AQUALABO

Smart water solutions

AQUINOX

Operation Manual

This manual is designed to provide a comprehensive guide for people who need to set up the sampler software and write sampling programs.

The information contained in this manual is believed to be accurate but only applies to the machine type indicated on the previous page. If in doubt, please contact Aqualabo with the type and serial number of the machine.

Errors and omissions excepted.

Please read this operation manual carefully before commissioning and attend to the instructions of the chapter "*Security*" and "*Installation*".
Since it is about your security you must have read this operation manual before you start operating the unit.

Serial number: __ __ __ __ __ __

(Please enter the serial number of your sampler here.)

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1 General Instructions and Information

Aqualabo sampling systems provide a time, volume and event proportional record using both single and composite samples. The samples taken, together with their supporting data enable scientific staff to understand and monitor ongoing plant operations and enables them to design better, more cost-effective sampling programmes.

The samples are taken automatically using a pressure/vacuum pump capable of drawing water from depths of up to 7.5 meters (optional up to 8 m).

By addition of a *Aqualabo* vacuum-pressure lifting system (VP 13-30) lifting heights up to 30 m can be reached (*please contact Aqualabo for further information).*

1.1 Instructions

The sampler may only be deployed for the designated usage described in the operation manual and only with the supplied software.

Any usage in a manner not specified in this manual is not according to the directions and forbidden.

Aqualabo GmbH & Co. KG will assume no liability for resulting damages. The risk is to be carried solely by the operator.

Only **qualified personnel** shall be entrusted with installation, start-up, maintenance and further sampler operation.

The operation manual must be kept constantly available on site.

Only **original spare parts** supplied by Aqualabo shall be used for maintenance.

Warning: Before you start with maintenance and service disconnect the device from mains supply otherwise there is **danger of death or serious injury**. Disconnect the mains plug from the power outlet.

Notice: If you should contact *Aqualabo* for help we require the **serial number** of your unit. The number is to be found on the top-left inside the sample cooling chamber.

During installation, maintenance and transport you must carry the obligatory protective clothing.

1.2 Intended Use

The technical regulations for operation and ambient conditions [see chapter 1.6] are to be observed. Otherwise we do not guarantee for proper function and achievement of the stated performance data.

Operation in explosive atmospheres is absolutely forbidden!

The sampler is solely to be applied for automated and manual sampling of watery medium with temperatures of 0°C - 40°C (shortly up to 60°C); other liquids after consultation with *Aqualabo*

Standard application is sampling from pressure free resp. open channels using the VAC or VAR dosing system. Sampling from pressurised pipes up to 2 bars with the standard VAC or VAR system is possible with addition of a special cut-off valve. With higher pressures the sampler must be modified and the dosing system must be changed.

The compatibility of the sampled medium with the built-in materials must be ensured by the operator and agreed upon with *Aqualabo*
Intended use also refers to observance of the prescribed maintenance and service instructions.

Permitted Ambient Conditions

The following ambient conditions apply to the stationary samplers of *Aqualabo* :

- Maximum altitude for installation is 2000 m above sea level .
- The relative humidity must not exceed 80%.
- The temperature range of the sample medium must lie between 0°C and 40°C (temporarily higher temperatures).
- Ambient temperatures:

  operation: –25°C up to + 42°C.
  transport/storage: –35°C up to + 55°C

  During normal operation an optimum storage temperature of +4°C ±1.5°C is ensured.
- In–/outdoor operation (Ex-free), during all weather conditions.

A possible installation site must be examined for the following risks:

- Is personal safety guaranteed?
- Is the underground solid?
- Can danger of explosion be excluded?
- Can presence of toxic gases be excluded?
- Can low atmospheric oxygen content be excluded?

If one these conditions cannot be ensured the location is not appropriate for installation. In cases of doubt, please contact the *Aqualabo* GmbH & Co. KG.

Inexpert Use / Predictable Misapplication

- Sampling of fluids which do not comply with the above described specifications.
- Operation of the sampler in explosive atmosphere
- Operation in **areas** with risk of vibration
- Cooling of food, chemicals or objects which are not conform with the sample medium.

1.3 Disposal

Packaging:
The packaging materials wood, cardboard box and PE can be disposed at the regular disposal points.

Device:
Please consider environmental compatibility, health risks and local disposal directions. Thus you should clean and disinfect the sampler and dispose it at one of the authorised disposal points. Detailed information should be available at the responsible authority.

Warning:
Disconnect the sampler from mains and other supply lines.

Separate the material groups in order to dispose the materials in an environmentally compatible way.

Batteries are to be disposed according to the local regulations.

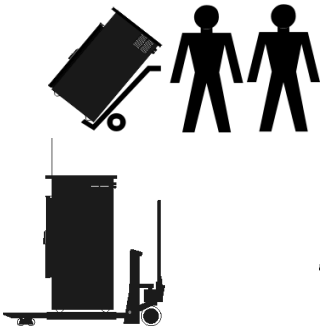
Note:
The housing can easily be separated into mono-material parts. The PU insulation can be removed by opening the stainless steel housing—it has not been foamed in.

After free delivery return to *Aqualabo*® we will take care of the disposal of your old *Aqualabo* sampler.

1.4 Transport and Return

For transportation or possible return of the sampler to *Aqualabo* for repair please consider the following points:

- The Sampler is heavy. When lifting use a two-person lift and move it with a two-wheeled hand cart or elevating truck.
- Disconnect the sampler from mains and other supply lines
- Clean and disinfect the unit completely. Pay attention to gaps, indentations and screws.
- **Screw the sampler on to the transportation pallet (fixation holes in the fastening bar).**
- Strechwrap the sampler and then cover it with a cardboard box for protection. Fix the cardboard box on the pallet with clamping tape.
- Do not tilt over the sampler.



Generally the unit must be **free** of hazardous and toxic substances and it must be properly packed and secured for transport.

A potentially required cleaning or disinfection will be invoiced by *Aqualabo*.

1.5 Your *Aquinox* is Unique

❶ **Aqualabo** menu-controlled programming

- Ability to save numerous programs and run them simultaneously.
- Multilingual.
- Time-, volume- and event-proportional sampling (option: flow-proportional)
- These different program types can be used in combination with each other.

The self-monitoring system controls the running time of the pressure/vacuum pump and of the cooling compressor.

❷ The easily accessible metering vessel is situated in the protected and temperature-controlled wet space. Thus the metering glass cannot freeze or be heated up by ambi- ent temperatures or sunshine.

The pinch-valve underneath the metering vessel is motor-driven.

❸ Inlet of the suction hose is possible both from the left and the right side.

❹ A high-grade door seal prevents thermal bridges

❺ Distribution using an XY distributor to locate the distributor hose directly over the bottle.

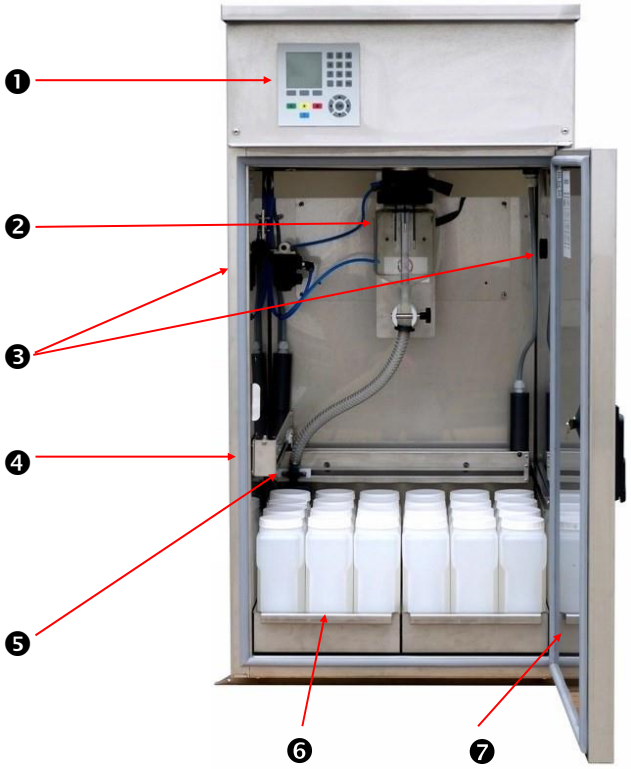
- The user is able to determine exactly which bottle to fill.
- Direct filling into the bottle. No cross-contamination of samples from residue in the distributor plate.
- No distributor plate to clean

❻ Various bottle combinations and bottle types can be filled with the flexible and fast XY direct distributor.

Besides the pre-installed bottle combinations you can also program your own bottle combination provided that the bottles fit underneath the XY distributor.

❽ **Aqualabo** sampling systems use a special pump for both pressure and vacuum for lift heights up to 8 m - ISO 5667-10.

- There is no need for a rubber membrane.
- The pump has a high life expectancy with automatic monitoring of running time during the program.



❼ Stainless steel housing AISI 304 (Optionally AISI 316Ti or powder-coated in RAL -colours).

- 40 mm thick insulation for maintaining cooled samples during normal operation in optimum storage conditions, +4°C at ambient temperatures of -25°C to +42°C.
- Electrical and electronic components are built into a separate, dry section in the upper part of the housing.
- The wet space with the sample bottles is situated in the lower part of the sampler.
- Easy separation of components for eventual recycling.

Note: The pictured sampler shows a AQUINOX with optional equipment. Depending on your sampler model, some components may be different.

1.6 Technical Data

Technical Data - AQUINOX	
Sampling Method	Vacuum-pressure; for time-, volume- or event-based sampling
Dosing Vessel	DURAN 50 Borosilicate glass
Sample Volume	20 – 350 ml (optional ~ 750 ml); manually adjustable
Inlet Hose	12 mm (0.47 in) ID braided PVC
Distributor hose	15 mm (0.59 in) ID silicone
Distributor	XY Distributor; discrete, freely programmable
Sample lift height	8 m (26 ft)
Pump	Standard: -0,8 to 1 bar, 14 l/min, Vm ≥ 0,5 m/s up to 6 m lift height, 230 V AC, 50 Hz, no collector Optional: -0.8 to 7 bar, 19 l/min, Vm ≥ 0.5 m/s up to 7 m lift height, 230 V AC, 50 Hz, piston pump
Housing	Stainless steel (V2A; 1.4301; DIN X 5 CrNi 18 10; AISI 304) with 40mm insu- lation, cold bridge free, IP 55, recyclable. Option: V4A (AISI 316 Ti) or powder-coated (RAL colors)
Cooling unit	Compressor cooling 230 VAC: 150 W; refrigerant R 134a; CFC-free; automatic defrost
Heating unit	Electric heating in stainless steel case 230 V; 350 W with excess temperature protection 70 °C
Thermostat	PT100 temperature sensor; internal temperature +4 °C ±1.5°C at an ambient temperature of –25 °C to +42 °C
Control	Microprocessor controlled, 24 button, 128 x 128 pixel LCD display; real time clock, 5 year RAM battery back-up
Software	Menu driven • 9 possible programmes (simultaneously) • Preset programs, easy to modify. Combination and interlinking pro- grammes as standard feature. • Operation signals • Preset and free distributor settings • Memories for errors, events and operation status (stores the last 200 procedures).
Signal inputs	flow – 0/4-20m or potential free contact (min. impulse 400 ms) event – potential-free contact (1 sec to 99 min) Control voltage - 24V DC
Serial interface	RS 232, RS 485
Remote control	Optionally via modem, GSM-modem, web (e.g. LAN, GPRS)
Electrical Data	Mains supply 230V 50Hz; power input max. 750 VA; main fuse 16A
Dimensions	Height = 1290 mm, Option: with raised base = 1590 mm Width = 655 mm (incl. fastening bar width = 720 mm) Depth = 770 mm, Weight approx. 90 –125 kg, according to equipment
Ambient Conditions	Ambient temperature: operate -25°C up to 42°C; storage –35°C bis 55°C Relative humidity: max. 80% Altitude of site: up to 2000m above sea level
Noise Level	Continuous sound pressure level < 65 db(A)

1.7 Brief Description of the Sampler's Functions

Programming

For control and command, the sampler uses a microprocessor, which can be programmed by the operator using simple dialog menus.

- When the sampler is programmed to operate at specific time intervals, time proportional sampling results.

Time proportional sampling

- Provided that the sampler is either supplied with or connected to appropriate instrumentation, it can be programmed to operate when the flow volume reaches certain levels. Volume proportional samples are taken using input from a flow measurement sensor *(for further information see page 14)*.

Volume / flow proportional sampling

- Event proportional sampling results when the sampler is programmed to respond to certain event triggers. For example, when pH or conductivity sensors indicate that something abnormal may be happening in the sample medium. This includes storm water overflows.

Event proportional sampling

- It is possible to program the sampler to use a combination of all three types of sampling method.

Sample Distribution

- Using the direct X-Y system, the samples are placed from the dosing vessel directly into the bottles via a distributor hose.

Sample Storage

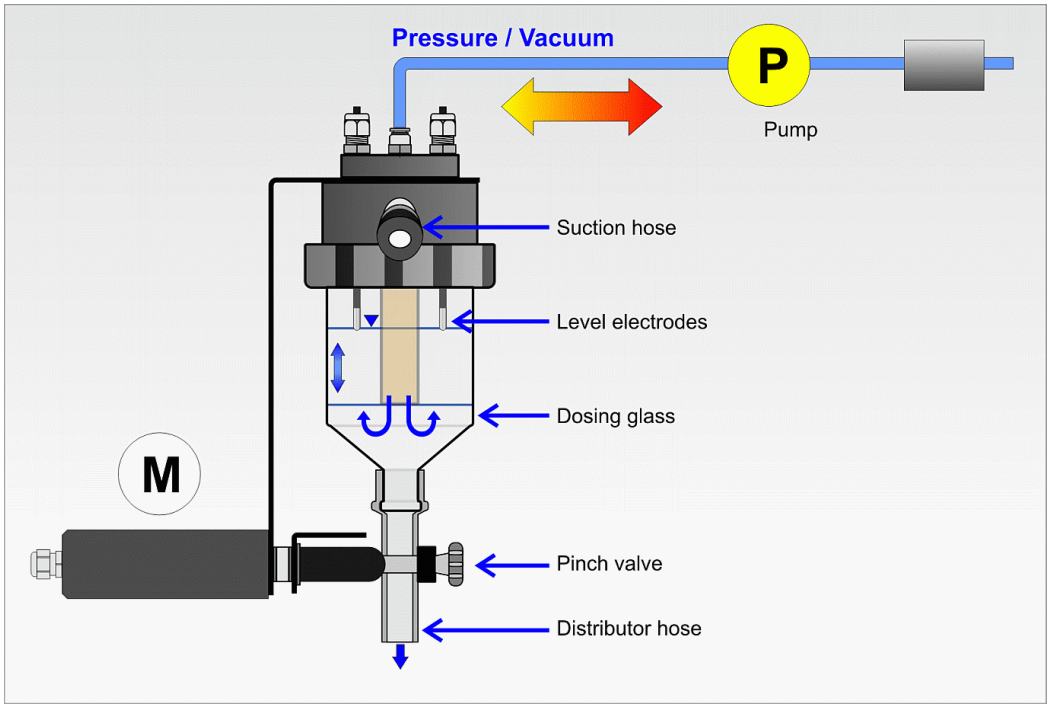
- If the collected samples have any organic content, they should be stored in the dark and cooled as quickly as possible to between O°C and 4°C (ISO 5667/10 guidelines). Some national or local rules differ from this figure. It is ultimately up to the laboratory carrying out the analysis to specify conditions for both storage and transport of samples.

Temperature control of the samples

- The refrigerator can be set to thaw periodically for about 10 minutes. During these short periods, the air temperature inside the cabinet can rise considerably but the liquid temperature is barely affected.
- Care should be taken to ensure that the door is opened as little as possible and that it is always shut securely upon leaving the sampler.
- An industrial grade refrigeration compressor cools the sample storage chamber. The cold air is drawn behind the rear wall of the storage compartment and re-enters below the samples. It is quite normal to find that the temperature in the top of the cabinet is higher than that around the samples.

- Although freezing will not be detrimental to the samples, it makes collecting them somewhat difficult. In winter, therefore, a heating device is used to ensure that the storage compartment remains above freezing point and that the samples do not freeze.

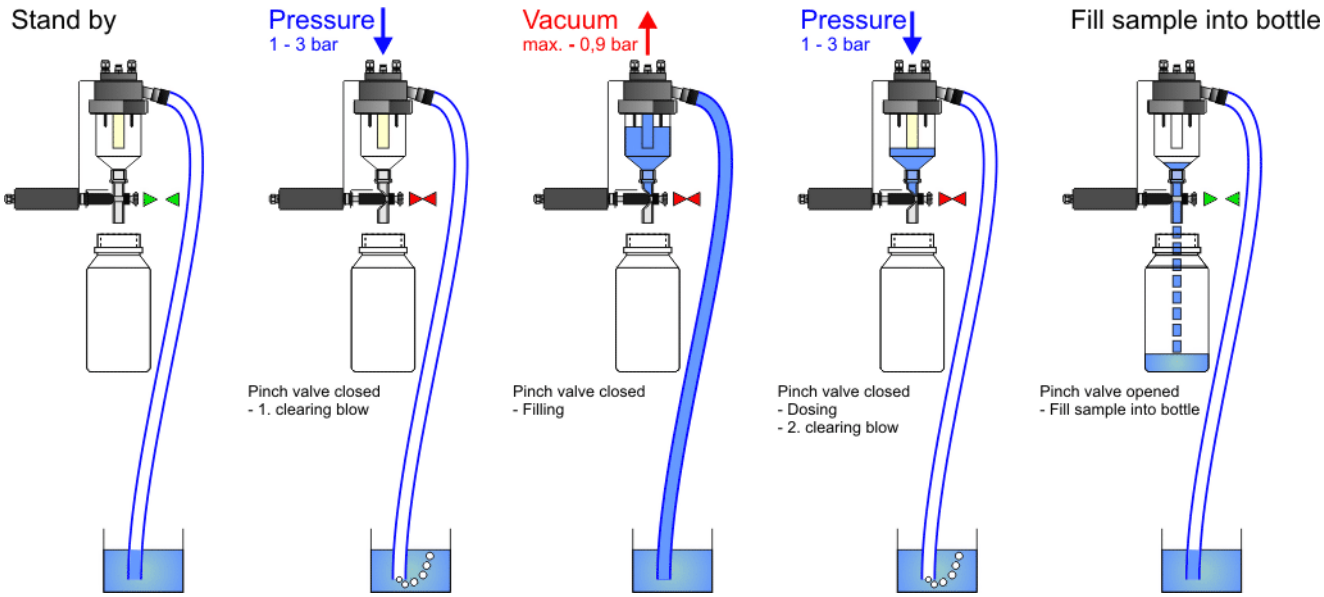
1.8 Brief Description of a Sample Draft



European samplers normally use the 'pressure/vacuum system' for taking samples. A pump supplies both compressed air to clear the sample hose and dosing vessel and vacuum to draw liquid into the sample hose.

A 'pinch-valve' seals the dosing glass while the sample is being drawn and opens to release the defined sample volume into the sample bottle.

The samples can be stored in more than one bottle if a suitable 'distributor' is fitted.



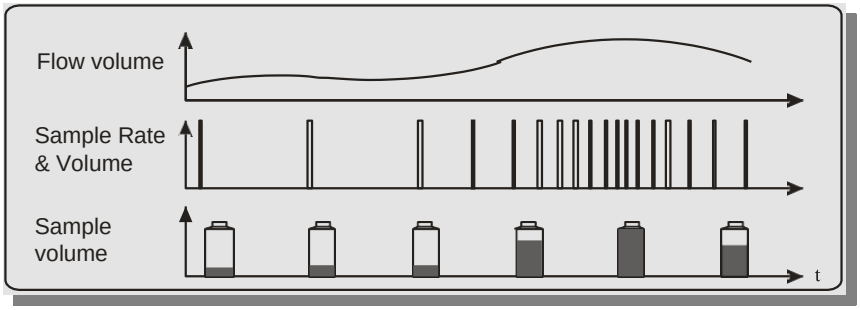
1.9 Flow– and Volume Proportional Sampling

There has been great debate about the various pros and cons of *flow* proportional sampling (also known as *CTVV sampling*) versus *volume* proportional sampling (also known as *CVVT sampling*).
Aqualabo samplers can do both, but **the standard machines come ready for volume proportional sampling.**

Both volume and flow proportional sampling take signals from the same flow meter. The difference is in the logic that the sampler software uses to interpret the data from the flow meter.

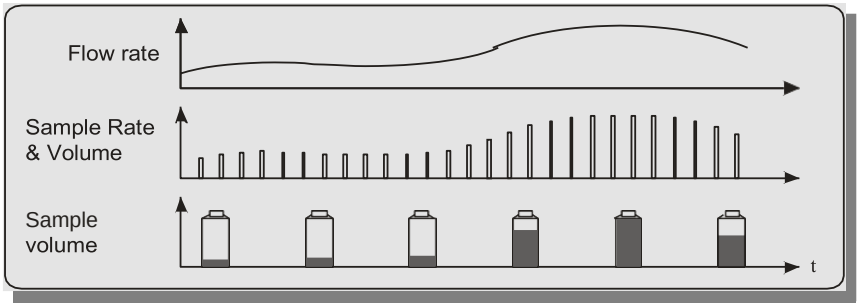
Volume proportional *sampling starts with the basic principle that the sample volume should remain constant as flow increases and decreases.*
As the flow rate rises, the sampler begins to take samples on a much more regular basis. The number of samples taken is directly proportional to the flow rate.

CVVT— Constant Volume, Variable Time



Flow proportional *sampling maintains an equal amount of time between samples but increases the volume of sample taken as the flow rate rises.*

CTVV— Constant Time, VariableVolume



Note: In volume proportional sampling, very low flow rates mean that there is a long time period between samples.

In order to overcome this, it is possible, in standard *Aqualabo* samplers, to set a maximum time period between samples. This ensures that even during prolonged periods of very low flow, a small sample will be taken as a security back-up if required, whilst still preserving the lifetime of the pump

1.10 Glossary of Sampling Terms

Bottle fill time	The length of time that each bottle will actively receive samples before the distributor advances to the next bottle or the program ends.	*See menu 04/07*
Bottle fill delay	The time between bottle changes during which samples must not be taken.	*See menu 04/08*
Sampling Interval	The time between individual samples in the same program. Usually used in time related sampling, but also need for sampling during events.	*See menu 04/09*
Impulse Divisor	A calculated figure to that informs the sampler how often to take samples in flow related sampling.	*See menu 04/10 and chapter 5.1*
Minimum Delay between Samples	Used in volume and flow related sampling. Sets a minimum time between individual samples if flow rates are so high that samples would otherwise occur more frequently than required.	*See menu 04/11*
Maximum Sampling Interval	Used in volume related sampling. Sets a maximum time between individual samples if flow rates are so low that samples would otherwise not be taken.	*See menu 04/12*
Time Proportional Sampling 	Samples taken at a predetermined time interval, regardless of flow or quality variations.	
Event Proportional Sampling 	Samples taken in relation to water quality using a suitable quality sensor to measure parameters such as pH, dissolved oxygen, conductivity, turbidity, temperature, redox potential.	*See chapter 5.3*
Flow Proportional Sampling 	Samples taken in relation to flow rates. Time between samples is constant but volume of sample increases with increased flow.	*See chapter 1.9 , 5.1 und 5.2*
Volume Proportional Sampling 	Samples taken in relation to flow rates. Sample size remains constant but period between samples shortens as flow rates increase	*See chapter 1.9 , 5.1 und 5.2*
Starting Mode	Allows the sampler to begin running its program at a different time from that at which the start button is pressed.	*See menu 04/01*

2 Security

2.1 Safety Signs

The following signs mark notes, warnings, prohibitions and mandatory within the operation manual.

