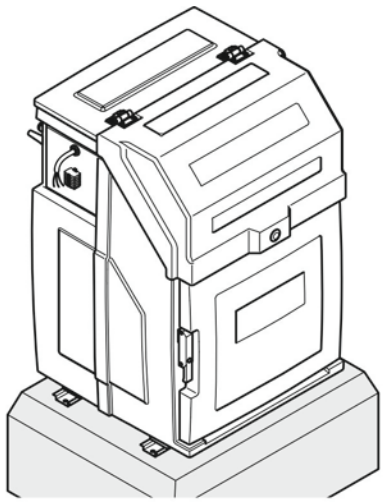
If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
Sampler does not function at all	- Mains connection - Fuse defective	-Check mains cable -Check all fuses and replace them if necessary
Cooling system does not function	- Power supply - Cooling system leaking	-Check mains connection of cooling machine -Contact service department

Connections

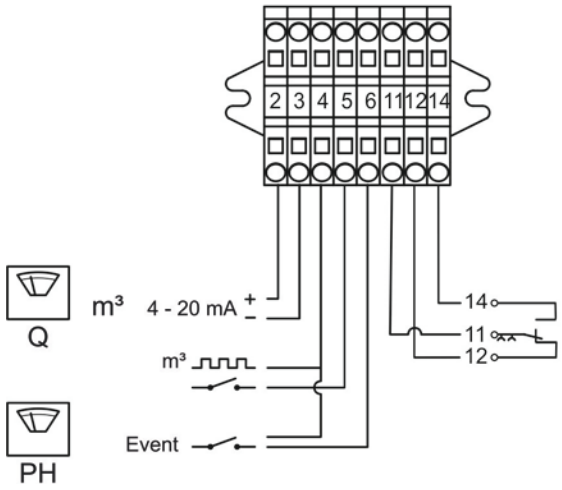
Terminal assignment – input signals





Remark: Terminals K2 to K4 are optional depending on the device version.

BL3010



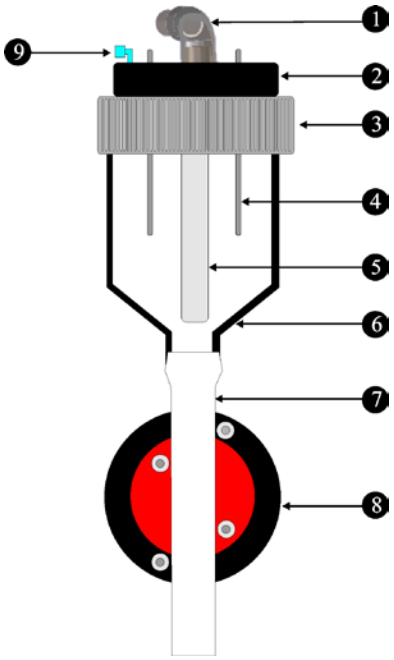
Sampling modes

The following sampling modes can be programmed:

Sampling mode	Description	Example
Time-proportional	In this sampling mode, the single sample extractions as well as the bottle change are effected in fixed time intervals.	Values to program: sampling interval e.g. 00:05 hh:mm Bottle filling time e.g. 02:00 hh:mm
Flow-dependent - digital	In this sampling mode the sample extraction is triggered by flow pulses. The bottle change is effected in fixed time intervals or after a certain number of sample extractions.	Values to program: pulse divider e.g. 100 (that means that a sample is extracted after each 100th pulse). Bottle filling time e.g. 02:00 hh:mm or bottle change after X sample extractions e.g. 100
Flow-dependent - analog	In this sampling mode samples are extracted according to the analog flow signal (0-20 mA or 4-20 mA). The sample extraction is started when the programmed flow is reached. Thus the interval between the sample extractions varies according to the flow signal. The bottle change is effected in fixed time intervals or after a certain number of sample extractions.	Values to program: Flow per sample extraction e.g. 1 m³ Bottle filling time e.g. 02:00 hh:mm or bottle change after X sample extractions e.g. 100
Flow-proportional	Samples are not extracted with a fixed volume but within a fixed time interval (e.g. every 10 minutes).For this kind of sampling, the variable automatic dosing system (available as option) is required. This system is only working with an analog flow signal! The sample volume adapts itself automatically proportionally to the flow. This is achieved by proportionally scaling the mA signal and the maximum sample volume. That means, the sample volume is automatically adjusted to the mA signal.	•Analog signal (4-20 mA or optional 0-20 mA) •The max. sample volume at 20 mA is fixed to 200 ml. At an analog signal of e.g. 10 mA, a 100 ml sample would be extracted accordingly. Sampling is effected in a fixed time interval of e.g. 10 minutes. Thus the sample extraction is always proportional to the flow, that means: high flow = big sample volume low flow = small sample volume.

Event-proportional	In this sampling mode the sample extraction is depending on an external event signal (potential-free make contact). The sample is only extracted as long as the signal is present. The sampling interval as well as the bottle change are programmed. The bottle is changed at each new event signal. If an event is longer than the programmed bottle filling time, two or more bottles will be filled for this event depending on the programmed bottle filling time.	Values to program: Sampling interval e.g. 00:05 hh:mm Bottle filling time e.g. 02:00 hh:mm

Vacuum sampling system



Metering vessel -structure-

1. Hose connector
2. Flange
3. Screw cap
4. Electrodes
5. Volume control tube
6. Metering vessel
7. Silicone discharge tube
8. Motor-driven pinch-valve
9. Air connection

Cleaning:
- **Glass metering vessel**: unscrew the screw cap (3) and remove the flange. Now, the metering vessel together with the silicone discharge tube (7) can be detached.
- **Plastic metering vessel**: Turn the plastic metering vessel anticlockwise (bayonet fitting) and remove.

Adjustment of sample shot volume at samplers with glass metering vessel:
To adjust the desired sample volume, loosen the knurled screw and displace the volume control tube vertically.

Adjustment of sample shot volume at samplers with plastic metering vessel:
The sampler is always delivered with the volume control tube in full length.
To adjust the sample shot volume, the volume control tube (5) has to be cut to length.



Procedure
1. There is a graduation in millilitres on the volume control tube.
2. Remove the metering vessel (6).
3. Cut the volume control tube to the desired length with scissors or a knife.
4. Reinstall the metering vessel (6) and tighten.
5. Check the sample volume by starting a manual sample extraction.
6. Now the device is ready for operation.

Remark: If you need to work with different sample volumes, you can cut to size several tube pieces. As the volume control tube (5) is only slipped on the hose connector (1), it is very easy to change the tube.

Operation principle:



1. Inoperative position



2. Pinch-valve closes



3. Metering vessel is filled up to the electrodes



4. Dosing system is aerated



5. Pinch valve opens and sample drains off in bottle

Replacement of the silicone discharge hose
The silicone hose (BM69301) is only pushed over the lip of the metering vessel. A hose clamp is not required. Humidify the hose a little bit, fix it at one point and push it over the lip.

Remark:
Do only use original spare parts from the manufacturer. The use of a wrong hose type can lead to malfunctions at the system or may even damage the pinch valve!

Remark:
Conductivity of the sample medium
There are two conductive level electrodes in the metering vessel. Their sensitivity can be adjusted in the service menu. In the factory the electrodes are adjusted to tap water (this adjustment does not have to be changed under normal operating conditions). Minimum conductivity 50 µS/cm.
Please note that a wrong adjustment can lead to a flooding of the pneumatic system and to the damage of component parts.

The sampler is not suitable for extraction of distilled water due to low conductivity.

Conductivity at 25°C
Rain water 50 µS/cm
Drinking water 500 µS/cm
Waste water 5000 µS/cm (5 mS/cm)
Seawater 50000 µS/cm (50 mS/cm)

ATTENTION:
Wrong operating conditions can lead to malfunctions or may even damage the apparatus. No liability or claims under guarantee will be accepted in respect of any damage arising from the non-observance of these operating instructions.

Troubleshooting – vacuum sampling system

If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
Electrodes do not react, system flooded	Adjustment of conductivity too low. Distilled water has been used as sample medium.	Contact service department
	No contact to electrodes	Check cable connection
Sampler does not extract samples	System is leaking	Check whether all hoses and connections are tight
	Pump/diaphragm defective	Check pressure/vacuum of pump
	Metering vessel not tight, no vacuum	Check whether metering vessel is tight (screw cap)
	Filling level electrodes bridged	Clean electrodes
	Valve system/pinch valve does not function correctly	Check valve system/pinch valve or contact service department
No pressure / vacuum at pump	Defective diaphragm	Renew diaphragm
	Hoses are squeezed	Check hoses

Flow-proportional sampling system

The characteristic features of the flow-proportional sampling are:

• **fixed** sampling interval (e. g. every 10 min) with
• **variable** sample volume (related to the mA-signal (flow))

At the **variable** dosing system, the sample volume is automatically changed according to the analog flow signal.

Example: - the selected range is 4 to 20 mA (option 0 – 20 mA)
- the maximum sample volume at **20 mA** is fixed to **200 ml.**
That means at an analog signal of e.g. **10 mA,** a **100 ml** sample would be extracted. Thus the sample extraction is always proportional to the flow.

This sampling mode supplies very good, representative results as even if flow is very low (e.g. discharges at night) a sample extraction is still carried out in fixed time intervals.

For comparison a short description of the **flow-dependent** sampling mode:

The characteristic features of the flow-dependent sample extraction are:

• **variable** sampling interval (according to the mA-signal (flow)) with
• **fixed** sample volume (e.g. 100 ml)

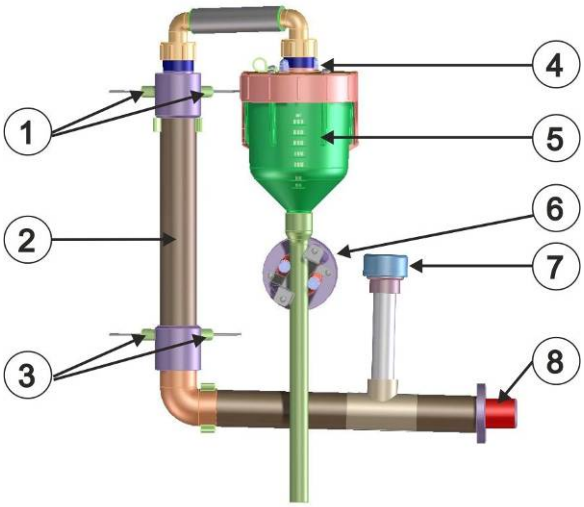
In the flow-dependent sampling mode, a sample is e.g. always extracted after **10 m³**, that means the signal of the flow meter is totalized.
In case of very low flow quantities (e.g. discharges at night) it is possible that e.g. 2-3 hours pass until the set 10 m³ are reached again and a sample is extracted.

Remark: That means if there is an accident (e.g. discharge of chemicals) during this period, there will be no sample. However, a sample would have been very important for an analysis and the taking of countermeasures.

Flow-proportional sampling system - structure

Structure:

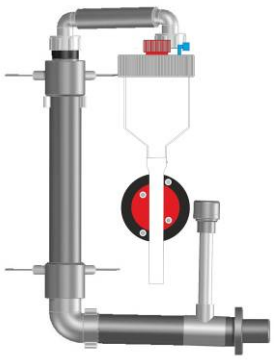
1. Electrodes 2
2. Measuring tube
3. Electrodes 1
4. Connection for aeration
5. Metering vessel
6. Motor-driven pinch valve
7. Cap of cleanout of air separator
8. Sample inlet



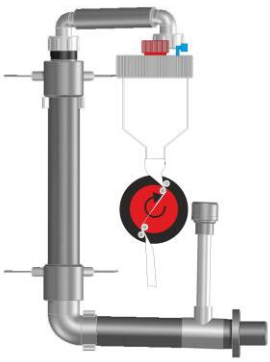
Function of the VAR flow-proportional sampling system

- Before the system can be used, it must be calibrated. In the automatic calibration function with 5 cycles, only the respective volumes have to be entered.
- At the flow-proportional (variable) sampling system the sample volume is directly entered in **ml** by means of the keys at the control when editing a sampling program.
- After the program start the pinch valve is closed.
- A pressure (air produced by the diaphragm pump) is applied to the metering vessel via the air connection. Thus the hose is purged.
- Now, the valve system switches to vacuum and the depression generated by the diaphragm pump withdraws the air from the metering vessel. A vacuum is generated and leads to the drawing-off of sample medium at the connected hose.
- The medium is sucked into the metering vessel via the measuring tube (2).
- While flowing through the measuring tube (utility model) the pre-set volume is measured directly and after that filled into the metering vessel.
- After the measurement the system is ventilated by opening the air inlet (4) so that sample medium remaining in the suction hose can flow back to the extraction point.
- After a pre-programmed aeration time, the pinch valve (6) opens in two steps and the sample is filled into a container.

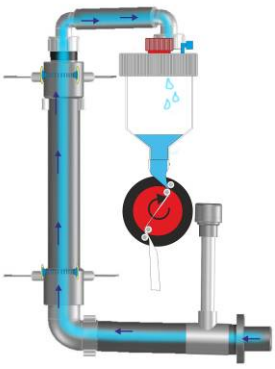
Cleaning:
To clean the metering vessel (5), open the screw cap (glass metering vessel) or at the plastic metering vessel, turn the vessel anticlockwise (bayonet fitting), pull the silicone discharge hose to the front and remove the metering vessel.
The measuring section (2) can be cleaned with a bottle brush BM60560.



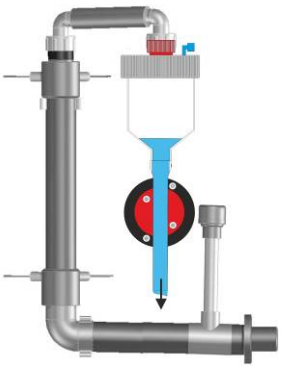
1. Inoperative position



2. Pinch valve closes



3. The sample volume is determined directly in the measuring section. Only the requested volume flows into the metering vessel.



5. Pinch valve opens and the sample is discharged into the bottle.

Troubleshooting – flow-proportional sampling system

If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
Level electrodes do not react, system is flooded	Adjustment of conductivity is too low. Distilled water is used as sample medium	Contact service department
	No contact to electrodes	Check cable connections
Sampler does not extract samples	System is leaking	Check whether all hoses and connections are tight
	Pump/diaphragm defective	Check pressure/vacuum of pump
	Metering vessel not tight, no vacuum	Check whether metering vessel is tight (union nut)
	Level electrodes are bridged	Clean electrodes
	Valve system/pinch valve does not work correctly	Check valve system/pinch valve or contact service dept.
Pump does not produce pressure/vacuum	Diaphragm defective	Replace diaphragm
	Hoses are kinked	Check hoses
Inaccurate sample volume	System has been initialized or hardware has been changed	Calibrate, see chapter „Programming“

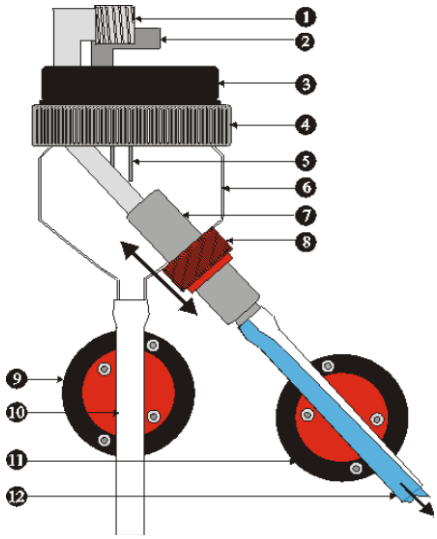
Bypass sampling system

This sampling method is suitable for use in bypass systems with flow-rates from 3 – 20 L/min.