Note!

Warning!
Indicates directions to prevent from damages of persons, sampler or environment.

Caution!
Stands for directions which must absolutely be obeyed to exclude risk of fatal injury.

Caution!
A warning sign alerting you of

If this sign is labelled on the sampler, it marked the location of the connection for potential equalisation.

Prohibition!
NEVER insert your fingers during operation!

Prohibition!
DON'T TOUCH! Danger of crushing.

Mandatory sign!
Wear gloves

Mandatory sign!
Wear a helmet

Mandatory sign!
Use safety glasses

2.2 General Security Advice

The operating safety and proper function of the sampler is only ensured with observance of the generally applied safety precautions and the specific security advice of this operation manual.

The staff assigned to installing, commissioning, maintaining and operating the sampler must carefully read and understand the operation manual.
Generally the personnel must have the adequate qualification for the specific work.

The operation manual must be kept constantly available on site.

In order to guarantee a safe operation please make sure before installing that:

- there is no transport damage.
- the unit has not been stored in inappropriate conditions for a longer time.
- the unit does not have any visible damage.

In case of doubt please contact *Aqualabo*

Furthermore please check the intended site of installation for permitted ambient and operation conditions described in chapter 1.2.

2.3 Safe Working with the Sampler

Only apply the sampler under the described conditions (chapter 1.2). Operation beyond these conditions is not intended.

- Fasten the sampler via the mounting hole on the steel base bar to a plain surface to make sure the stability of the device.
- Please see to connect the potential equalisation (connection via foot bar)
- Operate the sampler only under the ambient conditions specified under „Technical Data“ (chapter 1.6).

- **Caution**: Only employ the sampler for sampling of liquid hydrous solutions in a non-explosive environment. Further employment exceeding this purpose is not intended.
- **Caution: Biologically or chemically contaminated areas can be hazardous to your health.** Should the sampler be situated in such an area, you have to act according to the regulations for handling dangerous materials when cleaning or maintaining the sampler.

- **Caution:** Before servicing/maintaining the sampler, you have to stop and unplug it.
- The operator of the sampler has to assure that the valid EEC guidelines and national laws for occupational health and safety will be observed. The same applies to the regulations for accident prevention.
- The operating instruction manual is meant not only for beginners. It is also intended as a reference book containing tips, hints and suggestions.

- **Note:** Please employ only spare parts, accessories and special equipment which have been approved by *Aqualabo*
- When passing on the sampler to someone else, please assure to also pass on the complete technical documentation.
- If a sampler has to be returned to Aqualabo, it must be cleaned before and must not contain any hazardous material. If not, the sampler will be cleaned at the customer‘s expense.

Warning!
For correct operation of the electrodes inside the dosing vessel a conductivity of the sample medium of **more than 55µ S/cm** is required. A lower conductivity will cause flooding of the pneumatic system and damage of components.

3 Initial Start-Up Procedure

Although the sampler is suitable for use between –25°C and +42°C, transport from a cold into a warm environment may cause condensation water and thus lead to a disturbance. So please allow the sampler some time to adapt to the temperature of its new environment before you start running it.

Further, please make yourself familiar with the principles of sampling.

Afterwards, please follow the next steps.

3.1 Start-up Sequence

❶	Search an adequate installation location. (on level surface as close to the sampling point as possible).	*See page 19 for more details*
❷	Position the hose so that it slopes down towards the channel. A descent of at least 5cm/m length is recommended.	*See page 20 for more details*
❸	Adjust your **requested** dosing volume	*See page 21 for more details*
❹	Install the potential equalisation Plug in the sampler	
❺	Make yourself familiar with the control unit.	*See page 25 for more details*
❻	Follow the brief instruction „First Steps“ in chapter 4.3	*See page 27 for more details*

Warning!
Place your sampler in a non-aggressive environment. Take care that the built-in cooling unit is aired sufficiently.
An aggressive atmosphere can damage or destroy the cooling unit.

3.2 Installing a Aquinox Fixed Site Sampler

Installing a sampler is not difficult. The following notes will help you to find the best installation position for your sampler and thus achieve a best possible sample.

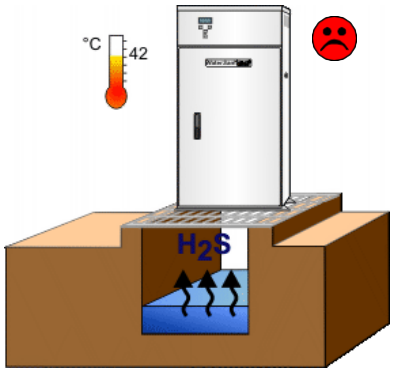
❶ **Search for the best suitable position acccording to the following criteria:**

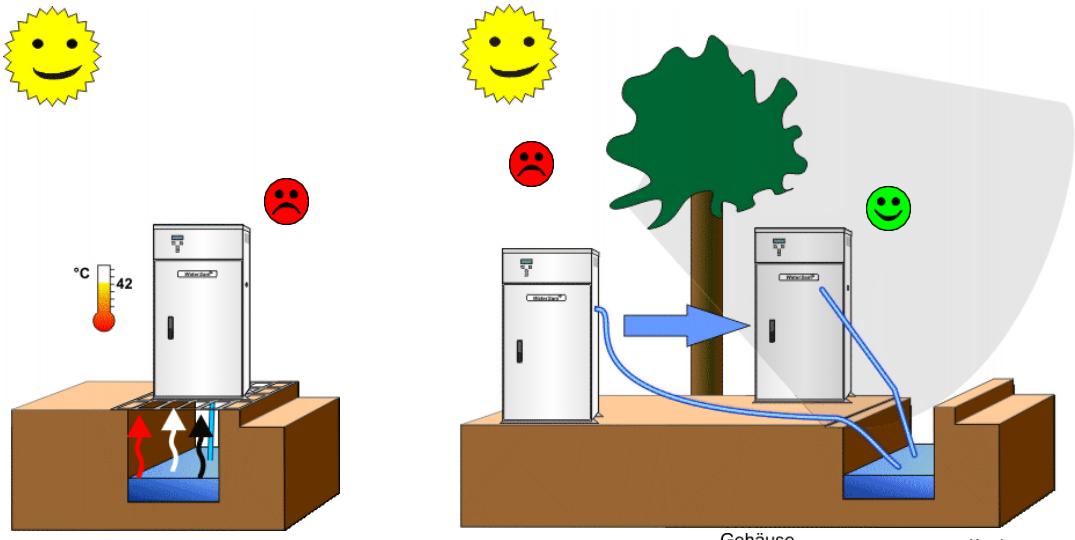
A. Is it possible to take a representative sample from there?

B. Can the sampler be positioned close to the sampling point (not farther away than 25 m)? As close as possible, please!

C. Avoid surroundings with aggressive atmosphere or hot areas. In such cases, it is better to accept a longer suction distance and place the sampler in a better place.

D. Take care that the interior cooling unit is aired sufficiently. Please do not block the ventilation grids on the sides.

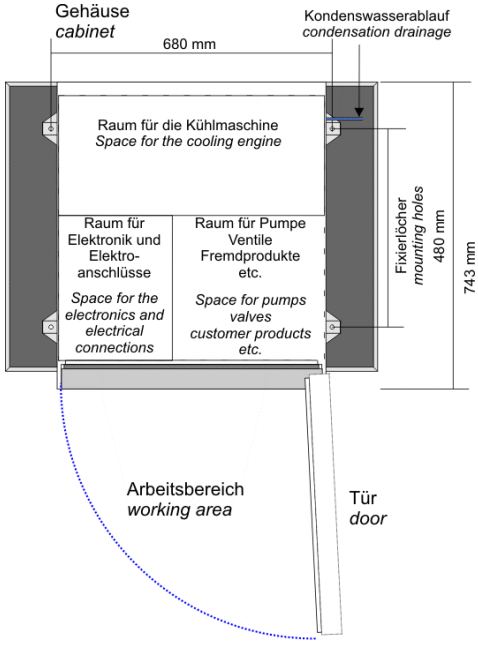




❷ **Position the sampler on a solid and plain ground and fix it.**

Use the fixing holes in the fastening bars on the bottom of the sampler

Sampler dimensions are to be found in chapter 3.4.



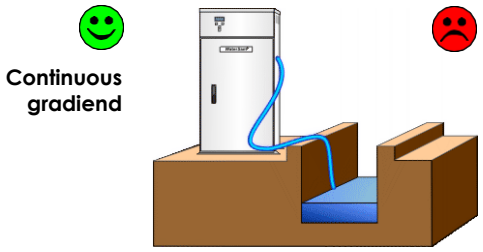
❸ **Make sure that the sampler and the samples are easily accessible**

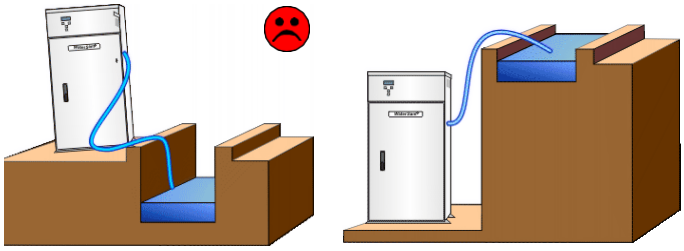
The working area in front of the sampler is to be kept free.
(E.g.: Ensure that the sampler door can be totally opened.)
Bear in mind the persons who will be collecting the samples.

4 **Take care that the suction hose is laid out correctly.**

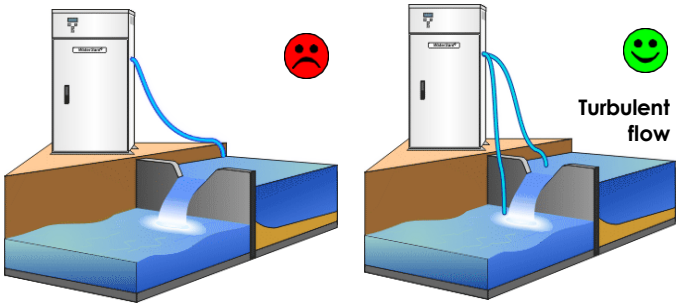
Note: Position the hose so that it slopes down towards the channel. A descent of at least 5cm/m length is sufficient.

- If not lead in a constant descent a water pocket may be created and residual sample medium will remain in the hose. Old liquid left in the hose from previous samples could contaminate later samples and thus you will not receive a representative sample.
- In very cold weather, an ice plug may also form and block the hose.
- If the sampling point is situated above the sampler the suction hose cannot be completely drained. Thus the remaining medium will flow back into the dosing glass and into the sample bottle. There is a general risk of flooding of the sampler.





Look for a position with turbulence to sample from (this ensures a representative sample).

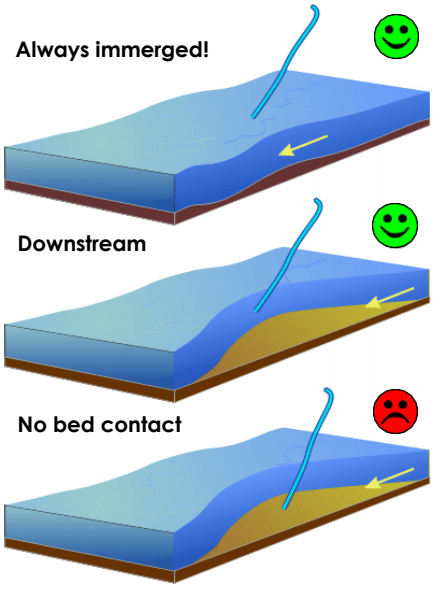


Make sure that the suction hose dips permanently into the sampling medium—also with low water le- vels.

Armatures are available from Aqualabo to help to position the tip of the hose at the right height in the liquid flow.

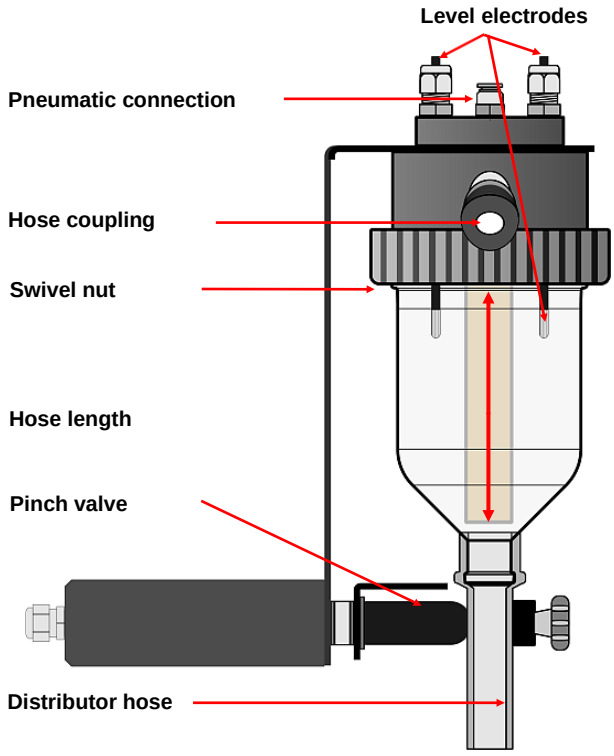
The tip of the hose should be facing with the flow.

The end of the hose should be suspended above the ground, out of contact with silt and stones.



IMPORTANT: The sampler roof must be put back in place and secured with all screws following installation and service procedures!

3.2 Adjustment of Sample Volume



In the standard unit the volume of the sample is adjusted by carefully trimming the length of the silicone tube inside the dosing glass.
For this purpose please open the swivel nut (❶) and remove the dosing glass (❷). Now you can cut the dosing hose to the required length in order to achieve the desired dosing volume (❸) and then screw the dosing glass back on again (❹).

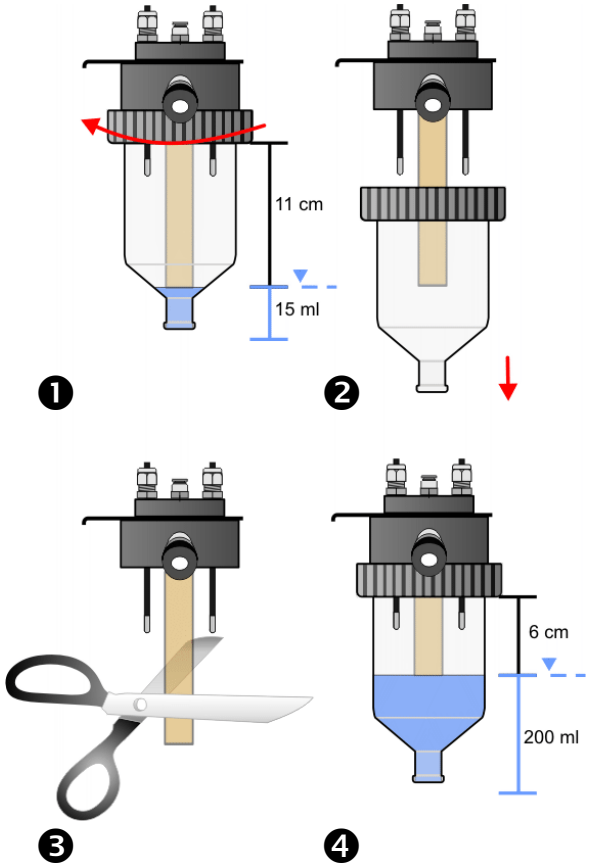
The list below is serving as orientation only.

The cone shaped end of the glass is made by hand so each dosing glass varies very slightly in size. This is only noticeable for very small sample sizes (below 50ml) and special care should be taken when cutting tubes longer than 6 cm.

350 ml Dosing glass

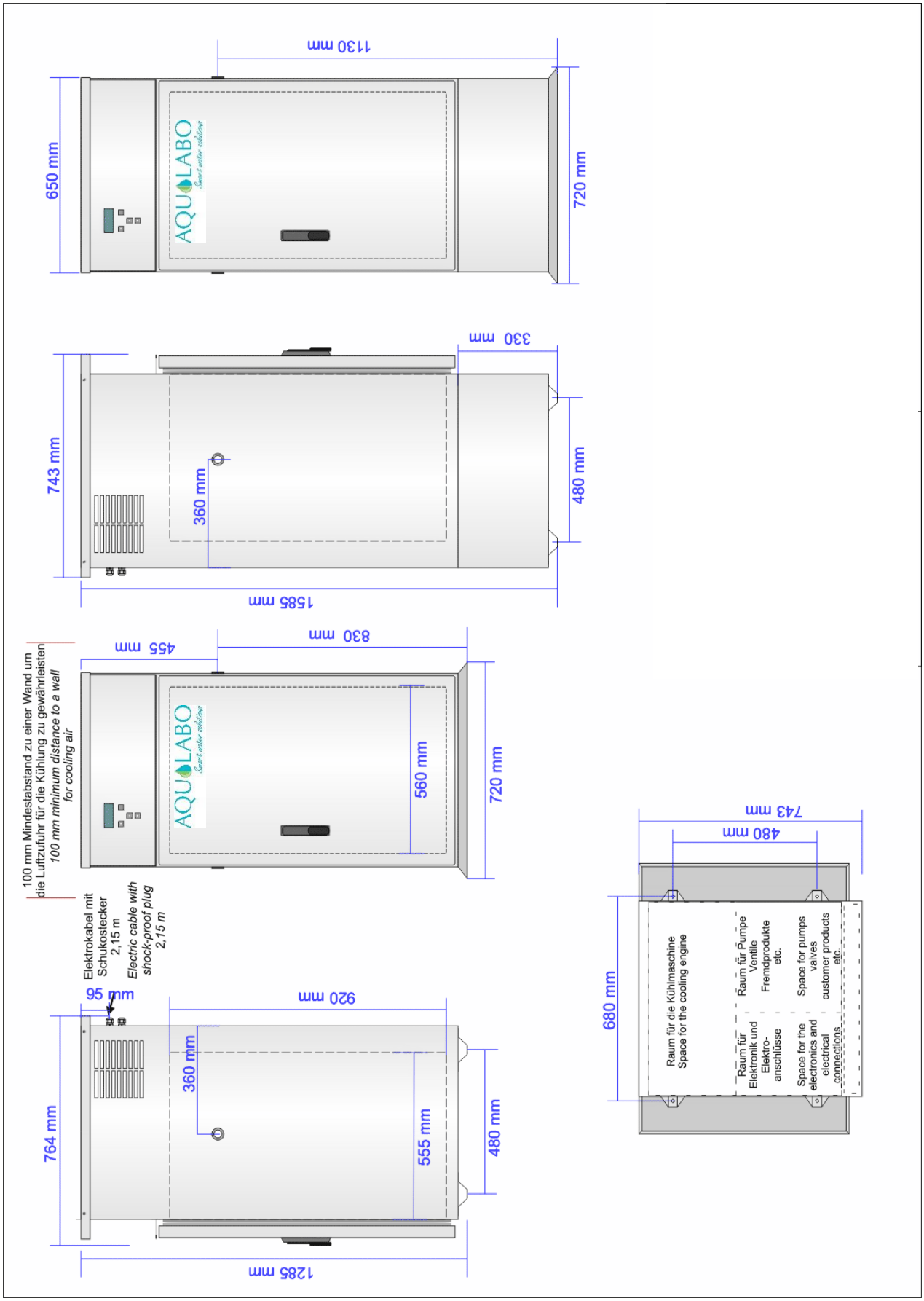
Aquinox

Sample volume in ml	Tube length in cm
15	11.00
25	10.50
50	9.00
75	8.50
100	8.00
125	7.50
150	7.00
175	6.50
200	6.00
225	5.50
250	5.00
275	4.50
300	4.00
325	3.50
350	3.00



For larger volumes, shown by the shaded areas, the level-sensing electrodes must be shortened.

3.4 Dimensioned drawing



Sampler dimensions without / with raised base

4 Programming Your Aqualabo Sampler

Although programming is actually quite easy and logical, the wide range of possible program variations may make the task seem a little daunting at first. Please note the following points.

- First of all, try to plan out what the sampler will be required to do. All *Aqualabo* samplers are capable of running up to 9 programs either simultaneously or one after the other, so don't let your experience with less advanced samplers influence your choice of program.
- The important thing to keep in mind is that each bottle has a finite capacity. Although the sampler can be set to prevent overfilling, try to use a combination of sampling frequency and sample volume that gives you the best overall results for your laboratory analysis.
- You may, for example, want to use some of the bottles for a timed program and some for a flow or event related option. You may choose to run one program during normal working hours and a different program at night or weekends. Almost anything is possible.
- If you have connected the sampler to other measuring instrumentation, the effectiveness of sampling can be greatly increased but you need to read the section on flow proportional sample and event proportional sample later in this manual.

Don't worry about making mistakes. You can play with the programming options as much as you want to, including taking manual samples. The sampler will not begin to run until you activate the selected programs in Menu 02.

It is very difficult to flood the machine and even if you do, it will not be damaged.

If you run into difficulties or would like help in deciding on the best sampling regime for your site, a *Aqualabo* expert is only a phone call away!

Sampling vocabulary can sometimes be confusing so we have provided a short glossary previously listed in this manual.

In the meantime we suggest that, once you have decided roughly on the frequency and volume of samples, you follow the steps suggested below until you are familiar with the programming operation.

4.1 Programming Technique

Menu Navigation

The interface is menu-based, and is easy to follow on the display.

The ↑ and ↓ buttons are used to page up or down between menus and move to the previous or following screens.

E.g. Press the down arrow to move from menu 04/03 to menu 04/04 and again to go to Menu 04/05 and so on.

In submenus, data can also be changed with the ↑ and ↓ buttons by scrolling up and down through a list of entries, e.g. days of the week. The numeric buttons can be used to enter numbers directly.

The ← or → buttons are pressed to select the instruction that is displayed at either the bottom left or right hand corner of the display.

For alteration of figures you can immediately enter the figures with the numeric keys. Then press the **OK** button to confirm.

For alteration of weekdays press ← to call up the modification, then the ↑ and ↓ buttons have the function of scrolling upward and downward through the weekdays. Then enter the figures with the numeric keys. Press the **OK** button to confirm.

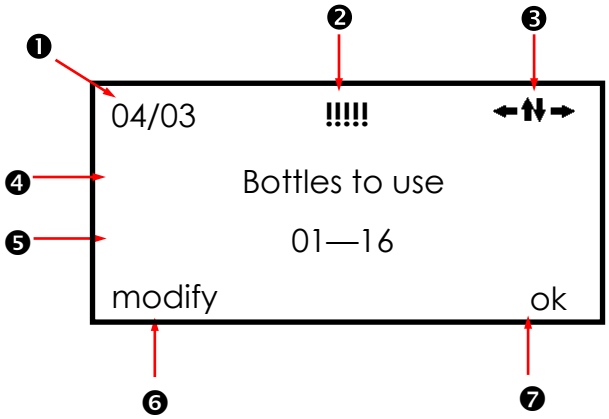
If you have made a mistake you can move between the figures with ← or → and change the blinking figure. Or you can press "delete" and re-start from the beginning. Press the **OK** button to confirm.