- Patented motor-driven **pinch valve** which squeezes the dosing hose or the flow-through hose below the metering vessel.
- No sensor, thus almost no wear.
- Front opening for ease of metering vessel cleaning
- The sample volume can be adjusted between 20 ml and 250 ml by displacing the filling tube

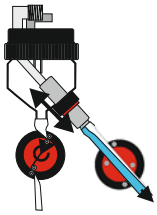
Metering vessel – structure -

1. Sample inlet
2. Hose connection for overflowing water
3. Flange
4. Screw cap
5. Filling level electrodes
6. Metering vessel
7. Adjustable tube – sample volume
8. Screw connection
9. Pinch valve 1 (sample outlet to distributor/bottles)
10. Silicone discharge tube
11. Pinch valve 2 (dosing)
12. Outlet hose

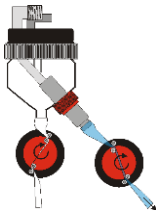


Method of operation

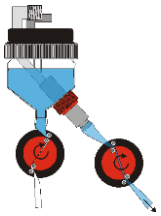
The desired volume can be adjusted between approx. 20 ml and 250 ml by means of the adjustable tube. To adjust the desired sample volume, loosen the screw connection and displace the filling tube upwards or downwards.



1. Continous flow
   Inoperative position



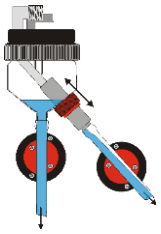
2. Pinch valves 1+2 are closed



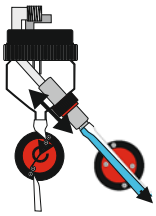
3. Water is filled up to the electrodes



4. Pinch valve 2 is opened. Water drains off up to the level of the dosing tube.



5. Pinch valve 1 is opened and the sample is filled into the bottle.



6. Inoperative Position

REMARK: The pinch valve (9) is always closed in the inoperative position. However, it will be opened once an hour to avoid the sticking together of the silicon tube.

Replacement of dosing hose

The silicone hose (BM69301) is only pushed over the lip of the metering vessel. A hose clamp is not required. Humidify the hose a little bit, fix it at one point and push it over the lip.

Remark: **Conductivity of the sample medium**
There are two conductive level electrodes in the metering vessel. Their sensitivity can be adjusted progressively in the service menu. The factory adjusts the electrodes to tap water (this adjustment does not have to be changed under normal operating conditions).

Please note that a wrong adjustment can lead to a flooding of the pneumatic system and to the damage of component parts.

ATTENTION: **Wrong operating conditions** can lead to malfunctions or may even damage the apparatus. No liability or claims under guarantee will be accepted in respect of any damage arising from the non-observance of these operating instructions.

Troubleshooting – bypass sampling system

If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
Level electrodes do not react, system is flooded	-Adjustment of conductivity is too low	-Check adjustment in service menu
	-Failure on the power board	-Exchange power board
	-Defective cable connection	-Check cable connection
Sampler does not extract samples	-Wrong programming	-Check programming
	-System is leaking	-Check whether the silicone hoses are tight
	-No flow	-Check whether there is water
	-Inlet hose clogged	-Remove clogging
	-Level electrodes bridged	-Clean the electrodes
	-Wrong setting of parameters in the service menu	-Check entered values and, if necessary, reset them to factory-set values by reinitialization
Metering vessel overflowing (backflow)	-Outlet hose is clogged or squeezed	-Remove clogging
	-Pinch valve does not open completely	-Adjust position of pinch valve

Sample distribution at Bühler 4010/3010//6010

- **Rotating distributor**
  - Motor-driven **rotating distributor** with encoder (pulse generator) which ensures:
  - an exact sample discharge position as well as
  - an automatic bottle position identification by means of a forked light barrier.



Remark: For reasons of operating safety, the distributor first **always** runs over position 1 again when changing to the next bottle. Thus a correct positioning even after a malfunction (voltage loss) is always guaranteed.

Remark 2: **When there are no pulses, the output is switched off and thus neither the motor nor the gear will be damaged if the distributor is blocked.**

ATTENTION: The distributor is driven by a geared motor. The distributor must under no circumstances be turned by hand! In case of non-observance, the gear will be damaged!

Troubleshooting – distributor 4010/3010//6010

If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
No function	Connections Water penetrated in distributor drive	Check connections Dismantle distributor head and check for water penetration. Contact service department
Program cannot be started	Wrong distributor has been entered	Correct entry
Distributor is continuously turning	Forked light barrier defective Pulse generator defective	Contact service department, return defective part if necessary
Wrong positioning of distributor	Interfering pulses. Pulse generator does not function correctly	Contact service department

Sample distribution at Bühler 4210

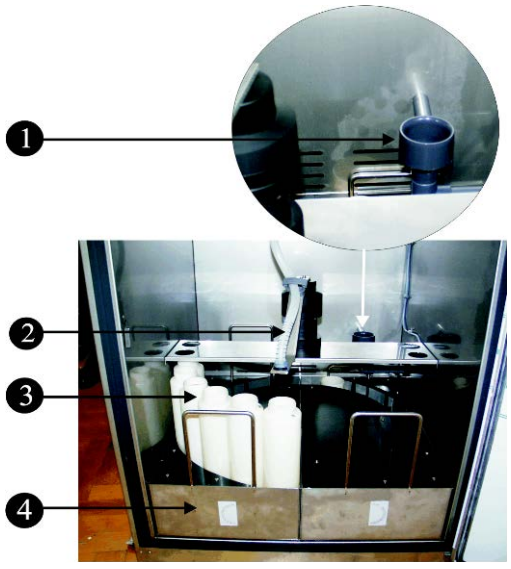
The picture shows the distributor unit:

1. Detailed view of discharge position when rinsing

2. Distributor arm with direct dosing

3. Sample bottles

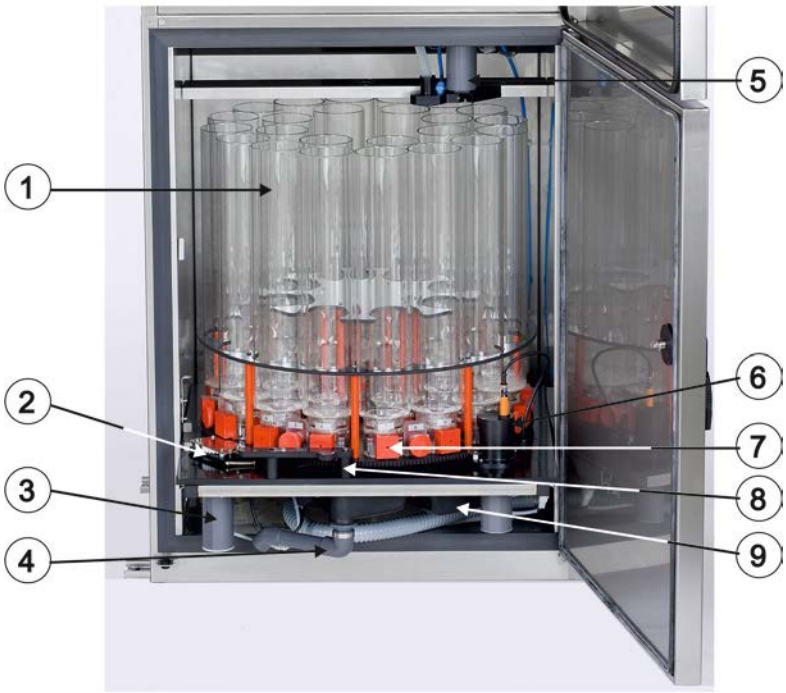
4. Bottle carrying tray



Sample distribution at Bühler 4410 – variants: 12 / 24 bottles

Distributor
The distributor system is available in two variants:
- with 12 glass bottles, each 1,6 L
- with 24 glass bottles, each 2 L.

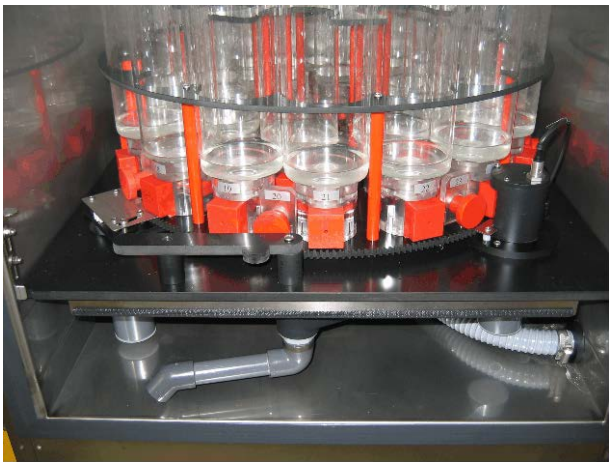
General view – complete distributor system with bottles**:**



1. 1,6 L or 2 L Duran50 glass bottle.
2. Drive unit with releasing mechanism, That means if the distributor is blocked, the drive unit is released. Thus severe damage to the distributor is avoided.
3. Distributor drive unit.
4. Swivelling outlet tube for the manual emptying of the bottle.
5. Combined dosing/rinsing head. On this position the glass bottles are automatically emptied, rinsed and filled again. For rinsing, the device has to be connected to a fresh water pipe. The emptying and rinsing intervals can be set in the service menu.
6. Emptying mechanism. There is a silicone hose at the bottle outlet which is closed if non-operated by means of a spring mechanism. To empty the bottle, the bottle outlet valve is opened and closed again after rinsing by means of an eccentric unit.
7. Closing cylinder of bottle.
8. Lever to empty the bottle manually. To actuate the closing cylinder, the lever has to be turned to the right. Now, the sample can be filled into a separate bottle.
9. Discharge tube for not needed samples and rinsing water with external hose connection to return this water to the sewer**.**

Take out, empty or put in a bottle
To empty a bottle, to take it out for cleaning or to put it in again, the desired bottle can be moved to the front position by means of the menu „Manual Mode“. This is also possible during a running program by means of the pause mode. The active program does not have to be interrupted and continues to run according to the programmed cycle, however, in the background. Detailed information can be found in the chapter „Programming“.

Detailed view – distributor drive



Detailed view – dosing/rinsing head



Sample distribution at Bühler 4410 – variants: 2 / 4 bottles

1. Distributor
2. Rinsing water connection
3. Container
4. Locking device for telescopic drawer
5. Telescopic drawer
6. Discharge trough



1. Description

The motor-driven distributor unit consists of a distributor tie-bar, a drive unit with motor, a light barrier and encoder as well as a distributor head with outlet tube.
There are 2 x 10 L PE containers (or 4 x 5 L PE containers) and each container is equipped with a discharge valve at the bottom. In addition there is a rinsing valve for each bottle at the bottom of the inner compartment.

2. Operating elements

The red screw cap of the distributor head can be unscrewed for cleaning.
Attention: Never turn the distributor by hand (geared motor)!

3. Method of operation

- The device is typically programmed in such a way that each container is filled for a period of 24 hours. Thus, a sample of the last 24 hours is available at any time.
- At each bottle change, the distributor passes a light barrier at position 1 to synchronize.
- After having passed the light barrier, the encoder pulses of the motor are counted to position the outlet tube on bottle 2.
- After each program-related bottle change, the new bottle is automatically emptied and rinsed.
- To do this, the distributor first moves on the respective bottle.
- Thereafter the discharge valve at the bottom of the container is opened.
- After expiration of the emptying time (adjustable), the respective rinsing valve is opened (rinsing time is adjustable, too) and the container is rinsed.
- After rinsing, the discharge valve closes and the device is ready for sampling again.

Troubleshooting – distributor Bühler 4410

If a fault develops in your sampler, we can only provide prompt assistance if you give us the type and serial number of the apparatus concerned. You will find these data on the type plate.
The more precise your description of the fault is, the better our fault diagnosis will be.

Symptom	Possible cause	Action
No function	Connections	Check connections
Program cannot be started	Wrong distributor has been entered	Correct entry
Wrong positioning of distributor	Interfering pulses. Pulse generator does not function correctly	Contact service department

Programming



The menu structure is similar to a directory tree and is split up in main menus and submenus.

Assignment and function of keys

The apparatus is interactively programmed by the user.

Function of keys:

Display of help texts. To activate the help text when selecting a new display, first press the arrow key pointing to the left.	Arrow key	◀
Move from one to the next menu	Arrow keys	▼ ▲
Select the desired menu	Enter key	↵
Move within the menu	Arrow keys	▼ ▲
Selection within the menu or scrolling within the data memory or bottle memory	Arrow keys	◀ ▶
Confirm the choice (is automatically marked with a ✓)	Enter key	↵
Entry/change of values	Arrow keys	◀ ▶ ▼ ▲
Confirmation of entered values	Enter key	↵
Return to higher menu level	Back key	↺
Initialization (reset) display	Back key + Enter	Press both keys at the same time ↺ ↵
Terminate sleep mode	Back key	↺ Press for at least 5 sec.
RESET / reset to factory settings	Back key	↺ Keep pressed when switching on

Navigation



The sampler can be operated by means of the control unit. With the ARROW KEYS, the ENTER KEY and the BACK KEY you can move from one screen to another. An arrow on the display shows that there are further selection possibilities (see illustration).

Example:

1. Press the “DOWN” arrow key two times to select the line DATA MEMORY.

2. Now press the ENTER KEY to display the data memory or to choose another selection possibility.

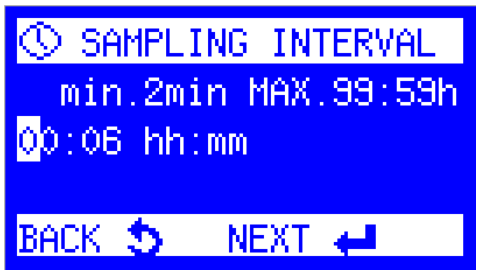
Remark: The arrow pointing downward on the right side (bottom) of the display indicates that there are further selection possibilities.

Menu variants:



The top line indicates that you can navigate to the right or to the left by pressing the arrow keys.

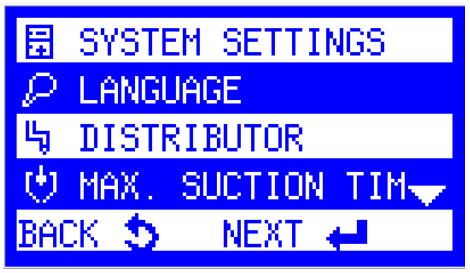
The bottom line indicates with which key the action is executed or terminated.



Here you can set a parameter. The top line shows which value is to be set. The bottom line indicates the possible range of values. The entry is possible directly by means of the number keys or the digit is selected with the right / left arrow keys and changed with the up / down arrow keys. The selected digit is displayed inversely (cursor). Confirm the entry by pressing the ENT key or abort it by pressing the BACK key (in this case the initial value is not changed). The arrows show that a digit can be changed.

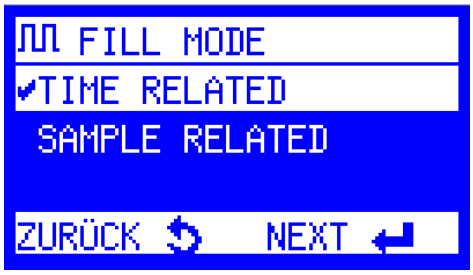
Settings with selection menu

The cursor is positioned on the current selection line (inversely) and can be moved up or down.
The arrow on the right side of the window indicates that there are further entries which can be displayed by scrolling up or down.
Depending on the menu, the display will show in which direction you can scroll.



Selection of individual menu points

In the selection menus, additional program settings are displayed. All the settings which have been activated by pressing the ENTER key are marked with a ✔.