Then ↑ and ↓ to page up or down between menus again.

Menu Display

The top 4 lines of the display show the various menus and sub-menus used for programming and adjusting settings.

The first line of the display shows the main-menu/sub-menu point, the cabinet temperature in refrigerated samplers and the direction buttons which may then be pressed.



❶ Number of menu (main-menu / sub-menu)

❷ Normal: temperature in sample storage chamber
Error: 5 flashing < **! ! ! ! !** > indicates an error
Message is in data logger
Detailed information in menu 07

❸ Active buttons in the submenu

❹ Menu, short description

❺ Menu settings / input line

❻ This option is chosen with the ← button

❼ This option can be chosen with the → button

Direct Function Buttons

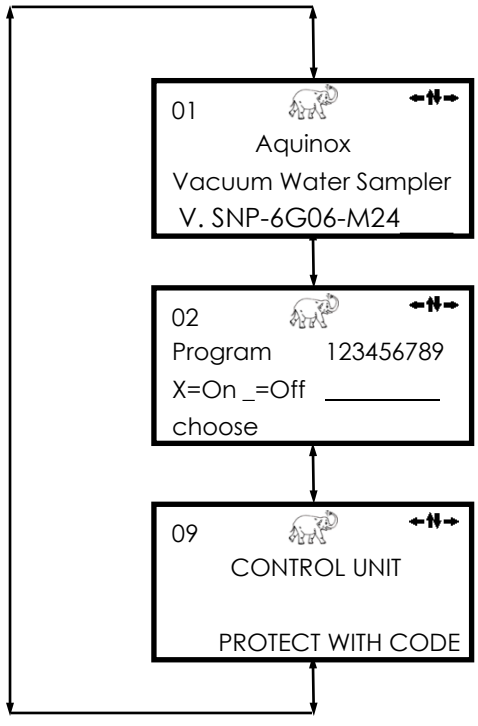
For ease of use, this sampler features direct-function buttons:

- **Start** / **restart all** programs selected in menu 02
- **Pause all** running programs
- **Stop all** running programs
- Initiate single **grab sample**
- Activate function indicated above button on display screen if present: i.e. **start program 1** / **start program 2** / **start program 3**.

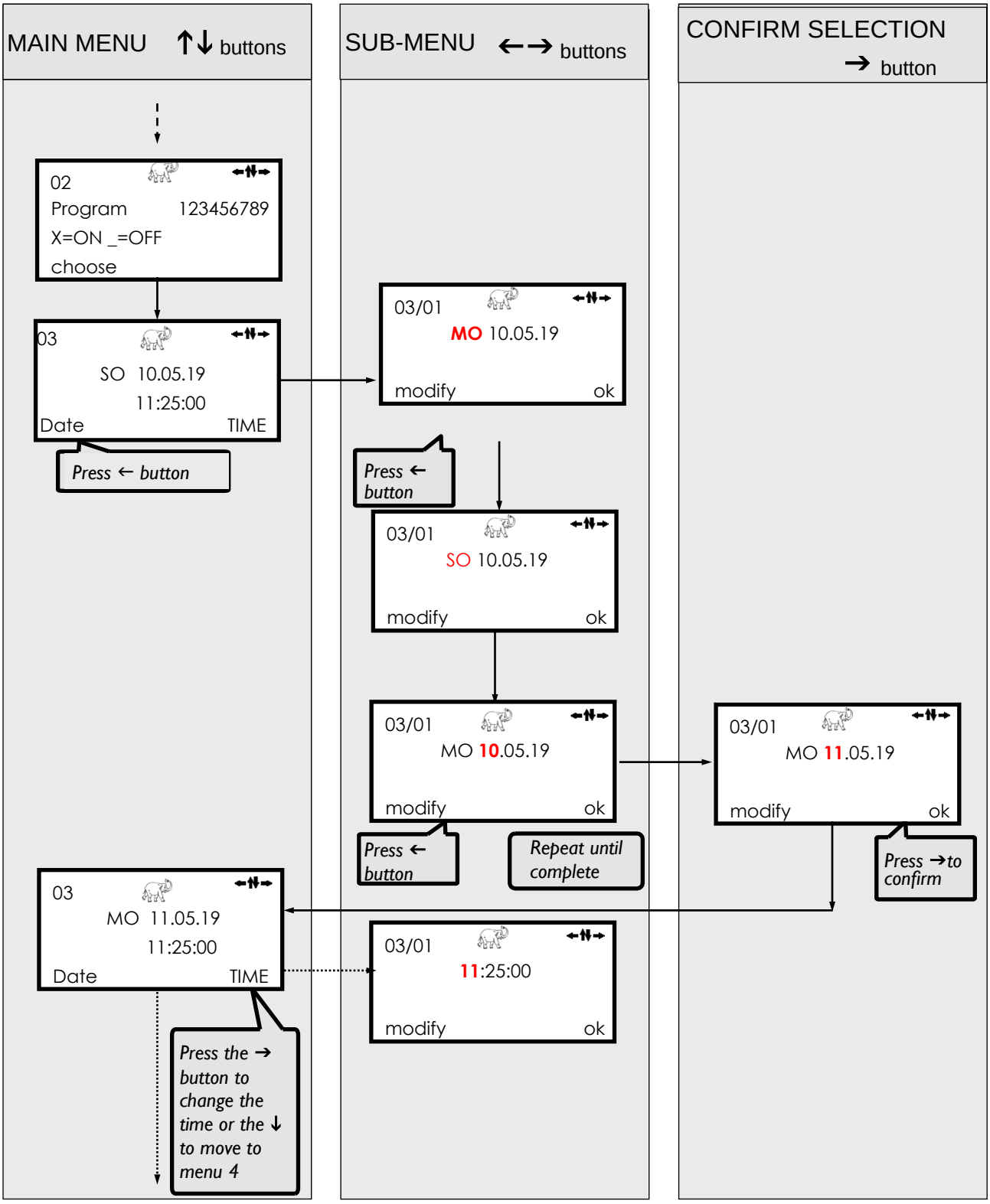
4.2 Description of Main Menus

Menu Number	Menu Function	Details on Page
01	Shows software number and version	28
02	Starts and stops programs. Interrupts running programs to enable samples to be cleaned or minor maintenance and service to be completed	29
03	Enables the correct date and time to be installed in the sampler‘s memory	31
04	Selects one or more of the 9 available program memories and enables program parameters to be set	32
05	Allows manual samples to be taken or alters the distributor position manually	42
06	Sets the parameters within which the sampler will have to operate. e.g. How long the pump should run when drawing samples The number of bottles currently in use	45
07	Provides information such as the timing of bottle changes, the time at which various ‘events‘ started or the current flow rate (assuming appropriate sensors are attached) Also identifies the nature of alarm messages and records the number of samples in each bottle	51
08	Service menu. Mainly for use by trained service personnel	55
09	Regulates the access level to the control unit.	56

It is easy to page through menus 01 to 09 using the ↑ and ↓ buttons



To work within a menu, simply press either the ← or → button to select the desired function. For example, try setting the date....



It couldn't be easier!
You can change things as many times as you want until you decide to activate the programs using Menu 02

4.3 First Steps

❶ Go to menu 06/01 and change the language

❷ Go to menu 03 and install the correct time and date

See chapter 4.4.3 for more details

❸ Go to Menu 06 and install and verify the general sampling settings

See chapter 4.4.6 for more details

❹ Go to Menu 04 and set the sampling parameters for program 01

See chapter 4.4.4 for more details

❺ Go to Menu 05 and take a manual sample to ensure that everything is properly connected

See chapter 4.4.5 for more details

❻ Go to Menu 02 to start the program

See chapter 4.4.2 for more details

Congratulations! You have just completed your first program.
Further programs can now be added by working with menus 04 and 02.

4.4 Detailed Programming Instructions

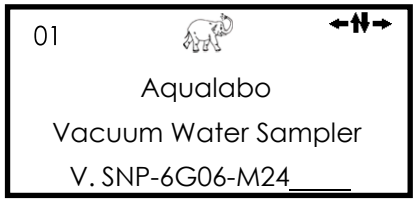
4.4.1 Menu 1 - Display Software Version

Menu 01

On this display you can see information about the installed software version.

Press the ↓ button to go to menu 02.

Gives details of software version installed



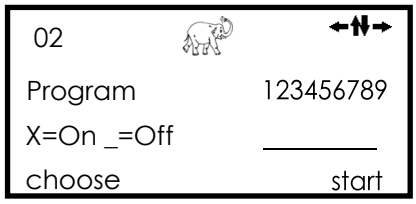
4.4.2 Menu 2— Starting and Stopping Programs

Menu 02

Menu 02 shows the status of sampler programs. If there is an **X** below the program number, it is switched on.

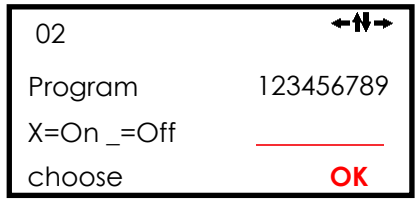
If there is a _ below the program number, it is switched off.

Switches programs on and off



Press the ← button to move through the several programs. A flashing _ below the program number marks the current program. If you push the → button <**O K**> the current program is marked with an X and in the following you can start it.

Switches programs on and off

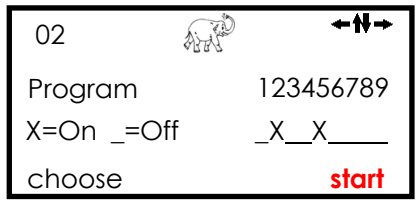


Press the ← button again to move through the other programs. Count through all 9 programs, either selecting them or not. Once you have clicked below all 9 programs the <start> option will appear..

Press the → button <**start**> to start all marked programs.

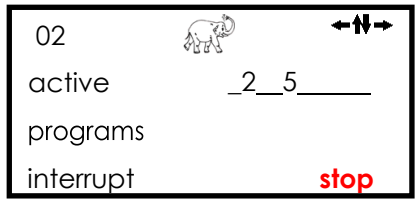
In the following you will see the right display. Press the → button to stop all the running programs. **On restarting all the selected programs will start from the beginning**.

Starts the marked programs



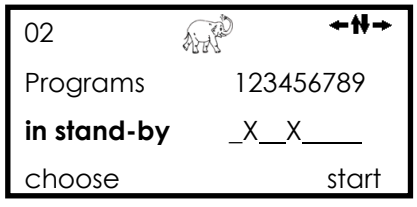
Note: Selection/deselection can alternatively be done by pressing a **numerical button** (e.g. press **3** to select/ deselect program 3).

Stops or pauses the marked programs



Warning: If the bottles have not been emptied it is possible to overfill the bottles with this action because a restart resets the internal counter for the overfill protection.

Pressing the ← button **interrupts** all programs. The interrupted programs are now in a '*stand-by*' mode. If you have interrupted the programs this display appears.



Now it is possible to add and start further programs from this window.

Note: During an interruption no program changes can be done in pre-activated pro- grams.

On restarting the interrupted programs continue exactly at the point they should have arrived at the restarting time.

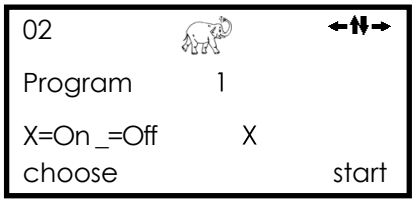
Press the ↓ to skip menu 02 and go to menu 03.

Menu 2 with limited number of programs

In menu 09, the number of programs available for selection in menu 02 can be limited.

In the example here, only program 1 is selectable.

Switches programs on and off

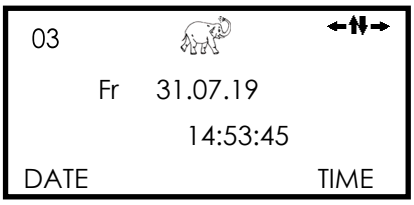


4.4.3 Menu 3— Setting Date and Time

Menu 03

Press the ← button to change the date or the → button to change the time.

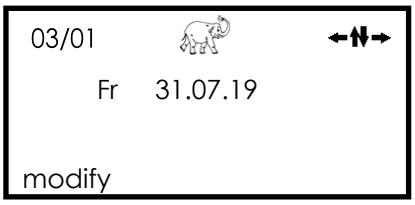
Selects Date or Time



Menu 03/01

Press the ← button to start the alteration.

The first changeable item will begin to flash

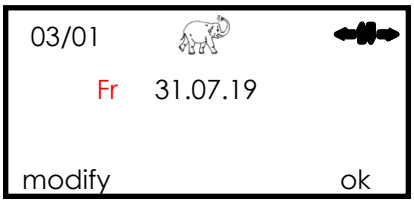


With the ↑ and ↓ buttons you can now count upward and downward.

Pressing the ← button again goes on to the next position of the date.

Count with ↑ and ↓.

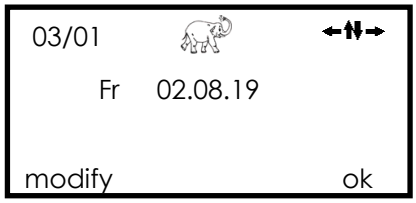
Continue until you have entered the correct date.



Once the correct date is shown on the display.

Press the → button <ok> to save the changes.

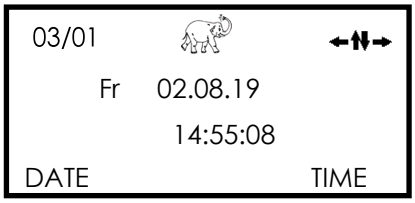
Saves changes to date



Menu 03/01

If required, the time can now be altered in exactly the same way.

Change the time or move on to the next menu



Notice:
Only if you stop all running programs, you can change time and date.

4.4.4 Menu 4 - Installing Sampling Programs

List of Individual Sub-Menus		visible		
04	Select program number			
04/01	Selection of starting modes			
04/02	Linkage of programs			
04/03	Selection of the bottles to be used			
04/04	Selects time, volume or event sampling	time	volume	event
04/05	Sets the first bottle of the program	●	●	●
04/06	Sets bottle parameters for event sampling			●
04/07	Sets bottle fill time	●	●	
04/08	Sets bottle fill delay	●	●	
04/09	Sets the sampling interval	●		
04/10	Sets the impulse divisor		●	
04/11	Sets minimum sampling interval for volume-proportional sampling		●	
04/12	Sets maximum sampling interval for volume-proportional sampling		●	
04/13	Sets sampling interval in event sampling			●
04/14	Sets number of samples per bottle during events			●
04/15	Overcharge protection: Sets maximum number of samples per bottle	●	●	●
04/16	Sets start delay in event sampling			●
04/17	Sets stop delay in event sampling			●
04/18	Exits sub-menu			

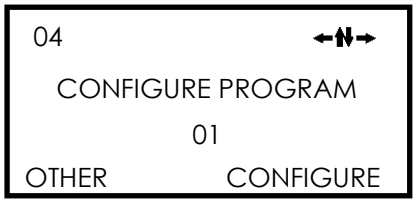
Menu 04

Press the ← button to select program 1 to 9.

Press the → button <CONFIGURE> to begin to customise the program.

Press the ↓ to skip manual control and go to menu 05.

Facilitates customisation of individual programs

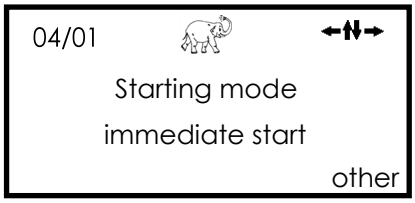


Notice:
Settings in menu 04 can only be made/changed for programs which have not yet been activated and for programs which were stopped.

Menu 04/01

When this display is in view, the program will start to **run immediately**. It is activated in menu 02.

Enables start time for program to be set



Press the ➔ button <other> to go to the next starting mode option.

Start of program at a specific weekday and time.
If this display is in view, the sampler will start the program every Sunday at 12:00—also if program is repeated. The starting time can be changed with ←,↑ and ↓ (see description in menu 03).

Starts program at same time each week

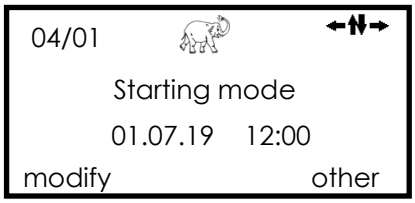
Note: The program must still be activated in Menu 2 but it will not start immediately!

Press the ➔ button to go to the next starting mode option.

Starting time on **a specific date**.

If this display is in view, the sampler will start the selected program at 12:00 on July 1, 2019. The starting time can be changed with ←,↑ and ↓ .

Starts the program once at a specific time



Press the ➔ button to go to the next starting mode option.

Program runs during a **defined time window.**

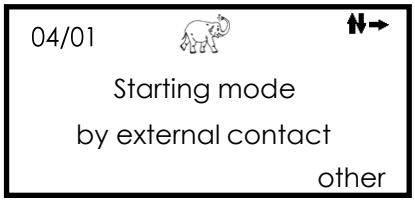
In this display the sampler takes samples in the defined time frame Sunday 12:00 to Wednesday 12:00. The remaining bottles will be filled next week during the time window.

Runs program within a specific time frame

Press the ➔ button to go to the next starting mode option (see also menu 06/18).

When this display is shown, the program will not start until it receives an **external signal** from, for example, a central control room or via a GSM telephone link. (requires suitable hardware)

Starts program from remote location



Press the ➔ button to go to the next starting mode option.

Start of program at a particular time.
If this display is in view, the program will start as soon as the clock reaches 12:00. Change the start time in the usual way.

Press the ➔ button to go back to the first starting mode option.

Switches off time pre-select

Menu 04/02

In this menu you can effect a linkage of programs.
In this example linkage is not activated.

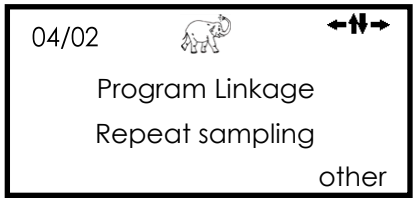
Press the ➔ button to go to the next linkage option.

Program runs once and then switches off.

Here the program is linked with itself: This option creates a program that takes samples continuously once a defined starting condition was met. The program run is started at the set start time (see menu 04/01). After each complete sampling procedure, a new run is started immediately.

Press the ➔ button to go to the next linkage option.

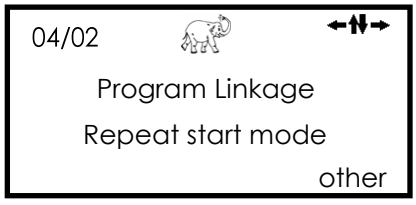
The same program always restarts immediately.



Here the program is linked with itself: After each complete program run, the system waits until the set start condition is reached again (see menu 04/01). Then a new program run is started.

Press the ➔ button to go to the next linkage option.

The same program always restarts with the starting mode.



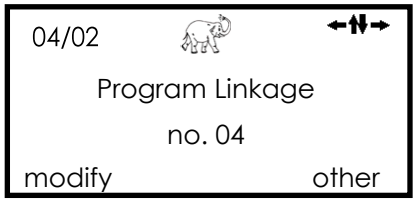
Note: Only available with starting modes “12:00”, “SU 12:00”, and “by external contact”.

Here the program is linked with another defined program.

Example: After the set program is finished program no. 04 will automatically start running.

Press the ➔ button to go back

After this program another program will be started.



Menu 04/03

This display indicates that the program will utilise bottle numbers 1 to 12. Even if your sampler contains more bottles, only numbers 1 to 12 will be used **by this program.** (Other programs may utilise other bottles.)

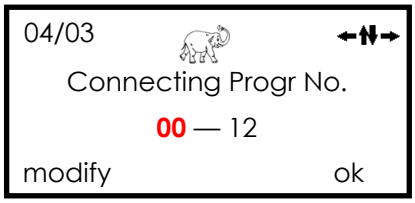
Change the bottle numbers selected in the usual way.

In menu 06/13 you change the distributor type

Tells the sampler which bottles to fill.

Note: If you set the first bottle number to „00“ a new display appears as described below...

Pass to menu „Connecting Progr No.“



Here you can “connect” the used bottles to the bottles of a different program. (in this window to the bottles of program no. 03).

Example: For both the program you are defining at the moment and program no. 03 you want to use the bottles 01-12.

By connecting, the two programs are interlaced and the bottles are filled successively.

Without “connecting” the distributor goes back to position 1 when this program is started and this might cause a double filling of the bottles.

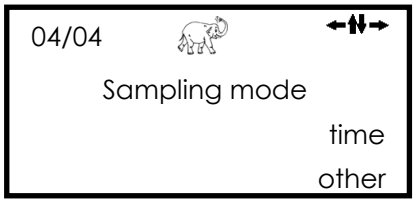
Enter program no. for bottle connection.

Menu 04/04

The display shows that the program will currently operate on a time-proportional basis.

Press the ➔ button to go to the next sampling mode option.

Selects sampling method

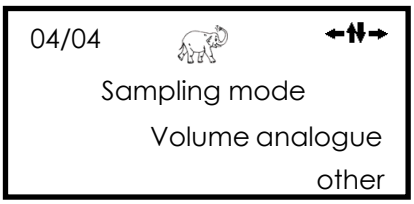


= time-proportional

The display shows that the program will currently operate on receipt of a 0/4—20mA signal from a connected flow meter.

Press the ➔ button to go to the next sampling mode option.

Selects sampling method



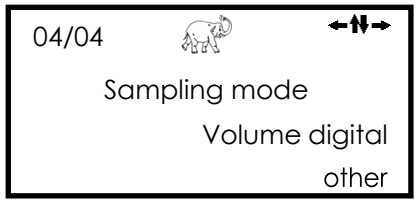
The display shows that the program will currently operate on receipt of a digital pulse signal from a connected flow meter.

Press the ➔ button to go to the next sampling mode option.

The display shows that the program will currently operate on receipt of a signal from a connected water quality meter. (e.g. temperature; pH; redox etc.)

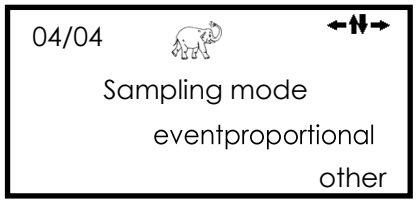
Press the ➔ button to go back to the first sampling mode option.

Selects sampling method



= volume proportional

Selects sampling method



= event-proportional

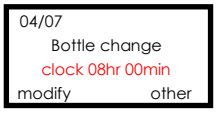
If this is correct, press the ↓ button.

Menu 04/05

There are occasions when it would be more convenient to place the first sample in a bottle which is not the first bottle in the sequence. This can easily be set. In this example, although bottles 1 to 16 are in use, the program will start at bottle number 4.

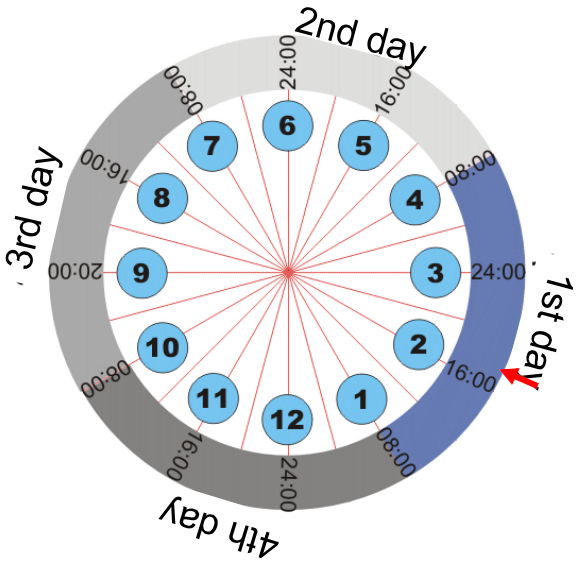
Changes the starting bottle

Notice: The following menus are only visible when Program Linkage (menu 04/02) is set to <with same Program>, and Bottle change (menu 04/07) is set to <clock ...>.