MAIN MENU STRUCTURE
The following list shows the main menu level with the menu points of the submenus:

DISPLAY	DISPLAY	FUNTION
PROGRAMS		
	STATUS/STOP	• INFO • PAUSE • STOP
	START	• IMMEDIATELY • DATE/TIME • WEEKDAY/TIME
	CHANGE	TIME,FLOW, EVENT
MANUAL SAMPLE EXTRACTION	INTO CURRENT BOTTLE INTO BOTTLE X	
DATA MEMORY		
	INFO MEMORY	SET FILTER
	BOTTLE PROTOCOL	
DIAGNOSTICS/TEST		
	COMPONENT TEST	• DIAPHRAGM PUMP • PINCH VALVE • VALVE SYSTEM • DISTRIBUTOR • DIGITAL OUTPUTS
	DIGITAL INPUTS	FLOW DIGITAL 0 EVENT 0 DI3 DI4 DI5 DI6 DI7 DI8
	ANALOG INPUTS	ANALOG 1: ANALOG 2: ELECTRODES 1: ELECTRODES 2: PT 1000 SENSOR VOLTAGE.:
	VERSION INFO	

SETTINGS

DATE/TIME	
SYSTEM SETTINGS	• LANGUAGE • DISTRIBUTOR • MAX. SUCTION TIME • PRE PURGE • POST PURGE • AERATION TIME • PUMP POWER • ANALOG SIGNAL • DISPLAY • PAUSE DURATION • FREELY PROG. INPUT • OUTPUTSIGNALS
SLEEP MODE (Only portable sampler)	• WAKEUP DATE/TIME • WAKEUP WITH 5s ESC • NO SLEEP MODE
PASSWORD	• CHANGE PASSWORD • CHANGE SETTINGS • CHANGE PROGRAMS
SERVICE MENU	Setting of base parameters (to be done by a service technician) Password protected.

Description of the menus

DISPLAY	DISPLAY	EXPLANATION / FUNCTION
PROGRAMS		
STATUS/STOP	• INFO • PAUSE • STOP	Display of program details Interruption of the running program (max. 120 min.) Stop /abort the program
START	• IMMEDIATELY • DATE/TIME • WEEKDAY/TIME	Program start can be started • immediately • with date/time (dd:mm:yyyy hh:mm) • with weekday/time (day; hh:mm)
CHANGE	PROGRAM No. [xx]	Change the program parameters like mode of operation (time, flow, event…), interval etc. Selectable modes: • TIME • FLOW DIGITAL • FLOW ANALOG • EVENT TIME • EVENT DIGITAL • EVENT ANALOG
MANUAL SAMPLE EXTRACTION		
IN CURRENT BOTTLE		Sample extraction into current bottle
IN BOTTLE X		Sample extraction into selectable bottle X
DATA MEMORY		
INFO MEMORY		Data can be displayed with filter
BOTTLE MEMORY		Display of data of the single bottles

DIAGNOSIS/TEST		
COMPONENT TEST	• PUMP • PINCH VALVE • VALVE SYSTEM • DISTRIBUTOR • DIGITAL OUTPUTS	Functional check of the components
OUTPUTS TEMPCARD		Displays status of: - Lower heating (OFF / ON) - Cooling (OFF / ON) - Upper heating (OFF / ON)
DIGITAL INPUTS		Display of (DI=Digital Input): - Flow digital Event (digital) DI3 DI4 DI5 DI6 DI7 DI8
ANALOG INPUTS		Display of: - ANALOG 1 - ANALOG 2 - ELECTRODES 1 - ELECTRODES 2 - PT1000 TEMPERATURE SENSOR (option) - OPERATING VOLTAGE
DISPLAY OF VERSION		Display of the firmware version
SETTINGS		
DATE/TIME		Setting of date / time
SYSTEM SETTINGS	• LANGUAGE • DISTRIBUTOR • MAX. SUCTION TIME • PRE PURGE • POST PURGE • AERATION TIME	Setting of device-specific parameters 1.PRE PURGE=purging of suction hose before sampling 2. POST PURGE= active purging of dosing vessel to adjust dosing volume

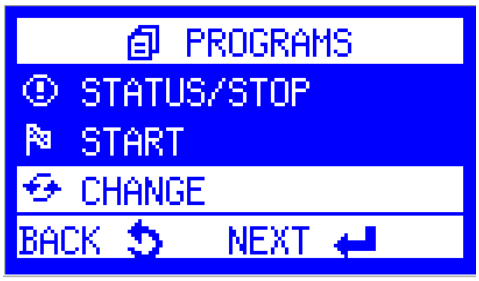
	• PUMP POWER • ANALOG SIGNAL • DISPLAY • PAUSE DURATION • FREELY PROGR. INPUTS • OUTPUT SIGNAL	The program can be interrupted for a period of 10-120 minutes Input signal to start a program e.g. externally Only active if an add-on board is connected
SLEEP MODE	• WAKEUP DATE/TIME • WAKEUP WITH 5s ESC • NO SLEEP MODE	Only available at portable samplers
PASSWORD	• CHANGE PASSWORD • CHANGE SETTINGS • CHANGE PROGRAMS	Setting / activation of the password
SERVICE		Setting of base parameters (to be done by a service technician) (Password protected)

Examples of programming
Programming of a time-proportional sampling program

Select PROGRAMS in the main menu



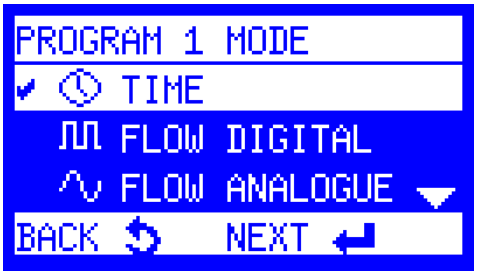
Select CHANGE



Select PROGRAM NO. 1 (out of 12).
Programs No. 2-12 can be selected by pressing the left or right arrow key.
Press ENTER to edit the program.



Select the sampling mode TIME
(Sampling is effected in fixed time intervals)



Set the sampling interval
(time interval between the single sample extractions)



Set the BOTTLE FILL TIME
(here: each bottle is filled for 2 hours).



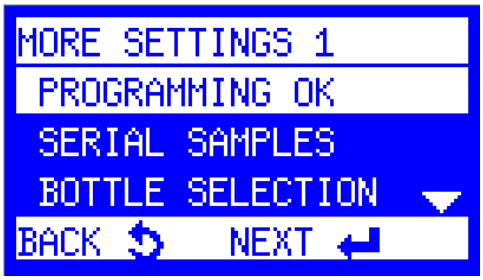
Terminate programming settings.



Now, the program can be started directly.



If the function "**MORE SETTINGS**" is selected, further selection possibilities with the following **special functions** are available:



- PROGRAMMING OK
  (Confirmation of selected setting and return to the START MENU)

- SERIAL SAMPLES
  (samples/extraction)
  At each sample extraction a series of samples (according to the entered value) is extracted successively. That means each requested sample extraction consists of xx samples. This function is useful if a big sample volume is required.

- BOTTLE SELECTION
  (first bottle / last bottle)
  The first and the last bottle can be defined for a cycle.

- PROGRAM PAUSE
  (Prg.Pause= delay of program start. Time delay between end of program x and start of the next program. Always delays the program cycle by the entered time in the continuous operation mode.)

- QT-AUTOMATIC (can only be selected in flow dependent programs)
  Time-flow automatic (set MINIMUM and/or MAXIMUM Qt-TIME)

- COMBINED EVENT SAMPLING
  (Combination of a time-dependent resp. flow-dependent program with the event mode, can be activated or deactivated)

- PROGRAM LINKAGE
  (End of Program 1 can trigger the start of Program 2, end of Program 2 can trigger the start of Program X, last program triggers the start of Program 1 or Program X again = continuous operation)

Program Start

After selection of the menu point “Start Program”, the program to be started (1-12) has to be selected with the left or right arrow key and has to be confirmed by pressing the Enter key.



There are several possibilities to start the program.

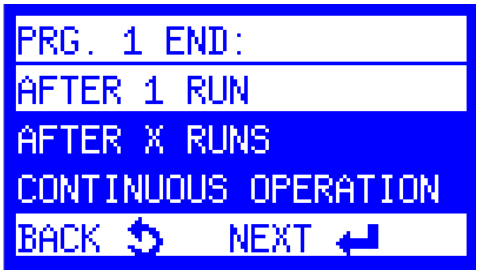


- **IMMEDIATELY** The program is started immediately.

- **DATE/TIME** The program start is effected on the selected date and at the selected time. Format:dd:mm:yyyy hh:mm.

- **WEEKDAY/TIME** The program start is effected on the selected weekday and at the selected time. Format: day; hh:mm

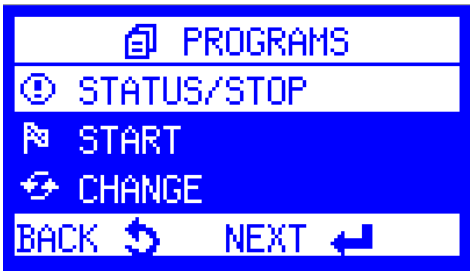
Program end
After having defined the start conditions, the program end can be set as follows:



- AFTER 1 RUN — Program is terminated after 1 run
- AFTER X RUNS — Program is terminated after X runs
- CONTINUOUS OPERATION — Program is continued indefinitely

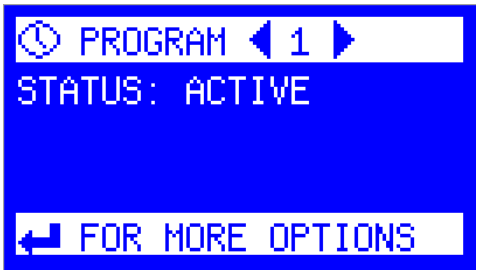
Display of PROGRAM STATUS/STOP

Here the status of one or more programs is displayed. The status of all programs can be checked by pressing the arrow keys (right/left).



When pressing the Enter key, the following is displayed:

STATUS ACTIVE = Program has been started
or
STATUS INACTIVE = Program has not been started



- INFO Display of information regarding the currently running program: current bottle, samples requested and samples taken, next sample extraction or bottle change.



- PAUSE The program can be interrupted for a period of 10-120 minutes (e.g. for cleaning). The exact time can be entered in the menu “SETTINGS”. The pause can be terminated manually or it is automatically terminated after the entered xxx minutes.

- STOP The program can be stopped directly.

INFORMATION on program

After selection of INFO all details regarding the running program are shown. The single screens can be displayed by pressing the up/down arrow keys.



STOP / ABORT program

An active program can be terminated.
There also is the possibility to stop all active programs.



Flow-proportional sample extraction



According to the output signal of your flow meter either the operating mode flow analog or flow digital can be selected in the program settings.
.

IMPORTANT: If an analog signal (0/4-20 mA) is used, it is absolutely necessary to calibrate the input prior to the first use.

FLOW ANALOG

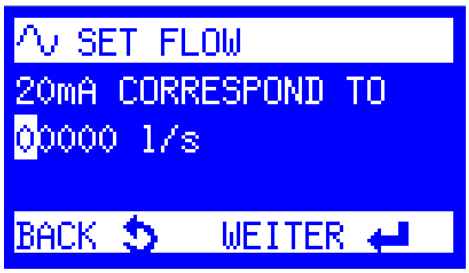


Calibrate the analog input 0/4-20 mA

The analog input can be calibrated in > SYSTEM SETTINGS" ->ANALOG SIGNAL. Just follow the menu instructions.
1st step: connect 0/4 mA and confirm
2nd step: connect 20 mA and confirm
3rd step: Calibration ok, confirm

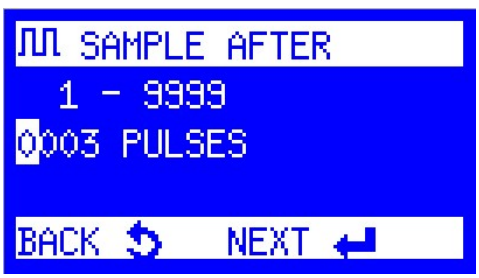
Remark: The analog input is already calibrated to 0-20 mA in the factory.

FLOW ANALOG



The only difference between the programming of the flow analog mode and the flow digital mode is the definition of the sampling interval. Point of reference is the maximum flow at 20 mA which can be set as l/s or m3/h.
.

FLOW DIGITAL



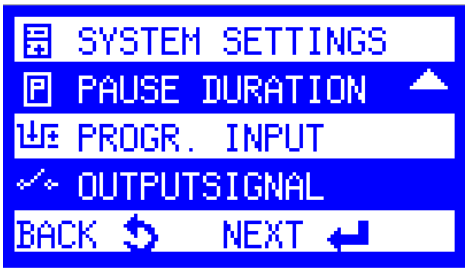
In the FLOW DIGITAL mode, the sampling interval results from the incoming pulses. The filling time can either be **time-related** or related to a **certain number of samples**. If **time-related** is selected there is a further menu to limit the number of samples (samples/bottle) to avoid overfilling (overfill protection).

Event-proportional sample extraction



When selecting this sampling mode, the sampler is waiting for an external “event” signal, e.g. from a connected pH-meter. A sample is extracted according to the programming as long as the signal is present. When the signal is deactivated the sampler waits for the next signal and then fills the next empty bottle.
Which „event“ sample has been filled into which bottle is recorded in the info memory.
In the event mode the sample extraction can be time or flow dependent. The programming is effected as described before (sampling mode time, flow digital).

FREELY PROGRAMMABLE INPUTS



- PROGR. INPUT
- ADDITIONAL INPUT 1
- ADDITIONAL INPUT 2
- ADDITIONAL INPUT 3

There is 1 programmable input in the basic version.
With the option "I/O expansion board" further 3 inputs are available. Thus the sampler can be controlled via a digital pulse (e.g. with an external PLC).

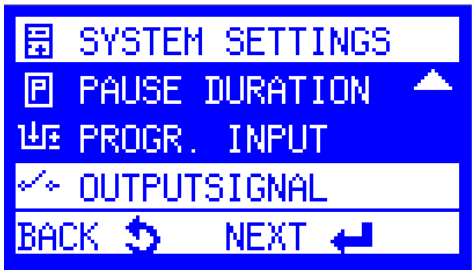
Each INPUT (1-3) can be programmed according to the following list:

- NO FUNCTION
  (reset of the setting)
- PROGRAM START PULSE
  (when selected, program x will be started)
- PROGRAM STOP PULSE
  (when selected, program x will be stopped). Back with ESC
- PROGRAM RUN DURING PULSE
  (program is executed when there is a continuous signal. As soon as the signal drops out, the program is stopped.
- BOTTLE CHANGE PULSE
  Pulse signal: **<= 3sec** means “advance to next bottle”
  >= 5 sec means "move to bottle 1":
- SAMPLE PULSE
  A pulse triggers the sample extraction
  Pulse signal must be > 50ms!

Remark: This function is only possible if **no** program is running. In this case the unit is controlled by an external pulse (eg PLC).

OUTPUT SIGNALS

As an option 5 output signals are available. These output signals are freely configurable.



OUTPUT SIGNALS

- OUTPUT SIGNAL 1
- OUTPUT SIGNAL 2
- OUTPUT SIGNAL 3
- OUTPUT SIGNAL 4
- OUTPUT SIGNAL 5

Each Output signal (1-5) can be programmed according to the following list:

- PROGRAM ACTIVE
  Selection of "PROGRAMS ACTIVE" or "PROGRAM XX ACTIVE"
- PROGRAM END
  Selection "PROGRAMS TERMINATED" or "PROGRAM XX TERMINATED
- ERROR ACTIVE
  Selection:
  - GENERAL FAILURE
  - ERROR ELECTRODES
  - ERROR SUCTION
  - ERROR DISTRIBUTOR
  - MAX. SPL/BOTTLE
  - ERROR ANALOG SIGNAL A1
  - POWER FAILURE
  - DOOR OPEN
  - INTERNAL TEMPERATURE
  - EMERGENCY CUTOFF
  - SUCTION TIME
- SAMPLING ACTIVE
- BOTTLE CHANGE
- DISTRIBUTOR ON POS.1
- SIGNAL REVERSED
- OUTPUT SIGNAL OFF (switch off/reset of the output signal)

ERROR MESSAGES

Error code	Text / meaning
1	Error distributor
2	Error suction
4	Error electrodes
5	End of voltage loss
6	Charge storage battery
7	Storage battery empty
10	Error analog signal A1
15	Emergency cutout
17	Storage battery defective
19	Error analog signal

LOG MESSAGES

Log code	Meaning
1	Error
2	Program start
3	Program end prog. xx
4	Start program pause
5	End program pause
6	System start
9	Bottle change
10	Sample extraction
14	Voltage loss start
15	Start of event
16	End of event
18	Terminate sleep mode
19	Conductivity sample medium (resistance)
20	Temperature regulation
21	Bottle statistics
22	Single bottle statistics
23	Password for service menu
24	PT1000 temperature sensor / operating voltage
28	Analog value A1 protocol
30	Overfill protection, Parameter **1**= Drop sample Parameter **2**= Switch over to new bottle

Maintenance

The apparatus should be cleaned regularly in accordance with the degree of contamination present. In view of the quality of samples, we recommend to clean thoroughly especially the wetted parts like dosing unit, electrodes, distributor, bottles and inlet hose.