If you have entered these settings, you can then assign bottles to correspond to a 24-hour day. The maximum number of bottles per day which can be set is the total number of bottles preset in menu 04/03 (e.g. 1- 12).

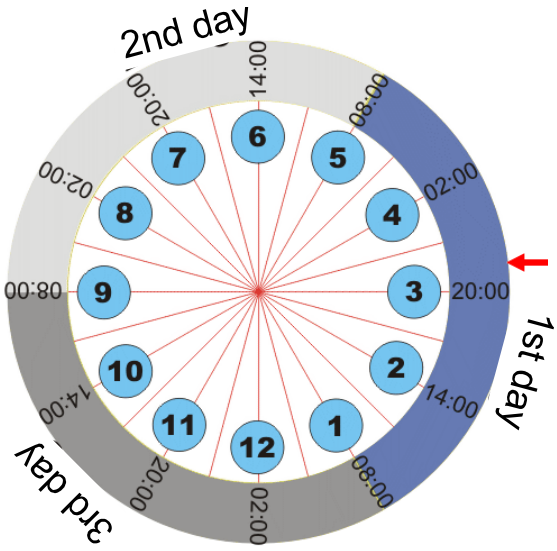
Example: 3 bottles/day



- **12 bottles available** (menu 04/03).
- **3 bottles per day**, which means a bottle change must occur every **8 hours**.
- The program starts at 08:00 o'clock with bottle 1.
- The next bottle change occurs at 16:00 o'clock to bottle 2.

Notice for example above: If the program is started at 17:00 o'clock, it will begin with bottle 2.

Example: 4 bottles/day



- **15 bottles available** (menu 04/03).
- **4 bottles per day**, which means a bottle change must occur every **6 hours**.
  After the 3rd day bottles 13-15 are ignored as a 24-hour day is not possible.
- The program starts at 08:00 o'clock with bottle 1.
- The next bottle change occurs at 14:00 o'clock to bottle 2 .

Notice for above example: If the program is started at 21:00 o'clock, it will begin with bottle 3.

Menu 04/06

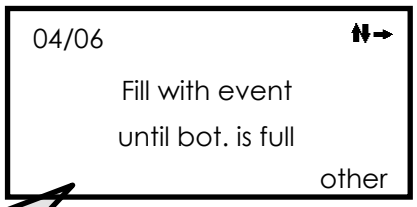
Several events may be possible during a program cycle. For example, during several prolonged periods of rainfall, only the first 2 hours of each storm may need to be sampled. In this case, the sampler can be instructed to fill only 1 or 2 bottles per event.

The number of bottles can be set with ← and then ↑ ↓.

On the other hand, samples from several events can also be placed into a single bottle until it is full. The sampler will then move to the next bottle.

Sets maximum number of bottles per event

Event samples placed in bottles until they are full



If this is correct, press the ↓ button.

Menu 04/07 The length of **time that each bottle will remain active** can be altered. In this example each bottle will be filled for 2 hours before moving on to the next.

Press the ➔ button to go on to the next bottle definition option.

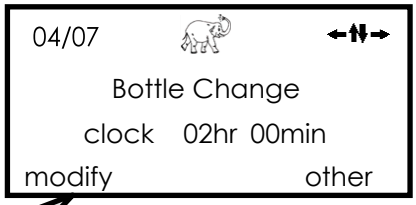
Sets bottle filling duration

If this is correct, press the ➔ button.

Bottle change at a specific time.
The display shows a 24hr clock. The sampler can be programmed to move on to the next bottle at a specific time each day.

Press the ➔ button to go on to the next bottle definition option.

Sets the bottle change time



If this is correct, press the ➔ button.

If this display is in view, the sampler will **fill each bottle to its maximum capacity** before moving on to the next bottle.

Press the ➔ button to go back to the first bottle definition option.

Fills each bottle before moving on

If this is correct, press the ➔ button.

If this display is in view, the sampler will fill each bottle until an **external command for bottle change** will be given.

Press the ➔ button to go back to the first bottle definition option.

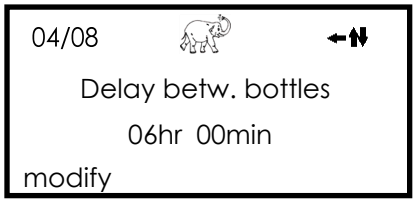
Bottle change after an external signal.

If this is correct, press the ➔ button.

Menu 04/08

Sets the bottle fill delay time during which samples must not be taken. For example, bottle 1 may take samples between 9am and 10am. Bottle 2 may take samples between 4pm and 5 pm. The bottle fill delay would be 6 hours.

Sets time delay between bottle changes

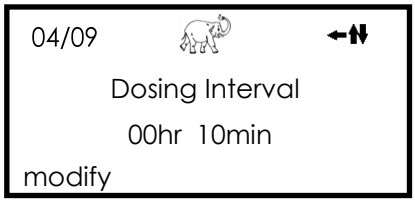


Menu 04/09

The example shows that a period of 10 minutes will elapse between individual samples (i.e. 6 samples per hour will be taken).

The time can be set as required, with a minimum of 2 minutes. (30 samples per hour)

Sets pause time between individual samples

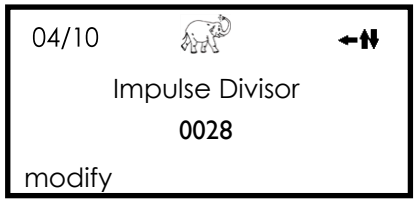


Menu 04/10

The Impulse Divisor is different for each flow situation. It is determined by the flow meter settings and the sample volumes required.

For more details, see page 61

Informs the sampler about flow meter signals

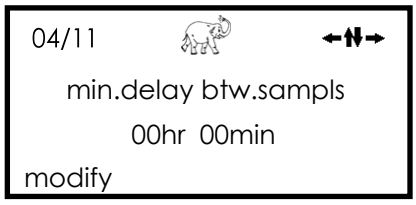


Menu 04/11

Sometimes, very high flow rates could result in too many samples during a short period of time. To avoid this, it is possible to set a minimum interval between samples.

If the display shows 00hr 00min, it means that the feature is switched off

Sets minimum sampling interval between flow samples



Menu 04/12

Conversely, very low flow rates may result in no samples for long periods. In such cases, it is possible to take a sample on a timed basis, if no flow samples have been taken in the interim.

Sets maximum sampling interval between flow samples

Menu 04/13

Sets the interval between samples during an event. The right display shows the settings for all assigned event bottles.

Press the ➔ button to go to the next sampling interval option.

Sets sampling interval between event samples

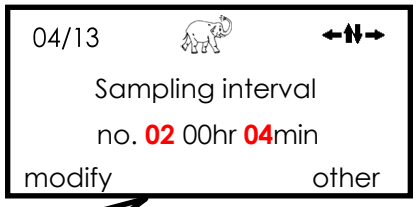
If this is correct, press the ➔ button.

In this 2. example, **bottle number 1** will have a sampling interval of **2 minutes**. With the 🡻 button you jump to the next assigned bottle. For bottle number 2 the interval is 4 minutes.

Each bottle must be set individually.

Press the ➔ button to go back to the first sampling interval option.

Sets sampling interval between event samples



If this is correct, press the 🡻 button to page through each bottle in turn and leave the menu

Note: You can define the sampling intervals only for the number of bottles which is defined as max. number of bottles per event in menu 04/06. In our example, "2" has been specified in menu 04/06 as the max. number of bottles per event. Thus, here you can enter the sampling intervals for 2 bottles.

Menu 04/14

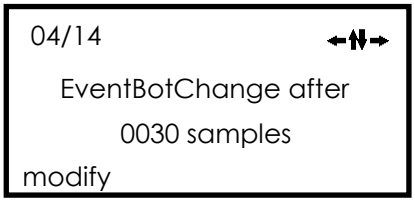
Sets the max. number of samples in each bottle.

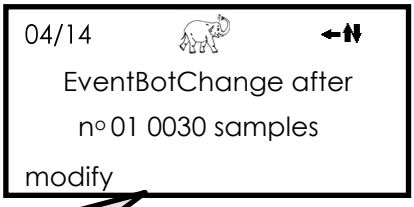
According to your choice in menu 04/13 either for the same sampling interval for all bottles or a different interval for each bottle you will see the equivalent window here.

In the upper window all the bottles are filled with up to 30 samples.

In the window below bottle 1 is filled with up to 30 samples.

Sets bottle filling for event samples



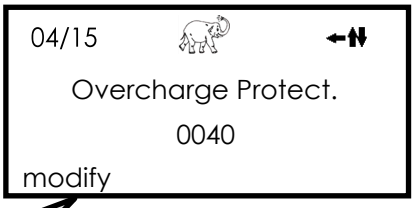


If this is correct, press the 🡻 button to page through each bottle in turn and leave the menu

Menu 04/15

In all forms of sampling, there is a maximum number of samples that can be placed into the bottles.

Prevents overfilling of bottles



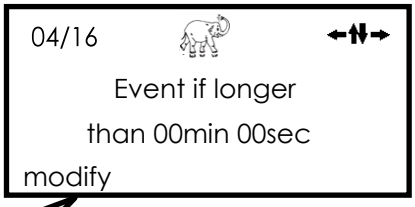
If this is correct, press the 🡻 button.

Note: The number depends on the size of the bottle and the volume of the sample.

Menu 04/16

In order to ensure that an event has actually started before the sampler begins to take samples, a time delay can be built into the program.

Prevents false alarms in event sampling

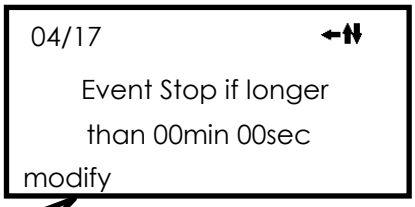


If this is correct, press the ↓ button.

Menu 04/17

In order to make sure that an event has really finished, a time delay can be built into the program. The sampler will continue to take samples until a signal of that length has been received

Prevents premature ending of event sampling



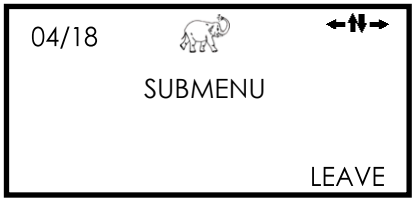
If this is correct, press the ↓ button.

Menu 04/18

Pressing the → button will quit the submenu.

The ↓↑ buttons can then be used to move to another menu.

Leaves sub-menu 4



4.4.5 Menu 5 - Manual Operation

List of Individual Sub-Menus		visible		
	settings in 04/04	time	volume	event
05	Manual Operation	●	●	●
05/01	Take a grab sample	●	●	●
05/02	Operate distributor	●	●	●
05/03	Release the current ‘event‘ bottle			●
05/04	Service mode: block external command input			
05/05	Start manual defrosting			
05/06	Exits sub-menu			

Menu 05

Press either the left ← or → buttons to enter the manual control functions.

Press the ↓ to skip manual control and go to menu 06.

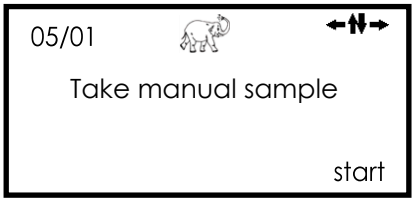
Calls up manual control options

Menu 05/01

Press the → button to take a manual (grab) sample.

You get a single grab sample, regardless of settings in menu 06/08 (multiple-shot sampling).

Takes a manual (grab) sample



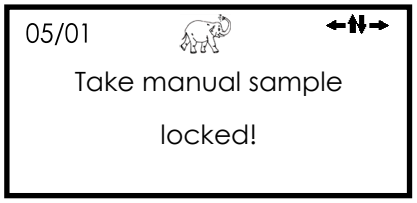
Warning: Make sure there is a bottle in position!

Within the information menu 07/02 this single grab sample is displayed and counted as one total sample.

A running program is taking a sample. Please wait until the button ‚start‘ is displayed.

It is not possible to take a grab sample while a running program is taking a sample.

Program was interrupted (‘stand by ’)



Note: If programs are **interrupted** (‘stand by’) and not stopped (menu 02), it is not possible to take a manual

Menu 05/02

Press the ← button <RESET> to move the distributor back to its original starting position.

Press the → button <start> to move the distributor on one bottle.

Move the distributor

Menu 05/03

Once an assigned event bottle is full, the sampler will stop taking samples until after the next programmed bottle change.

The full bottle can be replaced by an empty one. Pressing the → button will release the bottle and the sampler will begin filling the new bottle.

Allows replacement of full event bottle

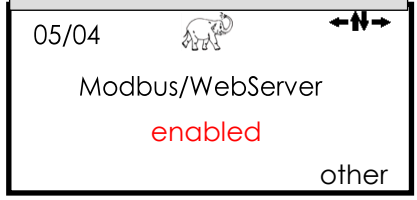
Note: Only visible if an event-proportional program is running and linked with itself (menu 04/02).

Menu 05/04

This menu provides the means to block control signals sent to the sampler from external sources. Because programs can be started/stopped by means of a Modbus protocol or by the Aqualabo WebServer Basic, it is important to block these signals when performing maintenance work on the sampler.

The default setting is that signals from Modbus protocol and WebServer Basic are **enabled**.

Allow/block external commands

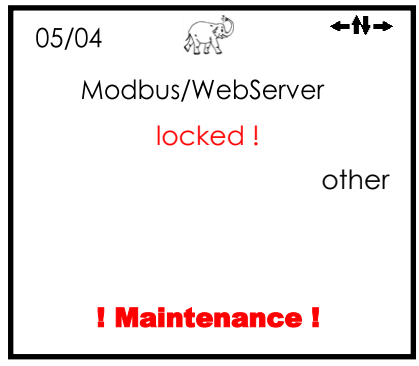


Note: This menu is only visible if the Modbus protocol functionality or the WebServer Basic are enabled in the sampler's basic configuration.

If you are using a Modbus protocol or the WebServer Basic to control the sampler externally, always make sure, to **LOCK** out those signal sources, before performing work on the sampler, like cleaning the dosing glass.

Press the → button to change the setting.

The ↓↑ buttons can then be used to move to another menu.

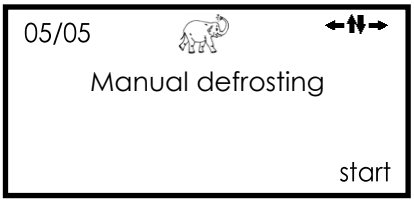


Note: Restarting the sampler will reset the blockage and external signals will be allowed again.

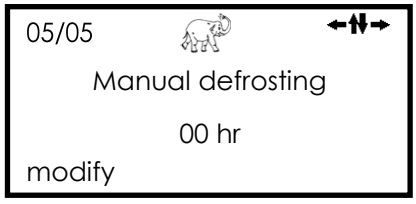
Menü 05/05

By pressing the ➔ button you initiate the manual defrosting procedure.

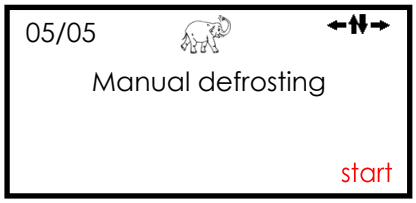
Manual defrost



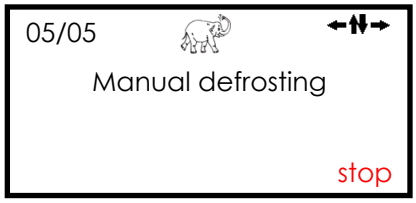
Enter the desired time for the defrosting here.



By pressing the ➔ button you start the manual defrosting.



While the manual defrosting procedure is active you can stop it by pressing the ➔ button.



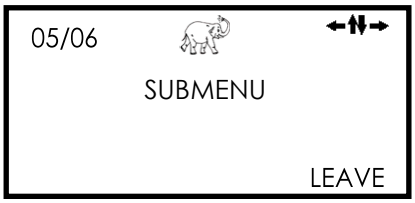
Note: only relevant for samplers with active cooling (AQUINOX).

Menu 05/06

Pressing the ➔ or ➔ button will quit the submenu.

The ↓↑ buttons can then be used to move to another menu.

Leaves sub-menu 5



4.4.6 Menu 6 - Setting the General Sampling Parameters

List of Individual Sub-Menus	
06	Sampling parameter set-up
06/01	Change Language
06/02	Change analog signal from flow meters
06/03	Set time for initial line clearance blow
06/04	Set vacuum pump run/time for suction
06/05	Set time for second line clearance blow
06/06	Set sample release time (pinch-valve opening)
06/07	Sets the number of dosing vessel wash cycles
06/08	Multiple dosing for larger sample volumes
06/09	Activate overfill protection function
06/10	Specify usual time of day for bottle emptying/exchanging
06/11	Set minimum amount of time for open door
06/12	Set maximum amount of time for open door (activates error message)
06/13	Automatic selection of pre-set distributor options
06/14	Shows number of bottles in distributor tray
06/15	Allows non/standard distributor settings
06/16	Sets flow meter settings
06/17	Enters PIN number for GSM Sim Card if installed
06/18	Sets option for 'Starting mode' (see menu 04/01)
06/19	Exits sub-menu

Menu 06

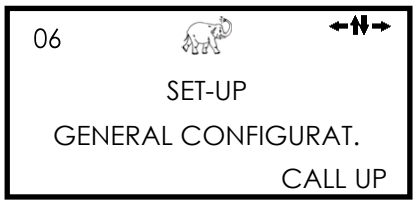
Sets the boundaries and limits within which the sampler programs will be expected to operate.

Once set, there is little need to re-enter this menu unless any parameters change. e.g. flow meter settings are altered.

Press the ➔ to call up menu 06.

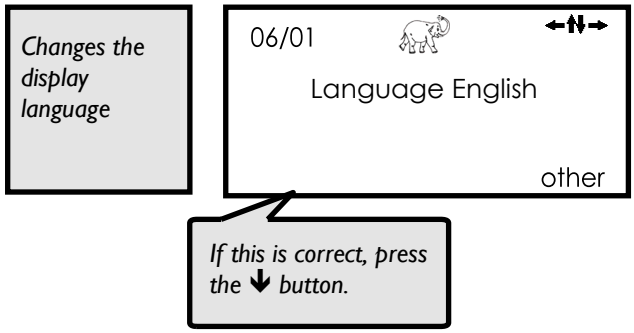
Press the ➔ to skip menu 6 and go to menu 07.

Sets program boundaries and constants for the device



Menu 06/01

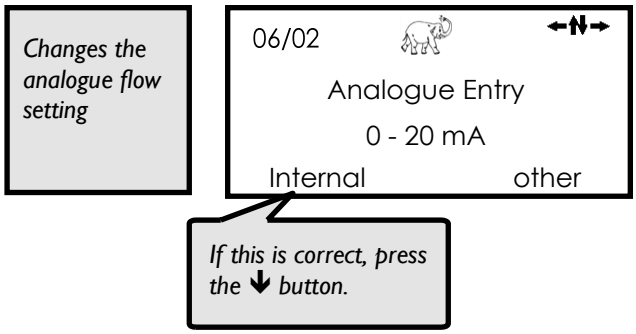
Press the ➔ button to alter the display language



Menu 06/02

Press the ➔ button to toggle the display between 0 – 20mA and 4 – 20mA, according to the signal sent by the flow meter.

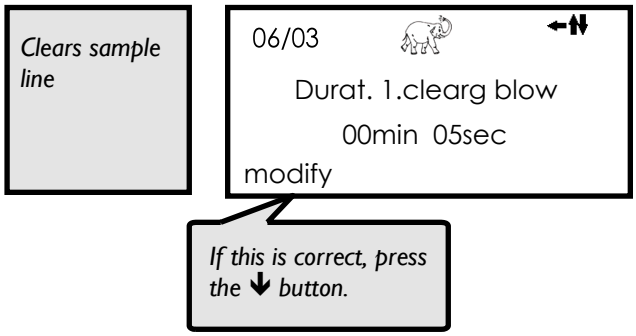
Press ← to switch the source for the volume signal between the internal analog input ("**internal**") and an Modbus register ("**Modbus**").



Menu 06/03

Set the duration of the first clearing blow with ← and then ↑ ↓ .

The duration should be sufficient to ensure that the contents of the sample tube are fully expelled. This depends on the length of tube that is under water but around 10 seconds is usually sufficient.

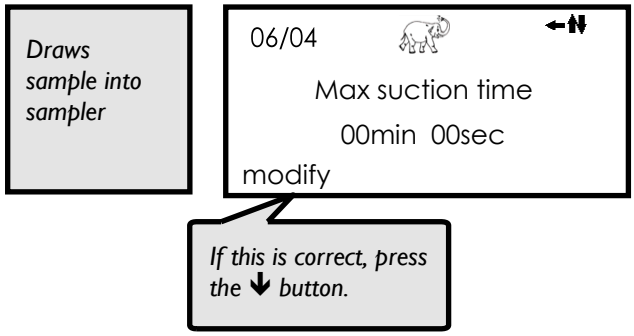


Menu 06/04

Set the duration of the suction phase of the sample collection with ← and then ↑ ↓ .

This should be sufficient to ensure that a more than sufficient volume of sampled medium is drawn into the metering vessel.

The duration depends on the diameter of the tube and the height from the sampler to the surface of the water, but between 30 seconds and 1 minute is usually more than enough.

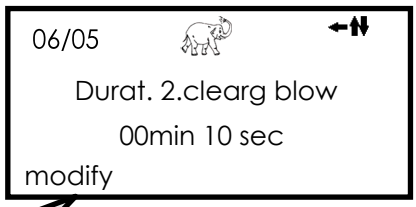


Menu 06/05

Set the duration of the second clearing blow with ← and then ↑ ↓ .

The duration should be sufficient to ensure that the contents of the sample tube are fully expelled, leaving the sample volume in the dosing vessel.

Expels excess sample



If this is correct, press the ↓ button.

Menu 06/06

Set the outflow time of the pinch -valve with ← and then ↑ ↓ .

The duration should be sufficient to ensure that the contents of the dosing glass are fully released before a next operation (bottle change, sample draft) can start. Around 10 seconds is usually sufficient.

Transfers sample to bottle

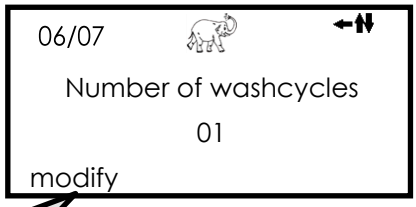
If this is correct, press the ↓ button.

Menu 06/07

It is possible that residue from a previous sample may remain in the sampling tube or dosing vessel. It is possible to instruct the sampler to draw and expel several samples before releasing one to a bottle. This should clear any old residues.

Press ← and then ↑ ↓ to change the number of wash cycles.