Remark:
There is a health hazard if the device is used in biologically or chemically contaminated areas. Please take the necessary precautionary measures when cleaning or servicing the device.

Attention:
Disconnect the power connections before carrying out any maintenance or repair works. Repair works must only be carried out by specially trained and authorised service personnel.

Remark: For cleaning of the metering vessel: see chapter „Operation – sampling systems“.

Pumping capacity: The **pumping capacity** (patented method) can be adjusted in the service menu between 70 and 100 %.

Remark: The adjusted pumping capacity has **no effect** on the suction height but **only on the average suction speed** when extracting the sample. The lower the pumping capacity, the longer the life of the pump

Spare parts / accessories BÜHLER 3010, 4010,

Version with 1 container (1x25 L)	
BM60046	25 L composite container
Version with 2 containers (2x10 L)	
BM40042	Slide-in plate for container positioning
BM60045	10 L PE container with cover
BM900499	Motor-driven distributor
Version with 4 bottles (4x6,3 L)	
BM40042	Slide-in plate for container positioning
BM60044	6,3 L bottle with cover
BM900499	Motor-driven distributor
Version with 4 containers (4 x 10 L)	
BM900502	Distributor 4 x 10 L with tie bar
BM60081	10 L container
BM40212	Intermediate bottom sheet
Version with 4 containers (4 x 14 L)	
BM900503	Distributor 4 x 14 L with tie bar
BM60334	14 L container
Version with 12 bottles (12x2,9 L PE / 12x2,0 L glass)	
BM40 034	Bottle tray for 12 x 2,9 L bottles
BM60 034	2,9 L PE bottle
BM60 035	Cap for PE bottle
BM900499	Motor-driven distributor system for 12 bottles
Version with glass bottles	
BM30 013	2,0 L glass bottle
BM60161	Cap
Version with 24 bottles (24x1 L)	
BM40 035	Bottle tray for 24 x 1 L bottles
BM60 036	1,0 L PE bottle
BM60 037	Cap for PE bottle
BM900500	Motor-driven distributor system for 24 bottles
Version with glass bottles	
BM30 012	1,0 L glass bottle
BM60144	Cap

Spare parts sample distribution BÜHLER 3010, 4010

Article No.	**Designation**
BM900499	Distributor unit 12x2,9 L, 4x6 and 2x10 L with spout
BM900500	Distributor unit 24x1,0 L with spout
BM900502	Distributor unit 4x10 L with spout
BM900503	Distributor unit 4x14 L and 2x22 L with spout
BM900505	Distributor unit 4x20 L with spout
Fixing components for distributors	
0050613	Support bar (2 pcs required) for **2x10 L, 4x6 L, 12x2,9 L, 24x1 L**
0001110	Nut M5 (8 pcs required) for **2x10 L, 4x6 L, 12x2,9 L, 24x1 L, 4x10 L, 4x14 L**
0040427	Bottom plate for **2x10 L**

Spare parts / accessories

Article No.	Designation
0040428	Bottom plate for **4x6 L**
0040422	Angular bar for carrying tray, right side, for **24x1 L** , **4x10 L and 4x14 L**
0040423	Angular bar for carrying tray, left side, for **24x1 L** , **4x10 L and 4x14 L**
0050044-4	Support bar for **4x10 L**
0069203	Edge protection profile for **4x10 L**
0069210	Edge protection profle for **4x14 L**
0050420	PVC spacing strip for **4x14 L**

Spare parts – for all fixed site models -	
BM900300	Suction hose ID12mm, length 7,5 m, with screw connection
BM900623	Suction hose ID10mm, length 7,5 m, with screw connection
BM900912	Suction hose ID12 mm, 7,5 m, with screw connection and extra heating
BM900913	Suction hose ID10 mm, 7,5 m, with screw connection and extra heating
BM69304	Suction hose ID 12 mm, running metre
BM69331	Suction hose ID 10 mm, running metre
BM50025	Stainless steel sinker weight, length 180 mm
BM900014	Extraction unit
BM900151	Interior lighting with door contact switch
BM900016	Mobile version consisting of: •2 V2A castors •2 V2A lock-type castors •Fastening kit with: 4 V2A screws M12, 4 V2A nuts, 4 V2A plain washers, 4 plastic covers
BM30009	Plinth
BM900017	Mounting kit
	<u>Possible messages</u>
BM900910	Hardware extension for MESSAGES (including control extension + 1 signal relay)
BM900911	Signal relay (for each message a signal relay is needed!). A total of 8 messages is configurable in the software. (Only in combination with BM900910)
BM10038	Relay 12V, TS 35, change-over contact
BM10042	Fine-wire fuse T 8,0A 5x20
BM69403	Flat packing 25x15x2 EPDM
BM60050	Hose connector 3/4" x 13
Spare parts for vacuum sampling system	
BM30004	Metering vessel 350 ml
BM30005	Metering vessel 500 ml (only possible at standard vacuum system)

BM69401	O-ring 16x4, NBR (only at glass metering vessel)
BM69402	Quad-ring 81, 92x5, 33, NBR (only at glass metering vessel)
BM80044	Plastic metering vessel 350 ml
BM69452	Flat packing (only at plastic metering vessel)
BM60457	Folded paper filter (pneumatic unit)
BM69301	Silicone dosing tube 12x2
BM900897	Valve system for fixed site sampler
BM900908	Pinch valve
BM900674	Complete glass dosing unit 350 ml for fixed site sampler
BM900243	Complete glass dosing unit 500 ml for fixed site sampler
BM900621	Complete plastic dosing unit 350 ml for fixed site sampler
BM900167	Diaphragm compressor ASF 007 CDC 19, ready for connection
BM60042	Diaphragm for ASF compressor
BM60043	Pump head for ASF compressor
BM60317	Diaphragm compressor KNF N 828
BM10004	Geared motor 12V
BM69302	Silicone tube for valve system 4x1,5
Additional spare parts for flow-proportional (VAR) sampling system	
BM900879	Measuring unit VAR
BM10104	2/3 solenoid valve (aeration valve)
Additional spare parts for bypass sampling system	
BM900877	Complete bypass dosing unit 250 ml
BM30027	Metering vessel for bypass system 250 ml
BM900202	Dosing pinch valve
BM69317	Silicone tube 20x2
Spare parts of BÜHLER 4210	
BM900682	Dosing flange compl. with rinsing nozzle
BM30005	Metering vessel 500 ml
BM10077	Rinsing valve
BM900568	Distributor unit 12 x 1 L
BM900666	Distributor unit 4 x 2 L
BM900683	Distributor unit 23 x 1 L

Spare parts / accessories

Spare parts of BÜHLER 4410	
BM300016	1,6 L Duran50 glass bottle
BM300028	2 L Duran50 glass bottle
BM60081	10 L PE container
BM69454	Container gasket for SPA 2x10 L
BM69405	Flat packing 40x25x2 EPDM (in distributor head)

Spare parts of BÜHLER 3010	
BM900766	Hood complete
BM40406	Cover of cooled compartment
BM60524	Gas spring

Spare parts of Bühler 1031	
BM91186	Pneumatically operated 2/2 ball valve 1 1/4“
BM91100	2/5 solenoid valve

Warranty and liability

The manufacturer warrants that the product supplied is free of material and manufacturing defects and undertakes the obligation to repair or replace any defective parts at zero cost.
The warranty period for instruments is 24 months. If a service contract is taken out within 6 months of purchase, the warranty period is extended to 60 months.
With the exclusion of the further claims, the supplier is liable for defects including the lack of assured properties as follows: all those parts that, within the warranty period calculated from the day of the transfer of risk, can be demonstrated to have become unusable or that can only be used with significant limitations due to a situation present prior to the transfer of risk, in particular due to incorrect design, poor materials or inadequate finish will be improved or replaced, at the supplier's discretion. The identification of such defects must be notified to the supplier in writing without delay, however at the latest 7 days after the identification of the fault. If the customer fails to notify the supplier, the product is considered approved despite the defect. Further liability for any direct or indirect damages is not accepted.
If instrument-specific maintenance and servicing work defined by the supplier is to be performed within the warranty period by the customer (maintenance) or by the supplier (servicing) and these requirements are not met, claims for damages due to the failure to comply with the requirements are rendered void.
Any further claims, in particular claims for consequential damages cannot be made.
Consumables and damage caused by improper handling, poor installation or incorrect use are excluded from this clause.
The manufacturer process instruments are of proven reliability in many applications and are therefore often used in automatic control loops to provide the most economical possible operation of the related process.
To avoid or limit consequential damage, it is therefore recommended to design the control loop such that a malfunction in an instrument results in an automatic change over to the backup control system; this is the safest operating state for the environment and the process.

Immunity

This equipment was tested for Industrial level EMC per:
EN 61000-6-2 (EMC Requirements for Electrical Equipment for Measurement, Control and Laboratory Use) **per 2004/108/EEC**
EMC: Supporting test records by Hach Company, certified compliance by Hach Company.
Standards include:
IEC 1000-4-2:08.02 (EN 61000-4-2:08.02) Electrostatic Discharge Immunity (Criteria B)
IEC 1000-4-3:12.06 (EN 61000-4-3:12.06) Radiated RF Electromagnetic Field Immunity (Criteria A).

Emissions

This equipment was tested for Radio Frequency Emissions as follows:
Per **2004/108/EEC** EMC: **EN 61000-6-4:08.05** (Electrical Equipment for measurement, control and laboratory use—EMC requirements)
Class “A” emission limits.
Supporting test records by Hach Company, certified compliance by Hach Company.

Additional Emissions Standard/s include:
EN 55011:08.03 (CISPR 11), Class “A” emission limits

Contact

HACH LANGE GMBH Willstätterstraße 11 D-40549 Düsseldorf Tel. +49 (0)211 5288-0 Fax +49 (0)211 5288-143 info@hach-lange.de www.hach-lange.de	HACH LANGE LTD Pacific Way Salford Manchester, M50 1DL Tel. +44 (0)161 872 14 87 Fax +44 (0)161 848 73 24 info@hach-lange.co.uk www.hach-lange.co.uk	HACH LANGE FRANCE S.A.S. 33, Rue du Ballon F-93165 Noisy Le Grand Tél. +33 (0)1 48 15 68 70 Fax +33 (0)1 48 15 80 00 info@hach-lange.fr www.hach-lange.fr
HACH LANGE GMBH Hütteldorfer Str. 299/Top 6 A-1140 Wien Tel. +43 (0)1 912 1692 Fax +43 (0)1 912 1692 -99 info@hach-lange.at www.hach-lange.at	DR. BRUNO LANGE AG Juchstrasse 1 CH-8604 Hegnau Tel. +41 (0)44 9 45 66 10 Fax +41 (0)44 9 45 66 76 info@hach-lange.ch www.hach-lange.ch	HACH LANGE NV/SA Motstraat 54 B-2800 Mechelen Tél. +32 (0)15 42 35 00 Fax +32 (0)15 41 61 20 info@hach-lange.be www.hach-lange.be
DR. LANGE NEDERLAND B.V. Laan van Westroijen 2a NL-4003 AZ Tiel Tel. +31 (0)344 63 11 30 Fax +31 (0)344 63 11 50 info@hach-lange.nl www.hach-lange.nl	HACH LANGE AB Vinthundsvägen 159A SE-128 62 SKÖNDAL Tel. +46 (0)8 7 98 05 00 Fax +46 (0)8 7 98 05 30 info@hach-lange.se www.hach-lange.se	HACH LANGE APS Åkandevej 21 DK-2700 Brønshøj Tel. +45 36 77 29 11 Fax +45 36 77 49 11 info@hach-lange.dk www.hach-lange.dk
HACH LANGE S.L.U. Edif. Arteaga Centrum C/Larrauri, 1C-2ª Pl. E-48160 Derio/Vizcaya Tel. +34 94 657 33 88 Fax +34 94 657 33 97 info@hach-lange.es www.hach-lange.es	HACH LANGE SP.ZO.O. ul. Opolska 143 a PL-52-013 Wroclaw Tel. +48 (0)71 3 42 10-83 Fax +48 (0)71 3 42 10-79 info@hach-lange.pl www.hach-lange.pl	HACH LANGE S.R.L. Via Riccione, 14 I-20156 Milano Tel. +39 02 39 23 14-1 Fax +39 02 39 23 14-39 info@hach-lange.it www.hach-lange.it
HACH LANGE S.R.O. Lešanská 2a/1176 CZ-141 00 Praha 4 Tel. +420 272 12 45 45 Fax +420 272 12 45 46 info@hach-lange.cz www.hach-lange.cz	HACH LANGE S.R.O. Rolnicka 21 SK-831 07 Bratislava-Vajnory Tel. +421 (0)2 4820 9091 Fax +421 (0)2 4820 9093 info@hach-lange.sk www.hach-lange.sk	HACH LANGE LDA Av. do Forte n°8 Fracção M P-2790-072 Carnaxide Tel. +351 214 253 420 Fax +351 214 253 429 info@hach-lange.pt www.hach-lange.pt
HACH LANGE D.O.O. Ivana Severa bb HR-42 000 Varaždin Tel. +385 (0) 42 305 086 Fax +385 (0) 42 305 087 info@hach-lange.hr www.hach-lange.hr HACH LANGE LTD	HACH LANGE D.O.O. Fajfarjeva 15 SI-1230 Domžale Tel. +386 (0)59 051 000 Fax +386 (0)59 051 010 info@hach-lange.si www.hach-lange.si HACH LANGE KFT.	HACH LANGE E.P.E. 27, Avlidos str GR-115 27 Athens Tel. +30 210 7777038 Fax +30 210 7777976 info@hach-lange.gr www.hach-lange.gr HACH LANGE S.R.L.

Contact

Unit 1, Chestnut Road Western Industrial Estate IRL-Dublin 12 Tel. +353(0)1 4602522 Fax +353(0)1 4509337 info@hach-lange.ie www.hach-lange.ie HACH LANGE 8, Kr. Sarafov str. BG-1164 Sofia Tel. +359 (0)2 963 44 54 Fax +359 (0)2 866 04 47 info@hach-lange.bg www.hach-lange.bg	Hegyalja út 7-13. H-1016 Budapest Tel. +36 1 225 7783 Fax +36 1 225 7784 info@hach-lange.hu www.hach-lange.hu HACH LANGE SU ANALİZ SİSTEMLERİ LTD.ŞTİ. Hilal Mah. 75. Sokak Arman Plaza No: 9/A TR-06550 Çankaya/ANKARA Tel +90 (0)312 440 98 98 Faks +90 (0)312 442 11 01 bilgi@hach-lange.com.tr www.hach-lange.com.tr	Str. Căminului nr. 3 Sector 2 RO-021741 Bucureşti Tel. +40 (0) 21 205 30 03 Fax +40 (0) 21 205 30 03 info@hach-lange.ro www.hach-lange.ro



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