Clears the sample tube of old residues

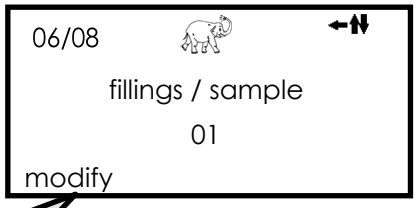


If this is correct, press the ↓ button.

Menu 06/08

The maximum single sample volume is 350 ml for the AQUINOX sampler. To gain a larger sample volume the sampler can do a multiple dosing, i.e. when a sample is to be taken several suctions can be drawn shortly after another (up to 9 times).

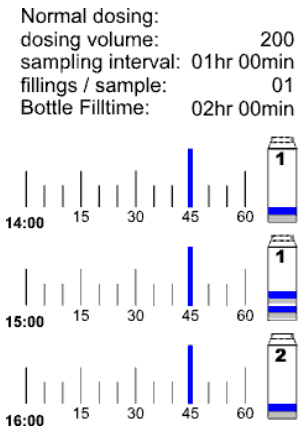
Achieve large sample volume

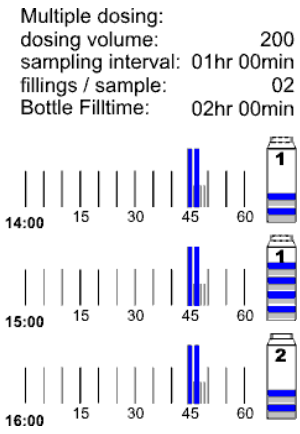


If this is correct, press the ↓ button.

Warning! If you work with multiple dosing you need a new calculation for the overcharge protection. Otherwise there is a risk of overfilling.

For example:
You have a 1 ltr. bottle and a 200 ml dosing volume. You require a sample volume of 400ml/sample. (That is, "fillings / sample" is set to value 02) . For the overfill protection you must calculate with 400 ml/ sample, so the overcharge protection setting in menu 04/15 must be 02 or less.



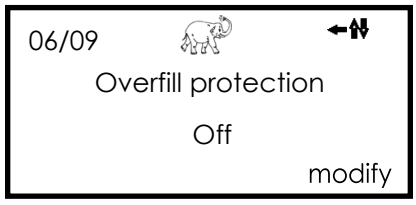


Menu 06/09

When a program repeats, the sampler assumes that the bottles are empty and begins to fill them, even if they were never actually emptied. If a sampler is equipped with a door limit switch however, the automatic overfill protection can be activated. This way the bottles are only presumed empty when the door has been open long enough (see menu 06/11). If the door has not been open long enough, it is presumed that the bottles have not been emptied and further filling will be blocked.

Without a door limit switch, the overfill protection must be set to OFF.

Overfill protection via door opening

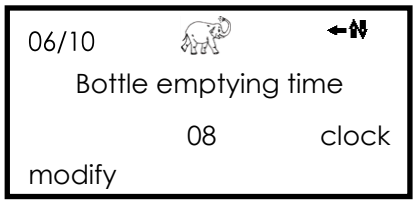


Notice:
Overfill protection can only be activated if a sampler is equipped with a door switch.

Menu 06/10

In this menu, you can specify the usual time of day when bottles are emptied or exchanged, e.g.: always at 8 o'clock. If the bottles are emptied/exchanged *before* 8 o'clock, the sampler waits until 8 o'clock and only then begins to fill the next appropriate bottle.
If the bottles are emptied/ exchanged *after* 8 o'clock, the overfill protection takes hold; i.e.: as long as the door has not opened, the bottles are presumed full and further filling is blocked. After the door has been opened, the next appropriate bottle begins to be filled.
Entering 0 turns this function off.

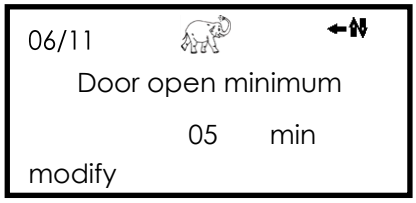
Usual time of bottle emptying/ exchange



Menu 06/11

If the door is open for at least the amount of time specified here, the sampler will presume that the bottles have been emptied. This prevents a brief look inside from being perceived as a bottle emptying.

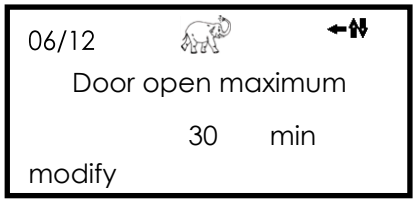
Door monitoring (bottle emptying) only with door limit switch



Menu 06/12

If the door is not closed within the amount of time set here, an error message appears.

Door monitoring (error message) only with door limit switch



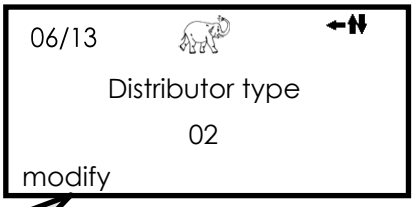
Menu 06/09

The *Aqualabo* machines are so versatile that many combinations of bottle sizes can be used. To make things easier, some of the main variants have been pre-programmed into the sampler.

See page 66 for the possibilities and set the chosen option into the sampler.

Non-standard distributor options can also be programmed by selecting the appropriate option number.

Selects pre-set options



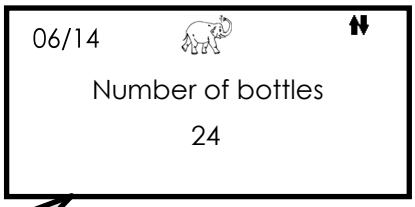
If this is correct, press the ↓ button.

Menu 06/10

The display automatically shows the number of bottles in standard distributor options.

When a non standard option is selected, the number of bottles can be input manually (max. 60). The usual CHANGE instruction will be seen in the bottom left corner of the display

Shows the bottles in the distributor



If this is correct, press the ↓ button.

Menu 06/11

Only seen if a non-standard distributor option is selected

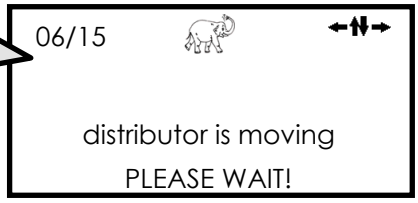
If you choose your own bottle format, you will need to program the distributor.

This is easy to do with the *Aqualabo* X-Y distributor.

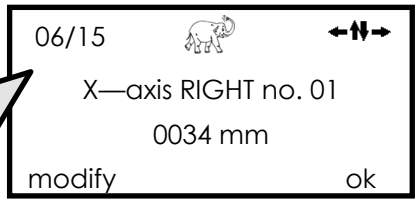
Only possible with distributor type setting 08

Allows setting of non-standard distributor options

Distributor goes back to the initial position.



Input the measurement (in mm) that the distributor must move so that it comes to rest over the opening of each bottle in turn.



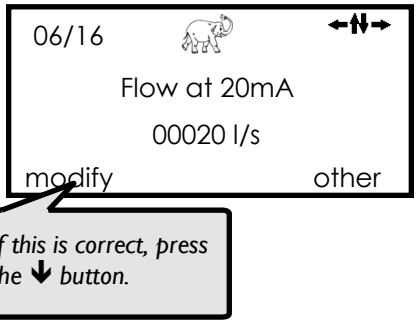
Enter the final result.

Menu 06/12

When a flow meter is attached to the sampler, it is necessary to set the flow meter parameters. The figure shown should be the flow represented by a 20mA signal from the flow meter.

Measurement units can be selected with the ➔ button.

Inputs flow meter setting



If this is correct, press the ↓ button.

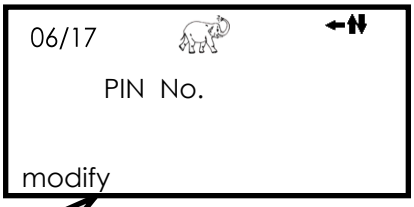
Menu 06/13

All of the *Aqualabo* samplers can be fitted with a GSM telephone modem that will take a standard, data enabled SIM Card. Enter the SIM Card PIN number here in order to switch on the modem. Once activated, the sampler can be contacted at any time via a PC modem.

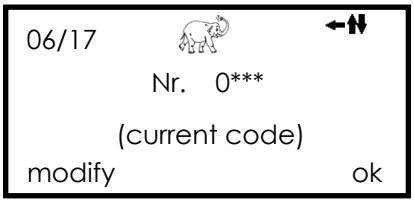
You can enter the PIN no. with the ← and then ↑ ↓ buttons. Confirm with the ➔ button.

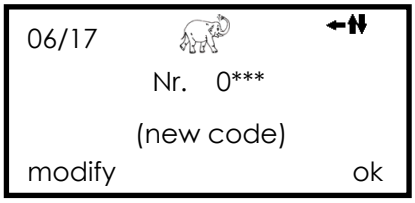
The sampler is delivered with the default PIN no. ‚0000', i.e. **no** connection to a GSM modem.

Enable GSM communication



If you wish to change your PIN no. press ←, otherwise go on with ↓





Warning:
If you use a GSM modem don't use the PIN no. '0000'. This would deactivate the GSM-Modem function.

Menu 06/14

In menu 04/01, there is an option to run the sampler only within a specific time window each week.

If this option is to be selected, it is necessary to use this display to identify whether each new sampling window should start with a new bottle or continue to fill the last bottle

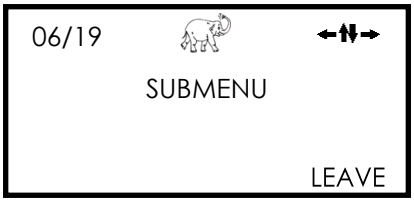
Selects bottle for start of new time window

Menu 06/15

Pressing the ← or ➔ buttons will quit the submenu.

The ↑ ↓ buttons can then be used to move to another menu.

Exits sub menu



4.4.7 Menu 7—Information on Sampler's Operation

List of Individual Sub-Menus	
07	Provides information on sampler operation
07/01	Gives details about the samples in each bottle
07/02	Gives details of when each bottle was active
07/03	Stores details on events (when connected)
07/04	Stores details of individual alarms
07/05	Acknowledges and quits alarm messages
07/06	Gives details of pump runtime
07/07	Gives details of fridge runtime
07/08	Shows current flow rate (if flow meter connected)
07/09	Exits sub/menu

Menu 07

Provides information on the performance of the sampler and various alarm messages.

Press the ↓ to skip menu 7 and go to menu 08.

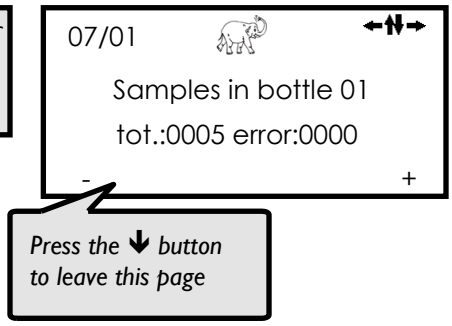
Gives Information

Menu 07/01

This example shows that 5 attempts were made to place samples in bottle number 1 and all were successful.

Use the ← or → buttons to page through other bottles

Shows details of samples in bottles

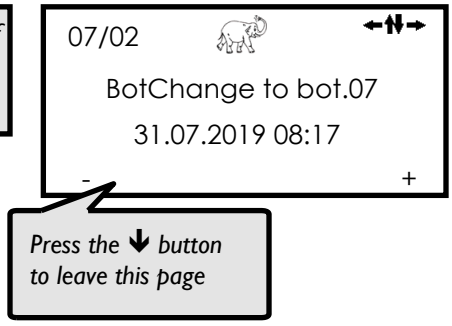


Menu 07/02

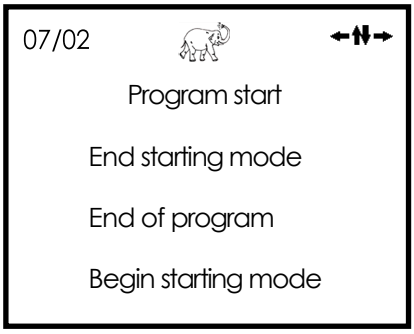
This display shows the sampler action, e.g. this example shows the bottle number 7 became active at 8:17am on 31st. July.

Use the ← or → buttons to page through other bottles

Shows details of distributor movements



Other possible messages in this menu are listed here.



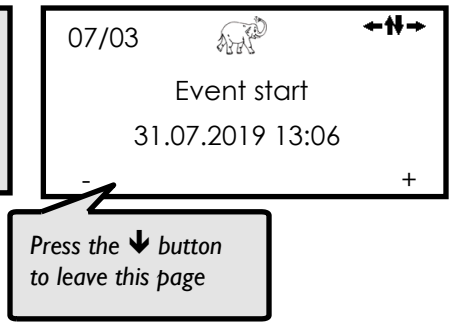
Note: If a bottle change is due before the next sampling, this will already be displayed here. However, the bottles is changed no sooner than when the next sampling starts.

Menu 07/03

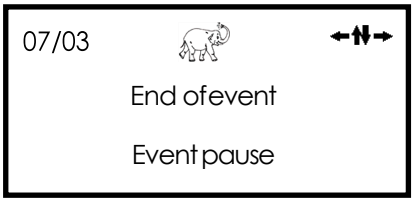
Data on the start and stop time of events is also recorded if event proportional sampling is used.

This example shows that the event (e.g. pH) fell back within the prescribed limits at 1:06pm on 31st. July.

Shows details of event start and finish times



Other possible messages in this menu are listed here.

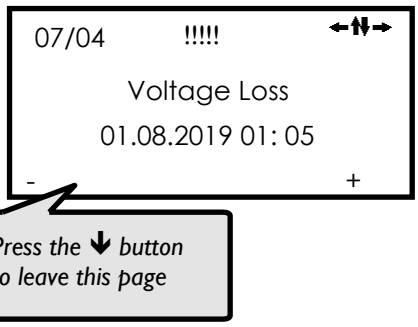


Menu 07/04

This example shows that the power to the sampler was lost at 1:05am on August 1st.

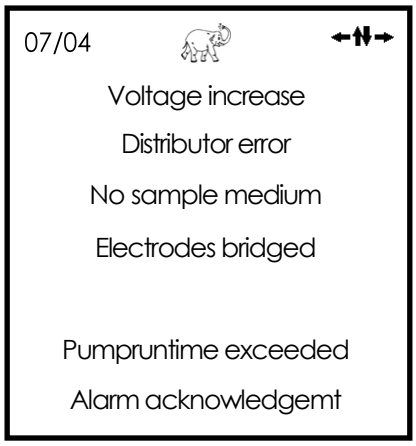
Use the ← or → buttons to page through other alarm messages. (The last 100 will be stored)

Shows recent alarm data



Other possible messages in this menu are listed here.

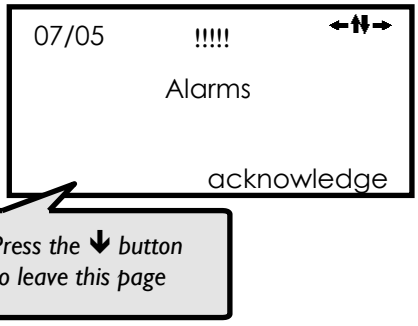
Differentiated sampling errors (see page 73 for further details)



Menu 07/05

Press the ← or → buttons to acknowledge an alarm signal and return to the elephant (temperature) symbol.

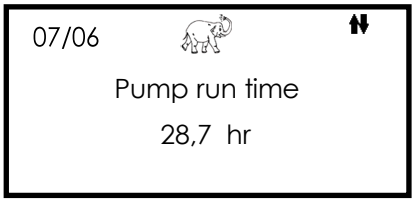
Shows recent alarm data



Menu 07/06

This menu shows the pump running time.

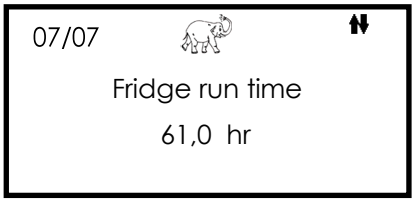
Details pump running time



Menu 07/07

Total fridge running time provides useful information for service personnel.

Details fridge running time



Menu 07/08

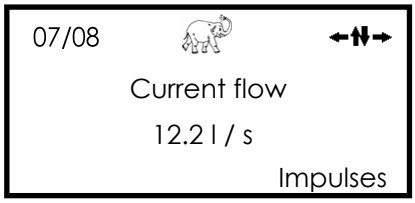
When connected to a flow meter, the current flow rate can be displayed in this window.

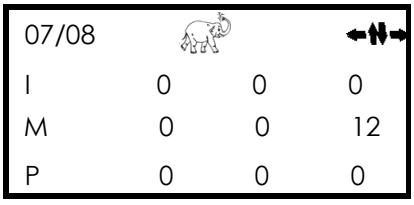
By pressing the ➔ button you can open the window that shows the exact impulse distribution (menu 04/04).

In the example on the right program 6 receives impulses from a connected flow meter. Up to how many impulses the program counts, depends on the preset pulse divisor (menu 04/10)

Press the ➔ button again and you will return to the first window.

Shows the flow rate



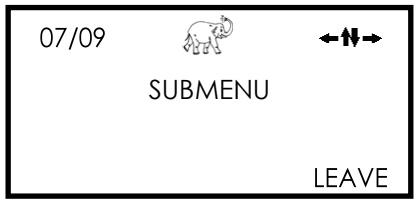


Menu 07/09

Pressing the ➔ or ➔ button will quit the submenu.

The ↑ ↓ buttons can then be used to move to another menu.

Exits sub menu



4.4.8 Menu 8 - Access Only by Service Personnel

Only qualified service personnel should attempt to enter this menu!

This menu is protected. You need an access code.

Warning:
Incorrect settings could seriously damage or destroy major components!

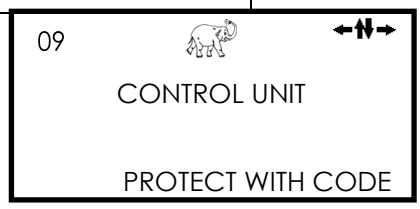
4.4.4 Menu 9 - Protection of the control by a Security PIN

List of Individual Sub-Menus	
09	Protection of control unit by code
09/01	Change the code number
09/02	Set protection level
09/03	Select programs to activate
09/04	Lock or activate volume programs
09/05	Lock or activate event programs
09/06	Leave submenu

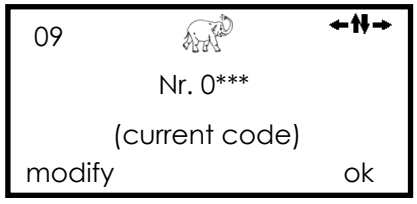
Menu 09

If you wish to protect your control unit (programs, settings etc.) from unauthorised changes, you can set an access protection.
In menu 09 you set the different security levels. Before changes are made you must enter a PIN for the menu 09 access.

Press the ➔ button to enter the protection menu.



Note: At delivery, the access code for menu 09 is factory preset to 0000.



Enter your current code by pressing ← and then ↑ ↓ button. Press ➔ button to confirm.

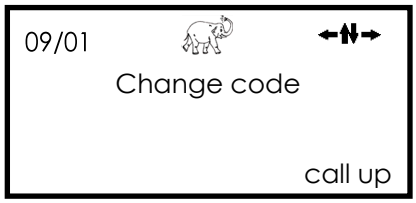
Go on to the next menu with ↓ .

Menu 09/01

If you keep your current code you can skip the window and go on to the next menu with ↓ .

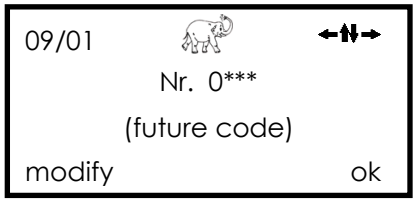
If you wish to change the code call up the menu by pressing the right arrow button.

Enter a new protection code



Enter the new code by pressing ← and then ↑ ↓ button. Press ➔ button to confirm.

Go on to the next menu with ↓ .



Menu 09/02

Here you can see that the control unit is not protected by a code. You can determine whether you want to protect the control partly or completely.

Enter the protection level

Level 01 corresponds to a **complete** protection.

All the menus except the information menu 07 are blocked.

Level 02 corresponds to a **partial** protection.

All the menus for the program settings, i.e. **menu 03, menu 04 and menu 06**, are blocked.

In menu 02 it is possible to select single programs and to start/stop all programs.

Manual sampling possible

Level 03 also corresponds to a **partial** protection.

All the menus for the program settings, i.e. **menu 03, menu 04 and menu 06** and the manual operation in **menu 05** are blocked with this protection.

In menu 02 you only have the possibility to turn the sampler on and off.

Further the display will show menu 02 if no button has been pushed for more than 60 sec.

Menu access possible with (Menu 08 and 09 are protected with codes)

	level 01	level 02	level 03	none
Menu 02	X	●	●1	●
Menu 03	X	X	X	●
Menu 04	X	X	X	●
Menu 05	X	●	X	●
Menu 06	X	X	X	●
Menu 07	●	●	●	●

● = Access possible

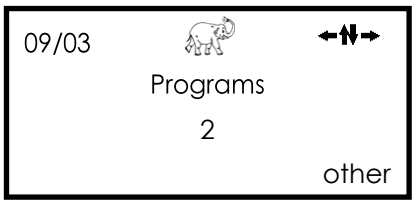
X = not possible

●1 You can only start or stop all selected programs together.

Menu 09/03

Here you can select the number of programs you would like to operate. Only the selected amount of programs will then be visible in menu 02.
Max. 9 programs can be selected.

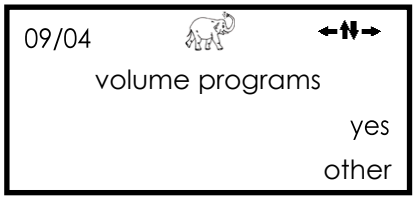
Select amount of programs

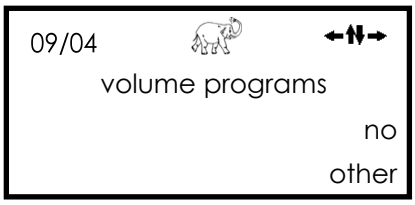


Menu 09/04

Programming issues often occur because the wrong mode of operation is selected. To prevent this, the unused modes of operation can be hidden in menu 04.
Here you can hide the **volume**-based sampling mode or make it available for selection and programming.

Hide / display volume mode





Menu 09/05

Programming issues often occur because the wrong mode of operation is selected. To prevent this, the unused modes of operation can be hidden in menu 04.
Here you can hide the **event**-based sampling mode or make it available for selection and programming.

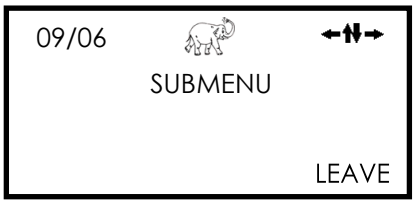
Hide / display event mode

Menu 09/06

Pressing the ← or → button will quit the submenu.

The ↓↑ buttons can then be used to move to another menu.

Leave submenu 09

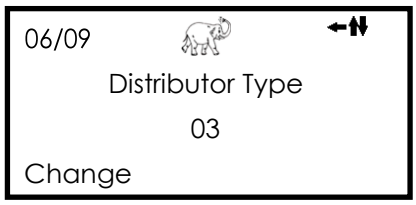


4.5 Time proportional Sampling Program

Sampler equipment: XY-distributor with 12 x 2.9 ltr bottles

Dosing volume: 50 ml

Requirements: 12 x 2-hour-composite samples in 24 hours. The program is to start at 10:00 h and is not to be reiterated. Sampling has to take place in regular time intervals (time proportional).



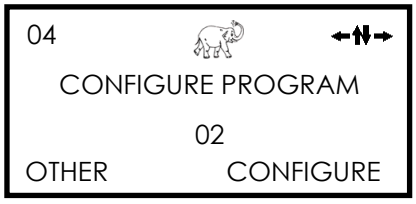
First, we have to calculate the overflow protection of a bottle and the smallest sampling interval.

- 12 bottles are meant to last for 24 hours. Thus, a bottle change must take place every 2 hours.
- The sampling volume is 50 ml. So, a 2.9 ltr. bottle will accommodate 58 samples. We do not want the bottle to be filled up to the upper rim, therefore, we calculate with 55 samples per bottle. This value is our bottle overflow protection. (menu 04/15).
- We determine the smallest interval between 2 samplings. Here, this is a 3 min interval (rounded up)

Now we have all the parameters necessary for generating a program. Before we do this in menu 04, please control the sampler settings in menu 06 (such as distributor type, number of bottles etc.).

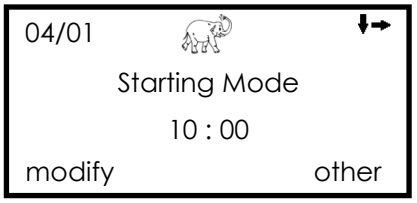
No. of samples =	$\frac{2900}{50}$ = 58 (55)
Sampling interval =	$\frac{120}{55}$ = 2.18 (3)

Menu 04 We select a sampling program to be generated.
In this example, it is program 2.



Menu 04/01 We enter the desired start time.

Here you specify the starting time of the program.

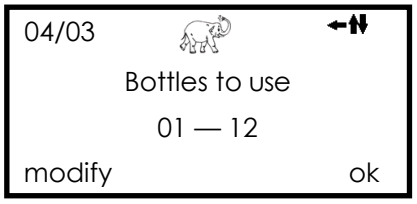


Menu 04/02 We do not wish a linkage of programs.

Program runs once and then terminates..

Menu 04/03 We need only 12 bottles.

Here you specify which bottles are to be filled.



Menu 04/04 Now we select time-proportional sampling.

Selection of sampling method

Menu 04/05 We want to start sampling with the 1. bottle.

Changes the start bottle.

Menu 04/07 To trigger the bottle change, there are 2 possibilities.

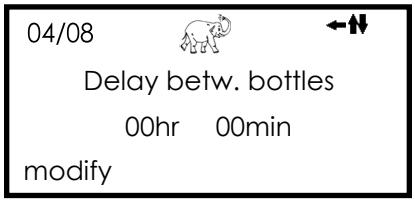
1. Either we determine a bottle filling time. In this case, this is 2 hours.
2. Or we determine that a bottle change has to take place when a bottle is full.

Here you specify the filling time for the bottles.

The bottle is filled and then the distributor moves on.

Menu 04/08 We do not need it in this example. Thus, we leave the pre -set 00:00.

Here you specify breaks between the bottles changes.

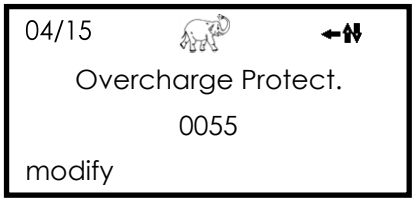


Menu 04/09 Here, we enter the 3 minute interval we had calculated at the beginning.

Here you specify the interval between samplings.

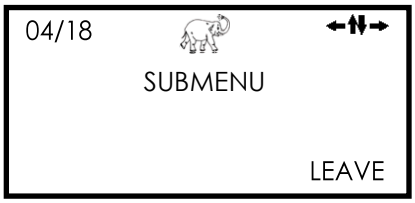
Menu 04/15 Here, we enter the overflow protection we had calculated.

Prevents the bottles from being overfilled.



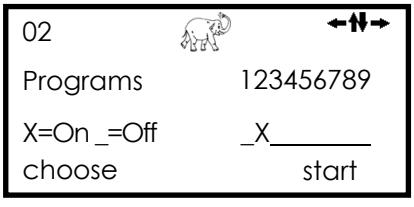
Menu 04/18 We have now finished programming and can leave menu 04. If necessary, please check the entries you made once again.

Here you quit submenu 04..



Menu 02 Now please select your program (in this example program 2) and start it.

Here you start the programs marked.



Notice!
Please make sure that your general machine settings in menu 06, such as 1. clearing blow, max. suction time, 2. clearing blow, and sample release time need less time in total than the sampling interval. Otherwise, the next sampling will be due before the current sampling is terminated.

5 Measurement and Quality Sensors

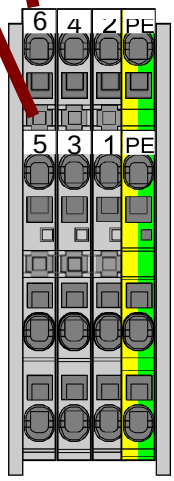
5.1 Programming Your *Aqualabo* to Operate with an Analog Flow Meter

Methodology

The flow meter sends an mA-signal to the sampler. The strength of the signal varies in proportion to the flow rate. As long as the flow meter itself is set up correctly, the maximum theoretical flow will be represented by a signal strength of 20mA. No flow will be represented by a signal of either 0mA or 4mA (depending on whether the measuring range is 0-20 mA or 4-20 mA.)

At full flow, a 20mA signal is generated which is transformed into 1600 impulses per hour in the sampler's control unit. The number of impulses is reduced as the signal strength decreases. In order to obtain an impulse number the sampler can process, a frequency or pulse divider is built into the sampler's control unit. This helps to determine the desired sampling frequency.
The sampling frequency is determined using a formula that takes into account the flow rate (such as dry weather inflow), the sample volume, the bottle size and the number of desired samples per hour. (It is not advisable to have a combination of parameters which would have the sample bottle filled after a few minutes of a 2 hour bottle fill time).
In the following, you find a detailed step-by-step instruction of how to calculate the flow settings for volume-proportional sampling. Should you have further questions or should you be insecure as to which of various options is the best, please contact us and one of our sampling experts will be happy to help.

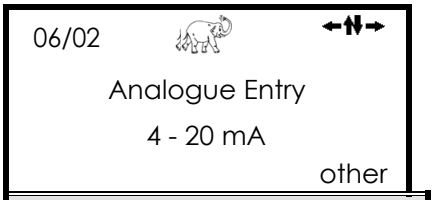
Ensure that signal cables are securely fitted into connectors 5 (+) and 6 (-)



Step 1 Make sure that the program setting in menu 04/04 is set for volume analog.

Step 2 Determine whether the flow meter is set-up to send a 0 – 20 mA signal or a 4—20 mA signal.

Make sure that the **respective** setting is installed in menu 06/02.



You now know the measurement range of the flow meter
Example: 4-20mA = 20 m³ /h
or (0-20mA = 20 m³ /h)

Step 3 Check if the flow rate for a 20mA signal of your flow meter is set correctly in menu 06/12 and if the flow is shown correctly in menu 07/08.

Example:
On site 11 m³/h

Step 4 Determine the maximum likely flow rate (the max. flow rate on site).

The *Impulse Divisor* can now be calculated.
Follows the directions on the next page.

Example

1. Step **Calculate the impulses per hour**

Flow meter measurement range	0 - 20 m³/h
Range of mA (menu 06/02)	4 - 20 mA
Flow rate on site	11 m³/h

20 m³/h 100% = 1600 impulses per hour
11 m³/h 55% = 880 impulses per hour

See analogue flow table on the next page.

2. Step **Calculate the samples per hour**

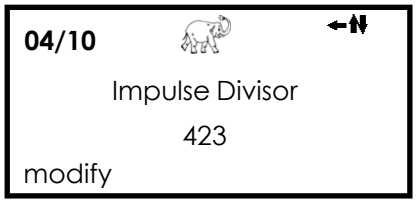
Bottle fill time	24	hours
Bottle volume	10000	ml
Dosing volume	200	ml
Max. samples / bottle	50	samples

$$\frac{\text{Max. samples per bottle}}{\text{Bottle fill time}} = \frac{50}{24} = 2.083 \text{ samples / hour}$$

3. Step **Calculate the impulse divisor**

$$\frac{\text{Impulses per hour}}{\text{Samples per hour}} = \frac{880}{2.083} = 422.47 \text{impulses/sample}$$

Impulse Divisor = 423 impulses per sample

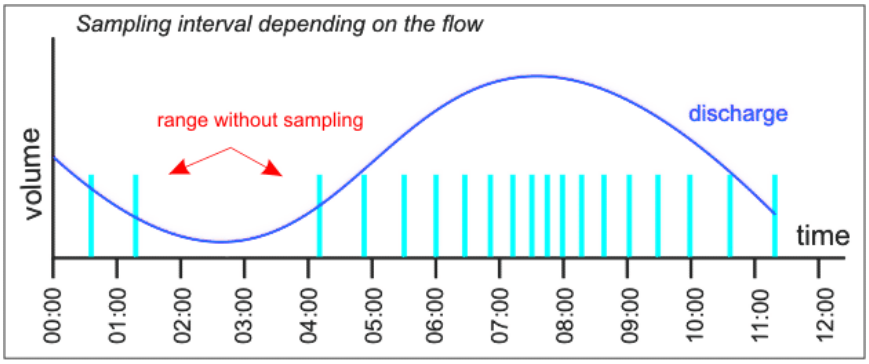


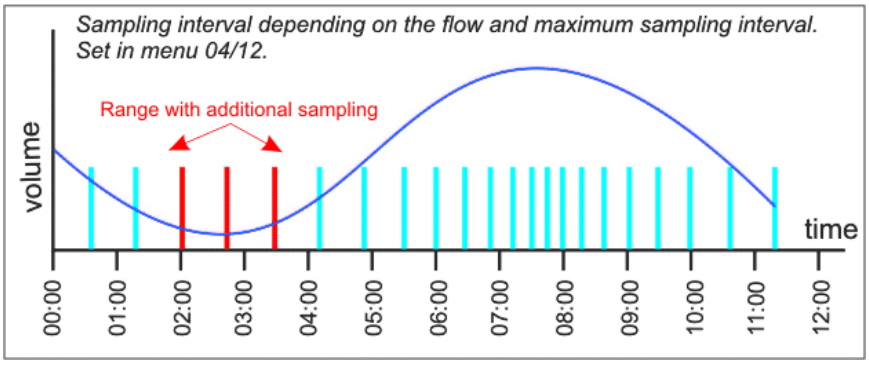
This setting would result in the maximum possible number of samples during periods of full flow. If the flow rate falls for longer periods, however, the volume of sample collected might be inadequate for analysis (ranges with no sampling).

In this particular case a maximum sampling interval can be set in menu 04/12. This is the maximum time interval between the sampling drafts during periods of low flow.

A second possibility to overcome this problem: You can reduce the sample volume and increase the sampling frequency.

According to the example above, you can now determine your new *Impulse Divisor* or call *Aqualabo* for help.





Analog Flow Tables

Table 1. 0—20 mA

mA	Impulses per hour	Percent
0	**0**	**0 %**
1	80	5 %
2	160	10 %
3	240	15 %
4	320	20 %
5	400	25 %
6	480	30 %
7	560	35 %
8	640	40 %
9	720	45 %
10	**800**	**50 %**
11	880	55 %
12	960	60 %
13	1040	65 %
14	1120	70 %
15	1200	75 %
16	1280	80 %
17	1360	85 %
18	1440	90 %
19	1520	95 %
20	**1600**	**100 %**

0,2	16	1 %

Table 2. 4—20 mA

mA	Impulses per hour	Percent
0	-	-
1	-	-
2	-	-
3	-	-
4	**0**	**0 %**
5	100	6.25 %
6	200	12.50 %
7	300	18.75 %
8	400	25.00 %
9	500	31.25 %
10	600	37.50 %
11	700	43.75 %
12	**800**	**50.00 %**
13	900	56.25 %
14	1000	62.50 %
15	1100	68.75 %
16	1200	75.00 %
17	1300	81.25 %
18	1400	87.50 %
19	1500	93.75 %
20	**1600**	**100.00 %**

0,16	**16**	**1 %**
0,8	80	5 %
1,6	160	10 %

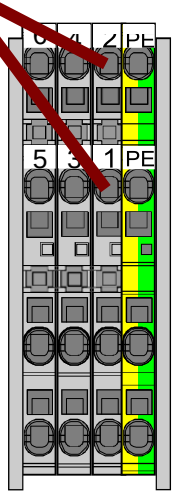
5.2 Programming Your *Aqualabo* to Operate with a Digital Flow meter

Methodology

Whereas an analog flow meter sends a variable signal to the sampler, which is then converted into pulses, a digital flow meter actually sends a pulse to the sampler. Otherwise, the principle is the same. The sampler counts the pulses and takes a sample for every X pulses that it receives (where X is the Impulse Divisor in menu 04/10).

The calculation of Impulse Divisor and sample volumes is the same as in the Analog section.

Ensure that signal cables are securely fitted into connectors 1 and 2



Step 1 Make sure that the program setting in Menu 04/04 is set for volume digital.

Step 2 Determine the flow meter settings for pulses at maximum flow.

Step 3 Follow the steps for 'Analog Flow Meters', substituting the appropriate pulse rate.

Example

Assume the flow rate is 20 l/s (72m³/h) and that the flow meter is set to send an impulse every 100L.

That means 720 pulses per hour

The maximum number of samples per hour with a sampling interval of 2 min. would be 30.

$$\text{Impulse divisor} = \frac{\text{max. Impulse / h}}{\text{max. Samples per bottle / h}}$$

This is an impulse divisor of 24. Please set this figure in menu 04/10.

The sampler will now take a sample every 24 impulses (a flow of 2.4m³), with a maximum of 30 samples in 1 hour.

The sample volume will vary according to the number of samples taken and the bottle size. To increase the sample size, reduce the maximum samples per hour from 30 to 20 or 10 at full flow.

Example:
Max. flow = 20 l/s (72m³/h)

Example:
IFF = 720 / 30 = 24

04/10

Impulse Divisor
0024
modify

Example:
Bottle fill time = 1 hour
Bottle volume = 1 Litre
Max samples/bottle = 30
Dosing volume = 1000 / 30 = 33.3 ml

Example:
Bottle fill time = 1 hour
Bottle volume = 1 Litre
Max samples/bottle = 10
IFF = 720 ÷10 =72
Dosing volume = 1000 / 10 = 100 ml
***Impulse divisor** now =720 / 10 = 72*

5.3 Programming Your *Aqualabo* to Operate with Water Quality Sensors

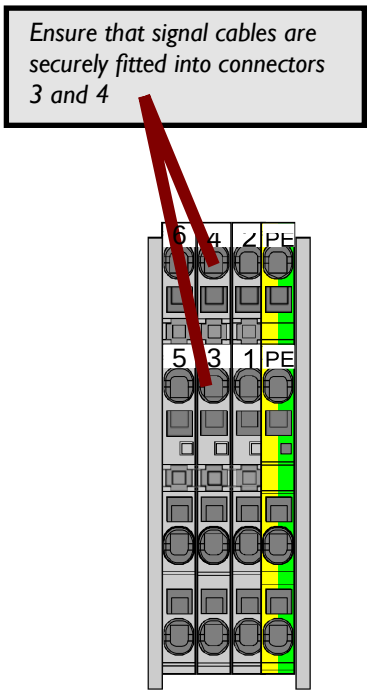
Methodology

Water quality sensors such as pH or turbidity meters transmit a signal (potential-free) to the sampler.

Whilst the sensor measures the parameters on a constant basis, for the most part, the water quality probably remains within its allowable limits. In this case, samples need not be taken. (You could use another program and set of bottles to collect time or flow related samples to meet statutory requirements).

If the water quality exceeds its normal values (set in the sensor software - not the sampler), the meter will send a constant signal to the sampler, which will then begin to take samples. It will continue to take samples until the signal stops. Time delays between onset and loss of signal can be programmed in menus 04/16 and 04/17 to make sure that an event has really started or stopped.

The sampling interval during an event is preset on a timed basis.



Step 1 Make sure that the program setting in Menu 04/04 is set for event sampling.

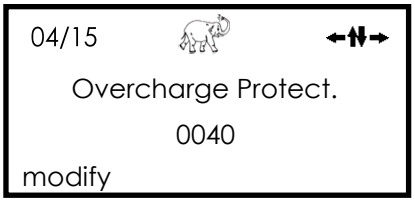
Example:

Step 2 Determine whether the sampling should stop when X bottles have been filled, even if the event continues. Alternatively, several events may be placed in each bottle until they are full.

Enter in menu 04/06.

Step 3 Determine the sampling interval between samples during an event in menu 04/13.

It is possible to set every event bottle with the same dosing interval, or give specific instructions for individual bottles.

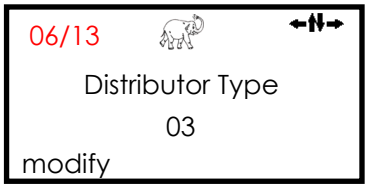


Step 4 Set the maximum number of samples to be placed in each bottle in menu 04/15 (overcharge protection).

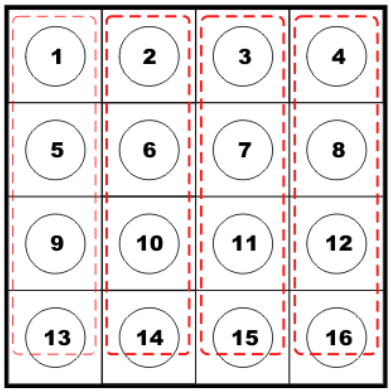
Step 5 Set the start and finish time delays in menus 04/16 and 04/17

6 Pre-installed Distributor Layouts

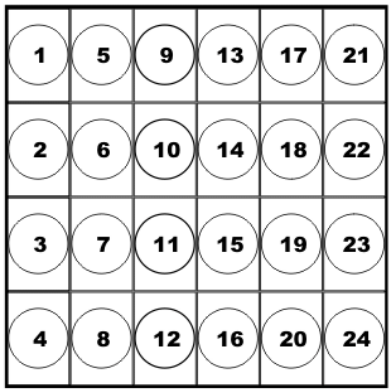
The sampler comes with several distributor layouts already installed. To select the correct one for your application, simply go to menu 06/13 and select the correct number.



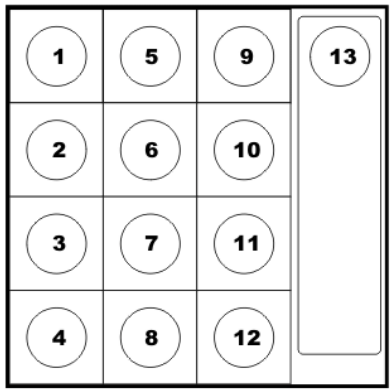
1 - 16 x 2.9 litres oder 4 x 12 litres



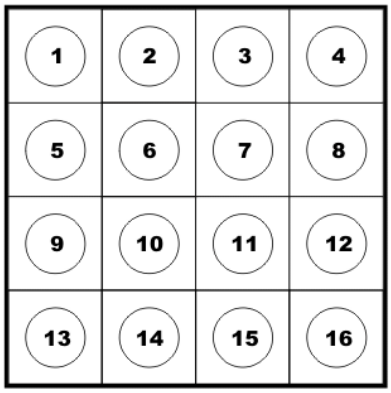
2 - 24 x 2.0 litres



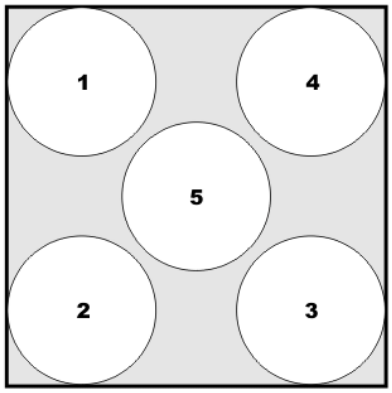
3 - 12 x 2.9 litres plus 12.0 litres



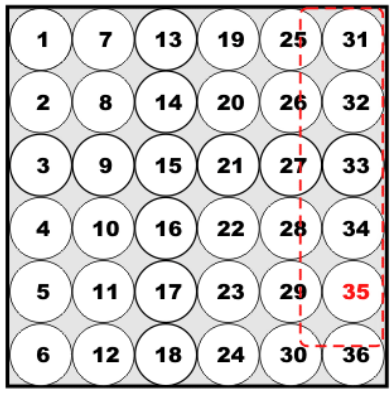
4 - 16 x 4.0 litres



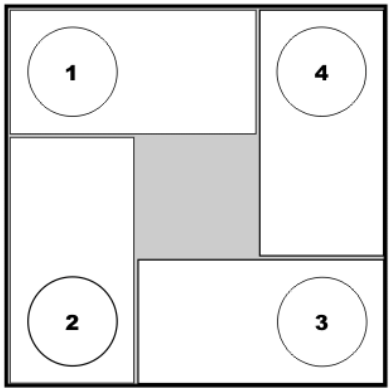
5 - 5 x 12 litres oder 5 x 6.4 litres



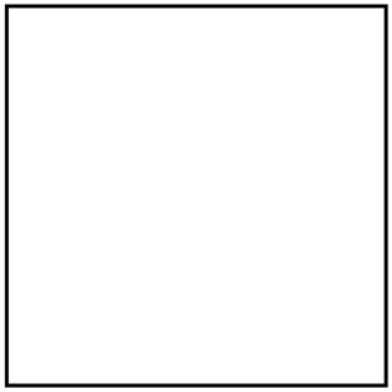
6 - 36 x 1 litre (24x1 plus 1x12 L)



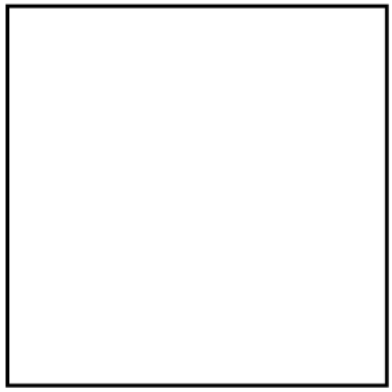
7 - 4 x 20 litres oder 4 x 25 litres



8 - User defined (menu 6/10)



9 -



7 Data Logging and Data Retrieval (optional)

This Aqualabo sampler can be equipped with the optional data logger feature. With this function, sampling data, online measurements or fault messages (to be specified by the customer) can be logged and stored on the SD flash card in the PLC. The log files are in *.csv file format for easy importing into spreadsheet software for analysis, however they can also be viewed with standard text editors.

The sampler can be preprogrammed to plot several data in conjunction with a sampling operation. When a program is active (this can be checked in menu 02 – see page 29), each sampling will result in a new line in the protocol file with the following information (shown in a column). This is an example for what can be logged.

List of sampling data, sample parameters and special events	
Date	Date of sample (dd.mm.yyyy)
Time	Time of sample (hh:mm:ss)
Sample into bottle	Indicates the bottle into which the sample was placed
Bottle change to bottle	Indicates the next bottle that the distributer will approach once the next sample has to be taken. Note: this means, that the time point of the bottle change registered by the software and the actual movement of the XY Distributor might differ.
Current flow	Flow rate at the time of sampling
Total volume (day) [m³]	Indicates the volume measured for the day up to the time of sample.
Total volume [m³]	Indicates the volume from the beginning of measurement up to the time of sample.
Program Start(100)/ Finish(99)	Indicates if at the logged time a program was started or has ended after completion of the programmed sampling procedure
Error message code	**General error codes:** 1000 = mains power failure/sampler has been switched off 1100 = mains power has returned/sampler has been switched on 1200 = distributor error 1400 = max. pump runtime exceeded **Sampling error codes:** 2220 = electrical pinch valve not functioning 2330 = fill level conductivity electrodes bridged 2440 = no sample medium in metering vessel

Every night at 23:59:55 an additional data point will be recorded to give the daily total of the flow measurement. At 00:00:00 this daily counter will be reset to zero.

Data retrieval by transfer to a USB flash drive

When a USB flash drive is connected to the PLC, a message in the lower half of the display will indicate that the drive has been detected: **"USB detected!"**. Go to menu 05/06 to start the data transfer from the PLC's SD card to your USB flash drive.

While the transfer is active, the display will show **"transferring .."**. Once the transfer is finished, this message reads **"Transfer complete"**. Now you can remove your USB flash drive.

The transfer speed might depend on the quality and properties of the USB flash drive.

Data retrieval by transfer with FTP client

Alternatively, the log files can be retrieved using FTP client software and connecting to the TCP/IP interface of the PLC. The necessary address data may differ according to local standards, but the samplers come preset from the factory with the following settings:
IP: 10.10.10.20, 10.10.10.30, 10.10.10.233, or 10.10.10.234
Subnet mask: 255.255.255.0

It is recommended that the stored log files be retrieved at regular intervals and then deleted from the SD card

Import data into MS Excel

To ensure correct formatting of the protocol data in MS Excel or similar programs, take care to choose the semicolon as delimiter for the values/ columns. Also ensure that the decimal separator is set to comma.

Erasing the protocol memory of the PLC

To minimize the duration of the data transfer delete the protocol files from the PLC in regular intervals.

You can use an FTP Client to delete the files in the „LOG"-folder.

Alternatively you can use the key sequence ***DELxxxxOK**. Insert the customer specific access code instead of „xxxx". The code is the one that can be changed in menu 09 and restricts access to that menu.

Attention: To prevent deletion of the protocol files by accident a safeguard is installed. To use the key sequence mentioned above it is necessary that a USB stick is plugged into the PLC's USB socket and is recognized by the PLC.

Ensure that all data has been downloaded prior to deletion!
Deletion is irreversible.

8 Taking Care of the Sampler

During care, maintenance and service jobs please take care of the safety precaution instructions at the beginning of this manual.

Caution: Biologically or chemically contaminated areas can be hazardous to your health.

Should the sampler be situated in such an area you have to act according to the regulations for handling dangerous materials when cleaning or maintaining the sampler.

8.1 Care of Sampler

Under normal conditions and with the correct care and maintenance, your sampler should operate for several years without problems.

The housing is made from hardwearing stainless steel. It will last for many years - inside or out (option). You may wish to clean it down occasionally. A mild detergent in warm water is all that is usually necessary. Spillages, inside or out, may require the application of a disinfectant solution (e.g. isopropanol) but other than that, the housing requires virtually no attention.

Clean housing with mild detergent and warm water—never use a hosepipe

A hosepipe should never be used on the sampler. Although the housing is safe against horizontal, driving rain, the need for refrigeration means that it cannot be made completely watertight.
Any water that gets under the roof of the sampler could damage the circuit board or cause electrical malfunctions. For this reason, extreme care should be taken when accessing the electrical and electronic components.

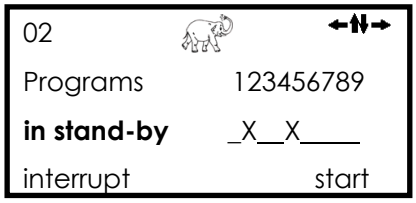
Ensure that rain or liquid splashes do not get onto the electrical or electronic parts.

Make sure that no rain or water splashes get on to electrical or electronic components

Note: To have samples of uniform quality, you should regularly clean all wetted parts which have contact with the sampling medium.

8.2 Technical Maintenance of a Sampler

Warning: Before starting with maintenance or service work stop or interrupt all activated programs. In case of service on electrical components DON'T FORGET to **UNPLUG** the sampler.
Wear the required protective clothing.



The care and maintenance of major components and circuits is best left to trained technicians. It is, however, possible to prolong the life of certain components. The pump in particular is one component that can be cared for through thoughtful programming.

Plan your programs sensibly to limit wear and tear on components

Notice: The life of the pump can be extended by limiting its running time.

- For example; if the suction line is fairly short and the dosing glass and line can be cleared of excess sample in a few seconds, there is no need to run the pump for longer.
- Be thoughtful about the dosing interval - do you really need a sample every 2 minutes?
- Do you need to take samples at the same interval 24 hours a day or could you use a second program to cover quiet periods?

Could the addition of a flow meter or other sensors reduce the need for samples?

And so on.

A pneumatic pinch valve has to be exchanged when it becomes leaky.

Maintaining the wet parts of the system can usually be left until the next service. In some cases you may, however want to check and change the silicone tubing or dismount the dosing glass for cleaning or clearing a blockage. This is easy to do.

8.2.1 Cleaning / Exchange of the Dosing Glass

Stop or interrupt all activated programs in menu 02.

Drive the distributor to the zero position. (<RESET> in menu 05/02 (only if programs have been stopped.)

Open the left star grip at the pinch valve and turn the backpressure plate with holding bracket downward (figs. 1+2).

Remove the dosing hose either from the dosing glass or from the -X -Y distributor.

Open the swivel nut at the top rim of the dosing vessel (turn left) and carefully take out the dosing vessel. (figs. 3+4).

Clean the electrodes with a soft cloth and rinse the dosing vessel under the tap (figs. 7+8).
Persistent dirt crusts can be removed with a brush (DO NOT USE ABRASIVE PAPER!).

Take care of the following when reassembling the parts:

1. Is the sealing on top of the dosing vessel closed firmly?

2. Is the distributor hose connected to the distributor again and is the bracket in front of the pinch valve screwed tightly again?

Press <start> in menu 2.

8.2.2 Service Electrical system

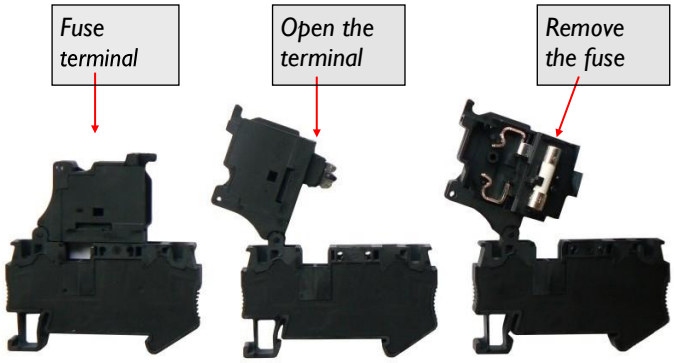
Warning:
UNPLUG the sampler before you begin with maintenance and service on the electrical system.

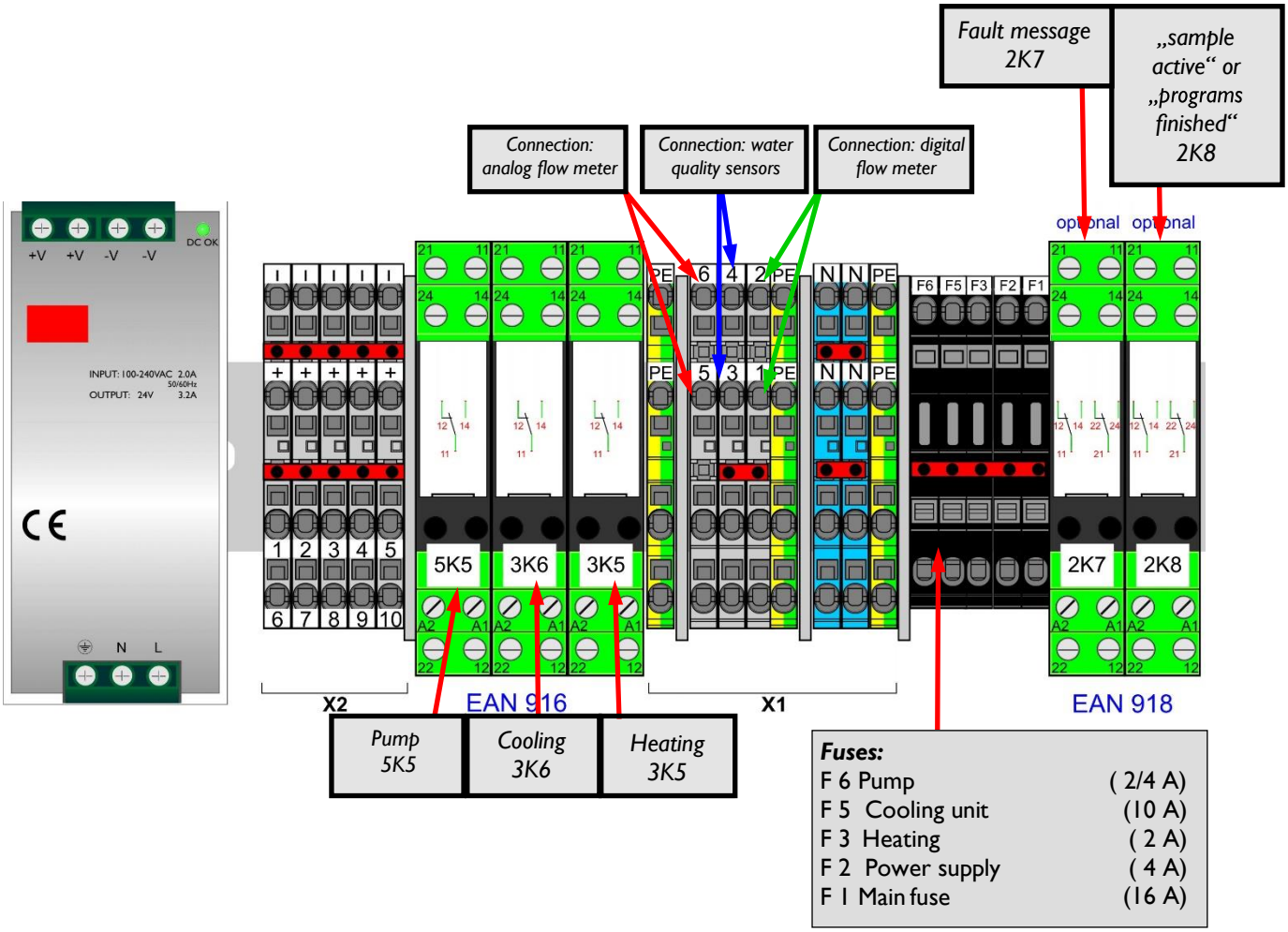
Open the roof by removing the screws on the front left and on the front right side. Lift up the roof and fix it with the supporting retainer.

If your sampler is installed outdoor then take care that no humidity and dust can get inside the electrical compartment.

You find the fuses inside the black terminals on the X1 strip in the electronic partition.

To change the fuse you must swing open the black terminal, open the fuse carrier and remove the fuse.





Fuses:	
F 6 Pump	(2/4 A)
F 5 Cooling unit	(10 A)
F 3 Heating	(2 A)
F 2 Power supply	(4 A)
F 1 Main fuse	(16 A)

8.3 Sampling Errors – Quick Troubleshooting

Only **qualified personnel** can be entrusted with installation, start-up, maintenance and further sampler operation.

Warning: Before starting with maintenance or service work, **stop or interrupt all activated programs**. In case of service on electrical components, DON'T FORGET to **UNPLUG** the sampler!

Wear the required protective clothing.

Only **original spare parts** supplied by Aqualabo may be used for maintenance.

"No sample medium"

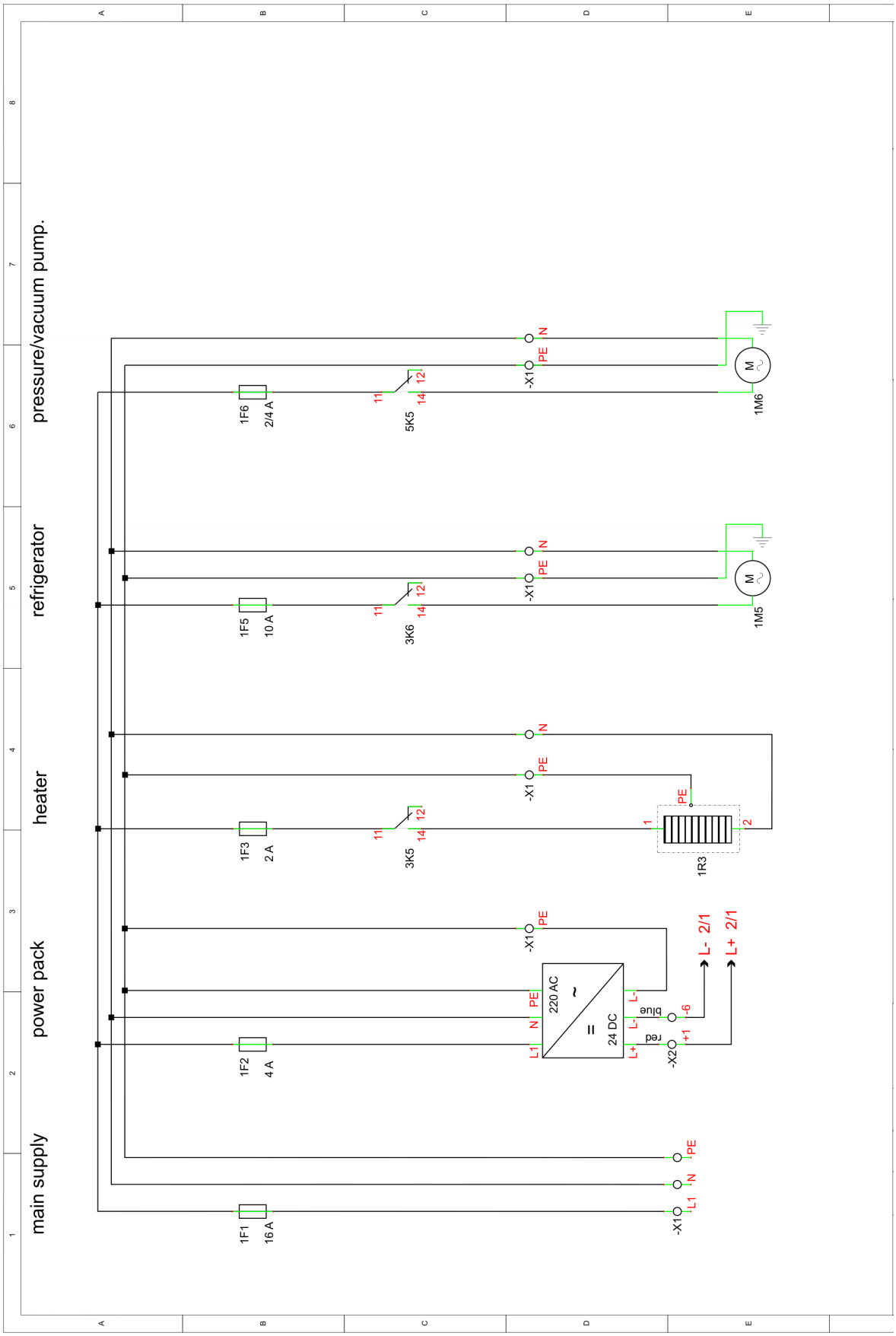
- Was the system cleaned recently? If so, please check the swivel nut on the metering glass, the threaded connections of the suction hose and on the conductivity electrodes for airtightness. Are all gasket rings present?
- The silicon hose may been damaged.
- The suction hose may be clogged or leaky, or not fully immersed under water during sampling.

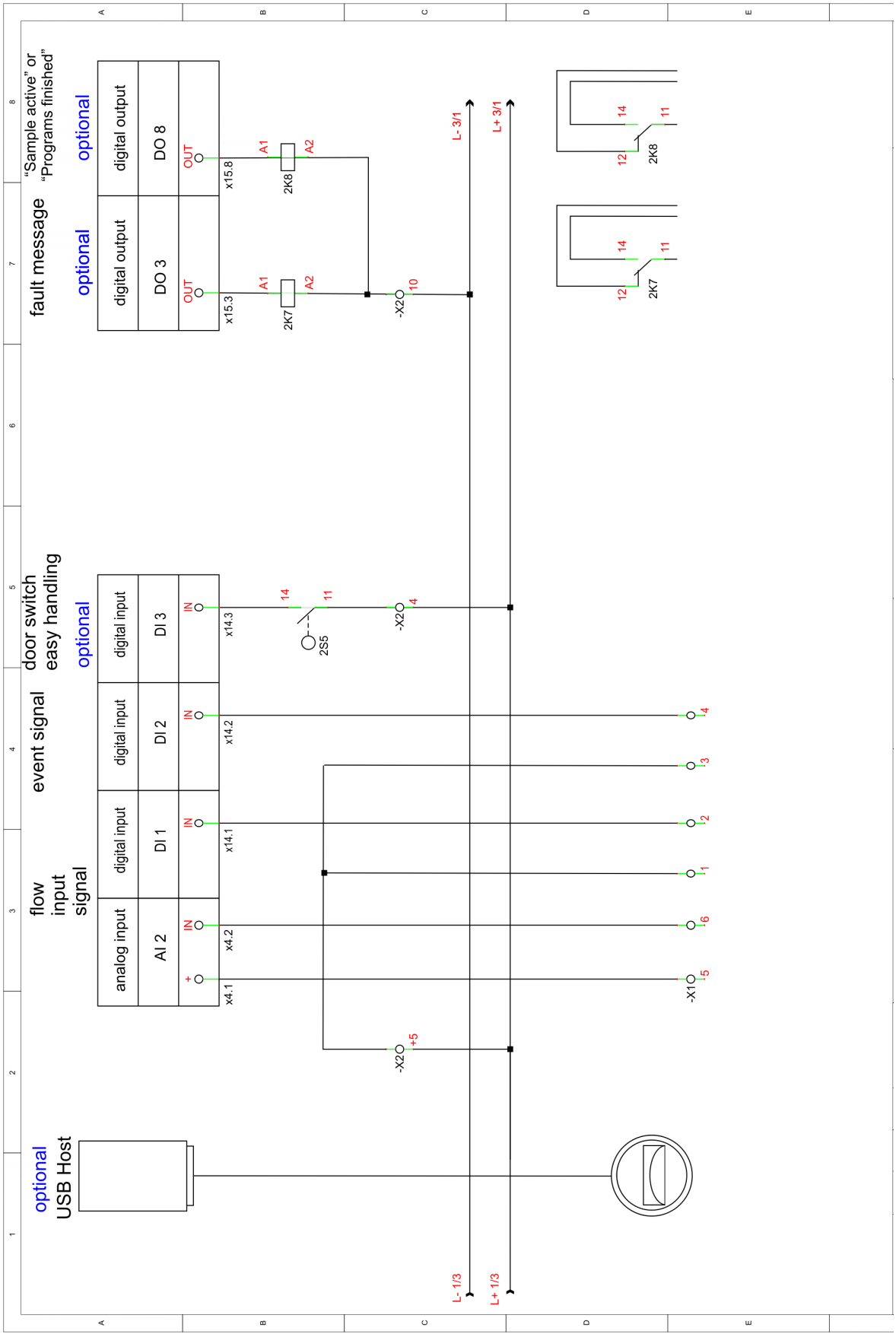
"Electrodes bridged"

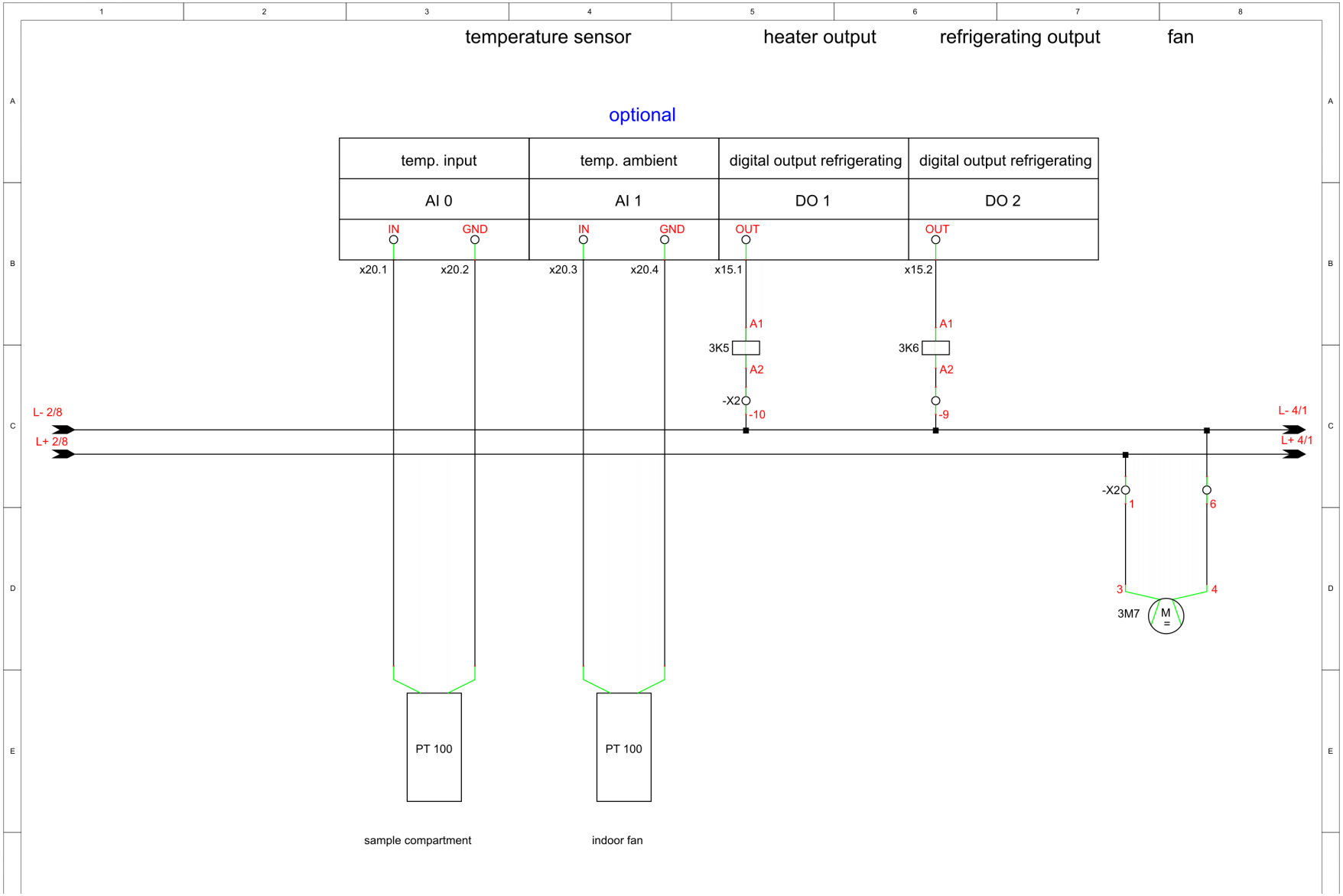
- A conductive film may have formed between the electrodes on the surface of the metering head.
- Clean the electrodes and the metering head surface in between the electrodes. If the film is persistent and difficult to remove, very fine abrasive paper may be used to remove the layer from the surface between the electrodes.

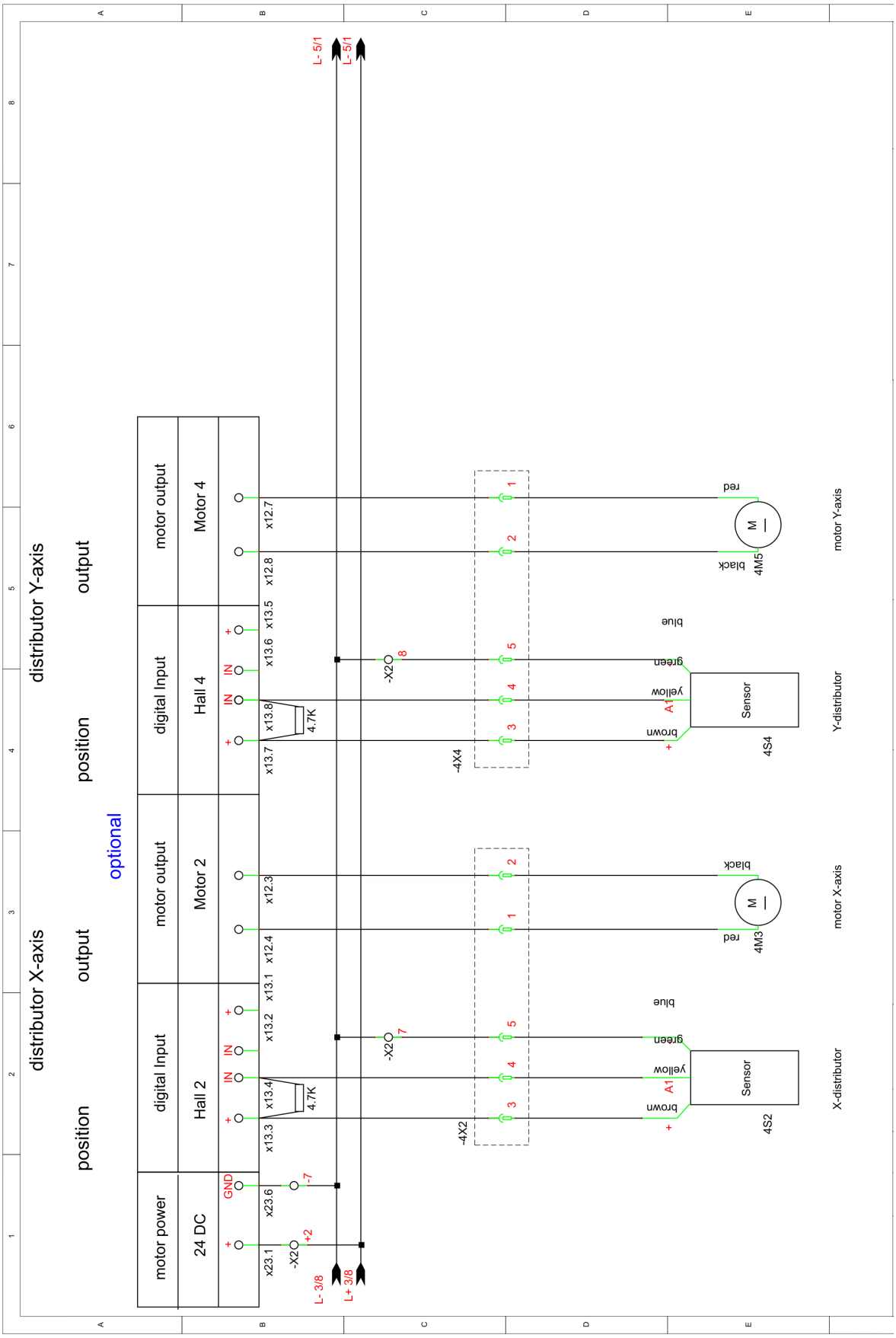
If the above mentioned points do not lead to a solution, please contact the customer support.

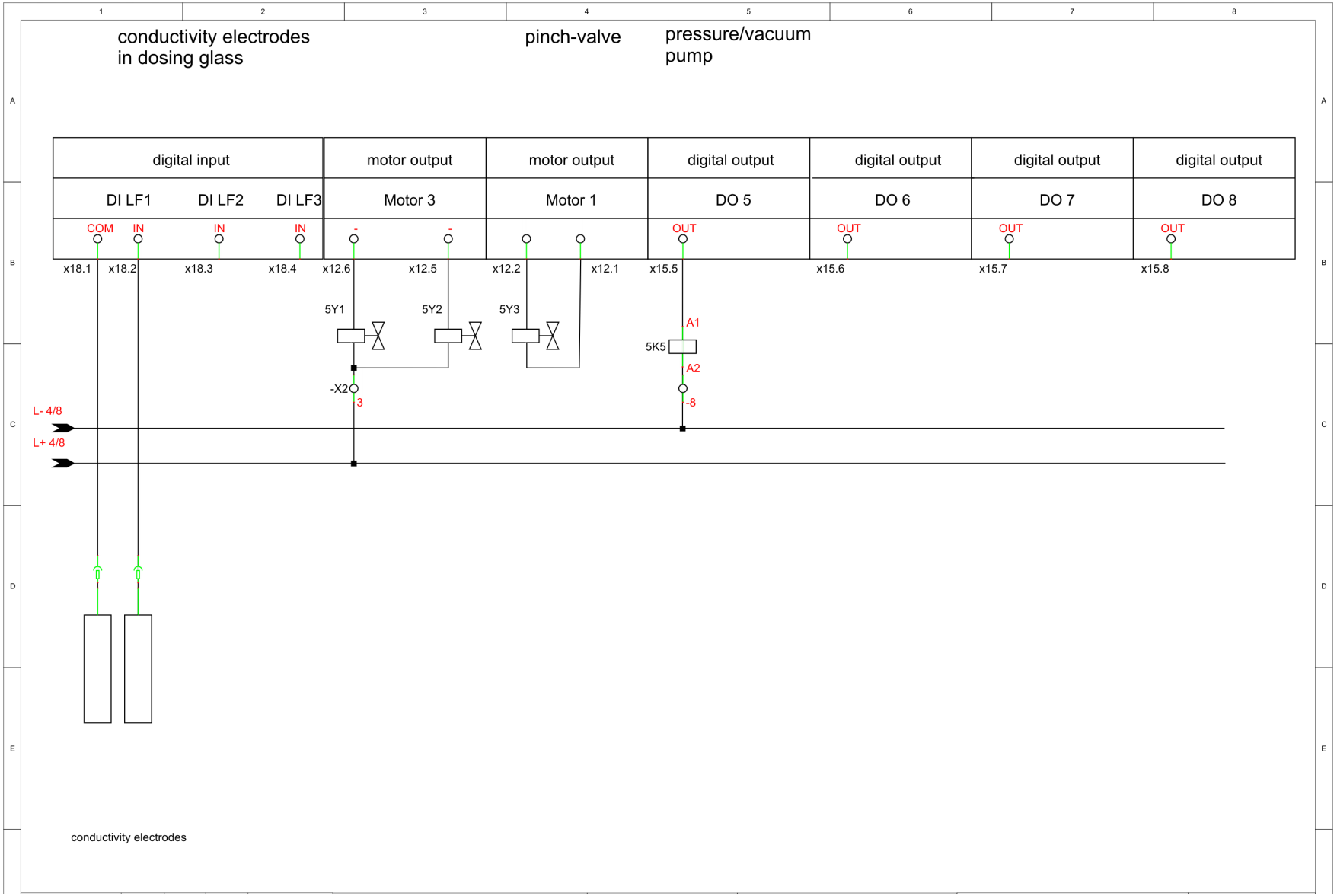
9 Wiring diagrams

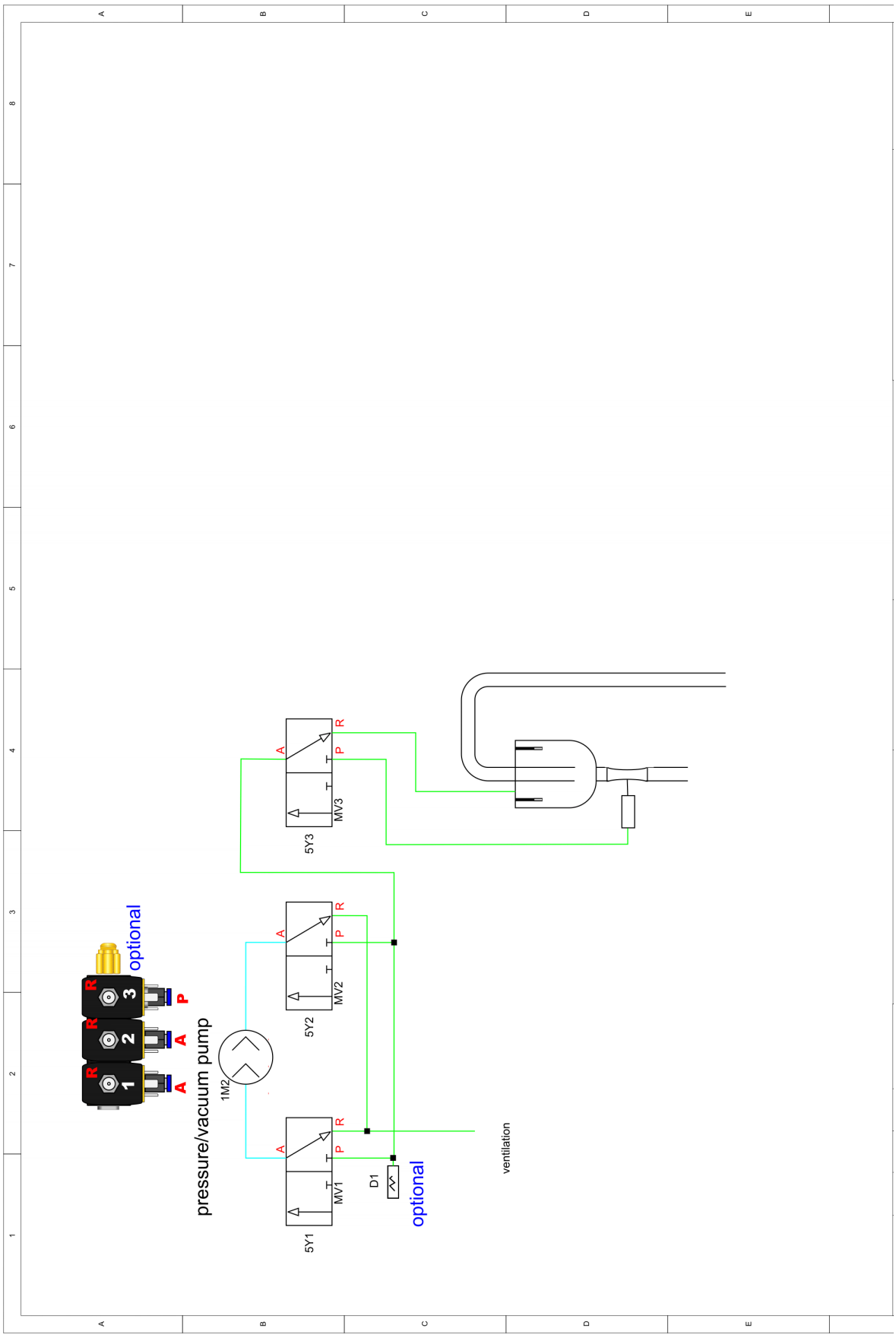


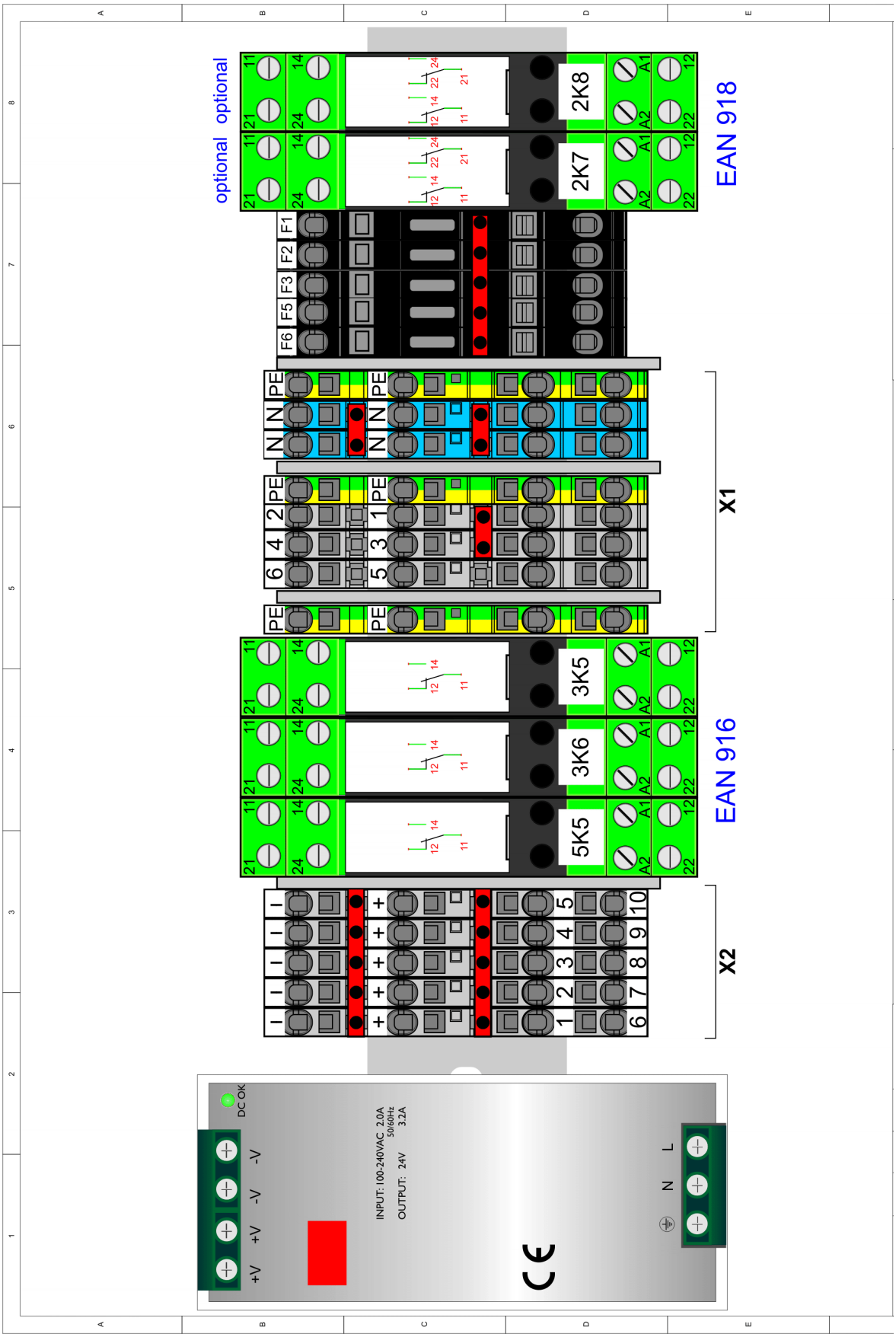

optional
USB Host
flow input signal
event signal
door switch easy handling
optional
analog input
AI 2
digital input
DI 1
DI 2
DI 3
digital input
IN
x4.1
x4.2
x14.1
x14.2
x14.3
-X2
+5
-X1
2S5
fault message
optional
optional
"Sample active" or "Programs finished"
digital output
DO 3
DO 8
OUT
x15.3
x15.8
A1
A2
2K7
2K8
L- 1/3
L+ 1/3
L- 3/1
L+ 3/1

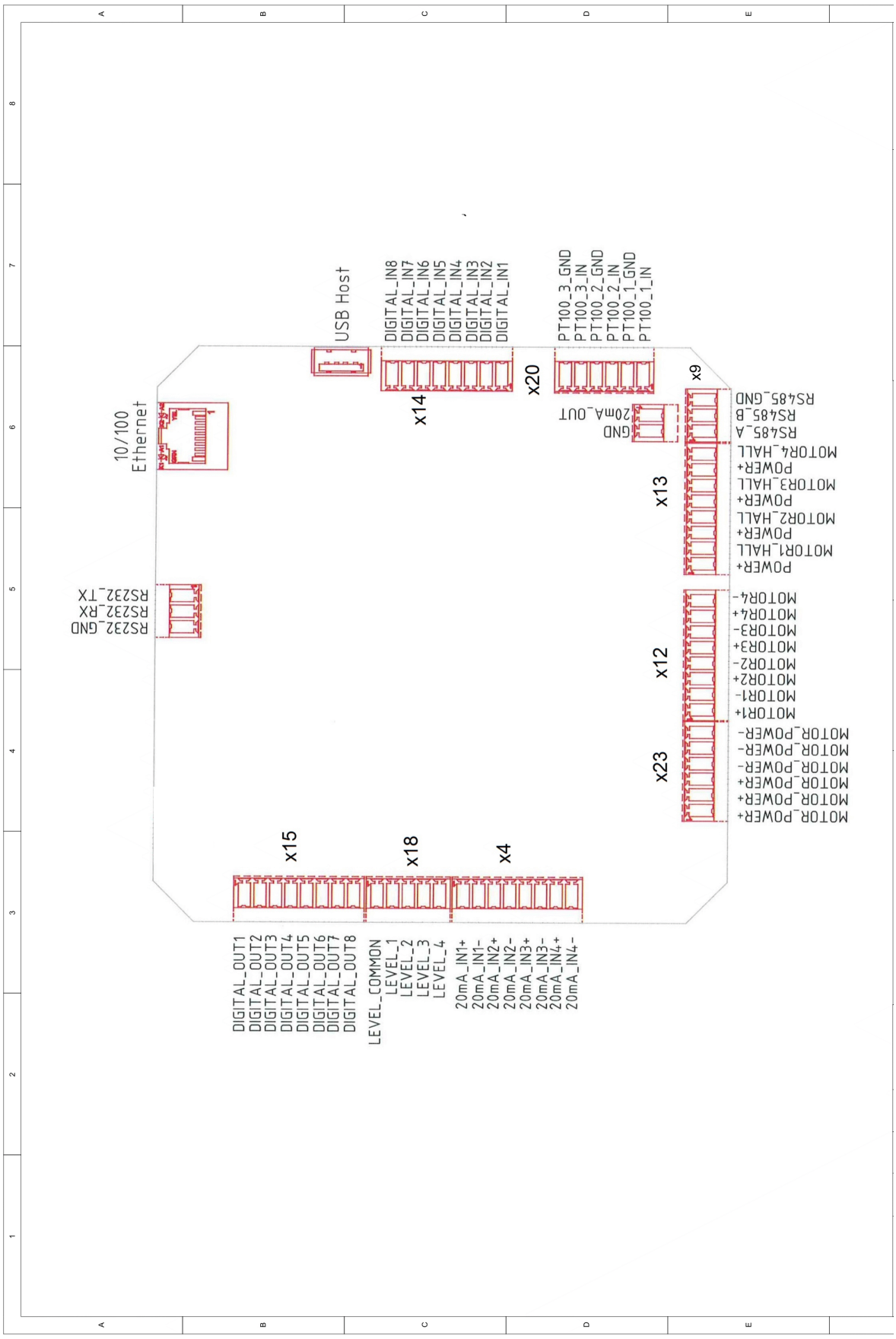

temperature sensor
heater output
refrigerating output
fan
optional
temp. input
temp. ambient
digital output refrigerating
digital output refrigerating
AI 0
AI 1
DO 1
DO 2
IN
GND
IN
GND
OUT
OUT
x20.1
x20.2
x20.3
x20.4
x15.1
x15.2
A1
3K5
A2
-X2
-10
A1
3K6
A2
-9
L- 2/8
L+ 2/8
L- 4/1
L+ 4/1
-X2
1
6
3
4
3M7
M
PT 100
PT 100
sample compartment
indoor fan


distributor X-axis
position
output
optional
distributor Y-axis
position
output
motor power
24 DC
digital Input
Hall 2
motor output
Motor 2
digital Input
Hall 4
motor output
Motor 4
GND
IN
4.7K
L- 5/1
L+ 3/8
L- 3/8
-X2
-7
+2
-8
-4X2
-4X4
Sensor
4S2
4S4
4M3
4M5
motor X-axis
motor Y-axis
X-distributor
Y-distributor
brown
yellow
green
blue
black
red
A1


conductivity electrodes
in dosing glass
pinch-valve
pressure/vacuum
pump
digital input
motor output
motor output
digital output
digital output
digital output
digital output
DI LF1
DI LF2
DI LF3
Motor 3
Motor 1
DO 5
DO 6
DO 7
DO 8
COM
IN
IN
IN
-
-
OUT
OUT
OUT
OUT
x18.1
x18.2
x18.3
x18.4
x12.6
x12.5
x12.2
x12.1
x15.5
x15.6
x15.7
x15.8
5Y1
5Y2
5Y3
A1
5K5
A2
-X2
3
-8
L- 4/8
L+ 4/8
conductivity electrodes


optional
R
R
R
1
2
3
A
A
P
pressure/vacuum pump
1M2
5Y1
MV1
5Y2
MV2
5Y3
MV3
D1
optional
ventilation


optional optional
EAN 918
2K8
2K7
F1
F2
F3
F5
F6
N N PE PE
PE PE
2 4 6
1 3 5
X1
EAN 916
5K5
3K6
3K5
X2
1 2 3 4 5 6 7 8 9 10
DC OK
+V +V -V -V
INPUT: 100-240VAC 2.0A 50/60Hz
OUTPUT: 24V 3.2A
N L


USB Host
10/100 Ethernet
RS232_GND
RS232_RX
RS232_TX
DIGITAL_IN8
DIGITAL_IN7
DIGITAL_IN6
DIGITAL_IN5
DIGITAL_IN4
DIGITAL_IN3
DIGITAL_IN2
DIGITAL_IN1
x14
x20
PT100_3_GND
PT100_3_IN
PT100_2_GND
PT100_2_IN
PT100_1_GND
PT100_1_IN
GND
20mA_OUT
x9
RS485_GND
RS485_B
RS485_A
MOTOR4_HALL
POWER+
MOTOR3_HALL
POWER+
MOTOR2_HALL
POWER+
MOTOR1_HALL
POWER+
x13
MOTOR4-
MOTOR4+
MOTOR3-
MOTOR3+
MOTOR2-
MOTOR2+
MOTOR1-
MOTOR1+
x12
MOTOR_POWER-
MOTOR_POWER-
MOTOR_POWER-
MOTOR_POWER+
MOTOR_POWER+
MOTOR_POWER+
x23
x15
x18
x4
DIGITAL_OUT1
DIGITAL_OUT2
DIGITAL_OUT3
DIGITAL_OUT4
DIGITAL_OUT5
DIGITAL_OUT6
DIGITAL_OUT7
DIGITAL_OUT8
LEVEL_COMMON
LEVEL_1
LEVEL_2
LEVEL_3
LEVEL_4
20mA_IN1+
20mA_IN1-
20mA_IN2+
20mA_IN2-
20mA_IN3+
20mA_IN3-
20mA_IN4+
20mA_IN4-

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