Cerlic COW

Water sampler

New proximity design

Table of contents

1. Introduction

The COW is a water sampler suitable for municipal and industrial sewage treatment plants. It is easy to use with all settings and operations managed with seven keys and a display. The sampling is fast thanks to the use of a pre-vacuum, which also results in representative samples. The equipment requires minimal maintenance as it has a built-in automatic rinse function.

The sampler can be used together with a flow meter to control the sampling cycle proportional to the flow. COW can also be controlled by fixed time intervals.

2. About this manual

The enclosed Quick reference guide has hints on installation, key functions, start-up and operation. This manual contains detailed descriptions of technical data, function and troubleshooting.

3. Design

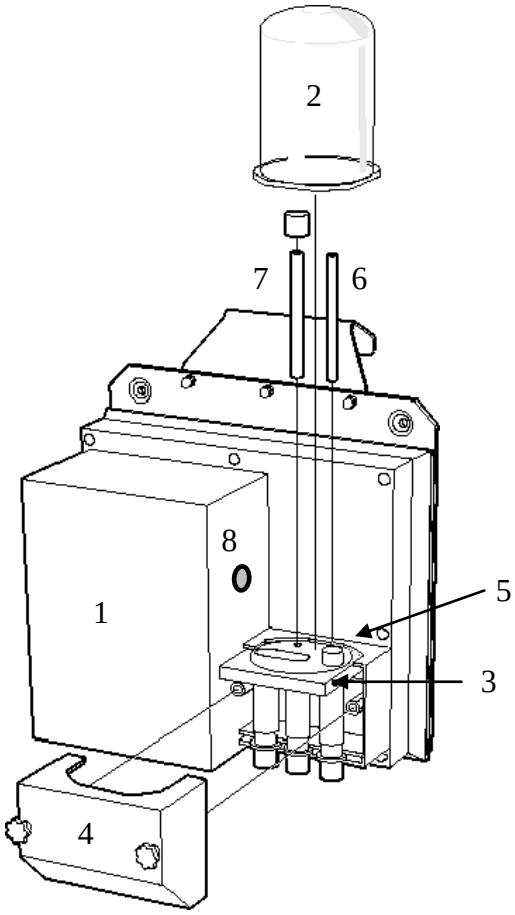
COW is built on an aluminium frame which serves as a protective ground and heatsink. A front cover made of plastic protects the electric components. This NEMA4 (IP65) cover is designed to protect the electronics from normal external cleaning.

The sample cup, made of macrolon plastic, is located next to the control panel. Required sample volume is determined by the height of the level tube. This design ensures that the sample volume is consistent.

The valve assembly is located between the sample cup and the connected hoses. Its function is to distribute the liquids during sampling and flushing and to function as a holder for three tubes: sample volume, flushing and vacuum tubes. The vacuum tube allows pressure and vacuum to enter the sample cup. Flushing liquid enters the sample cup through the rinsing tube. The length of the sample volume tube determines the sample volume.

The boards are located behind the front cover. They consist of two parts, a power supply board and logic board. The power supply board is mounted to the frame and contains the connecting terminals. The processor board is mounted to the back of the front cover and contains display, keyboard functions and system logic. COW is programmed using the seven keys and the display.

4. Working principle



The COW is a microprocessor-controlled water sampler that grabs a fixed volume of liquid at various intervals.

Parts

1. Front cover - Waterproof housing of minlon plastic protecting the electric components.
2. Sample cup - Transparent cup made of macrolon plastic in which the sample is collected.
3. Valve assembly - Black silicon rubber casting which distributes the sample liquid to/from the sampling cup.
4. Valve cover - Holds the sample cup and the valve assembly.
5. Sample volume tube – The height of the tube determines the volume.
6. Flushing tube - Distributes rinsing liquid into the sample cup.
7. Vacuum tube with flush ring and splash protection hat – Adds or removes excess air.
8. Level switch – determines maximum liquid level in the sample cup.

Suction

A vacuum is created by the vacuum pump. The sample is pulled into the sample cup through the suction hose. When the liquid in the cup is at the same height as the level switch the vacuum pump is stopped. In order to get a higher liquid level a stop delay has to be set, see also section “Manual calibration”.

Measuring

The sample cup is pressurized after the suction height have been reached. This results in a backflow of the excess liquid through the suction hose, until the top of the sample tube is even with the liquid surface. The remaining liquid is the sample volume.

Emptying

The center valve of the valve assembly is opened when the excess liquid has been returned through the suction hose. The center tube of the valve assembly is connected to the sample collection hose which leads the sample to the sample container.

Flushing

The sample cup is flushed after a predetermined number of samples. The settings in the control program decide when flushing is to be done. The flushing liquid is removed through the outlet hose.

Pre-vacuum for more than 3m (10') lift

A suction height of more than 3m (10') normally requires the use of the pre-vacuum function. The sample cup is pre-vacuumed before the suction hose valve is opened in order to decrease the time of sampling. This function should be deactivated at suction heights below 3m (10').

A calibration test is taken after every STOP function, after modifying the MENU or after a power failure. This is done to enable the COW to set the correct liquid level in the sample cup.

A pre-sampling can be done so that the sample cup becomes acclimated to the sample liquid before the actual sampling.

Sampling point

Areas where a turbulent flow exists will ensure a representative sample. This is often found just downstream of a weir or a flume.

Sample storage

Samples waiting to be analyzed must be stored in a cold, dark environment to stay representative. At a stable temperature between 0 and +4° C the chemical and biologic processes stops so the analytical results from the lab correlates with reality. Storage in wet, usually aggressive environment, often with presence of hydrogen sulphite, put high demands on the equipment.

Cerlic can supply suitable equipment like refrigerators, and different sample shifters for two to six containers. A console to mount a COW on top of a refrigerator is also available.

Calendar

COW has a calendar function to control the sampling. Several options are available.

1) The sampler can be programmed to start at a future date. That date can be a certain day of the week, a certain date or an external start pulse.
2) The sampler can be programmed to stop at a later date. That date can be a certain day of the week (only if started at a day of the week), at a certain date or after a certain number of samples.
3) Different sampling intervals can be programmed for weekends and working days. The start and end of the weekend can also be set.
4) At longer holidays, e.g. bank holidays, the weekend program can easily be activated manually.

5. Unpacking

The unit has been tested and approved before delivery from the supplier. Please check that no visible damage is apparent in this shipment.

Damages

If damages occurred during shipment, immediately contact the shipping company and the Cerlic representative. The shipment should be returned only after a return authorization number has been issued by Cerlic or the representative.

Packaging

The original packaging is designed to protect the equipment and should be used for storage or if the product must be returned.

Content

Please check that the content corresponds to your order and packing list.

Following items are included with the COW:

- One extra sample cup.
- One reinforced 19 mm suction hose, length 5 meters.
- One hose clamp for the suction hose.
- Two non-reinforced 19 mm discharge hoses, length 1 meter and 2.5 meters.
- One PVC-plastic flushing hose, 5 ø mm x 8 ø mm , length 2 meters.
- One sample volume tube, 25 mm long giving 120 ml sample volume.
- One sample volume tube, 100 mm long giving more than 500 ml sample volume. For other sample volumes refer to the section ”Sample volume”.
- One pack of lubricant for the surface between sample cup and valve assembly. This lubricant resists water and seals between the sample cup and the valve assembly.
- One container for flushing liquid (10 l).

6. Installation

It is important to place the COW at a sample point with turbulent flow. The back plate has to be vertically mounted and the bottom of the sample cup must be horizontal, to ensure correct sampling volume.

Installation example

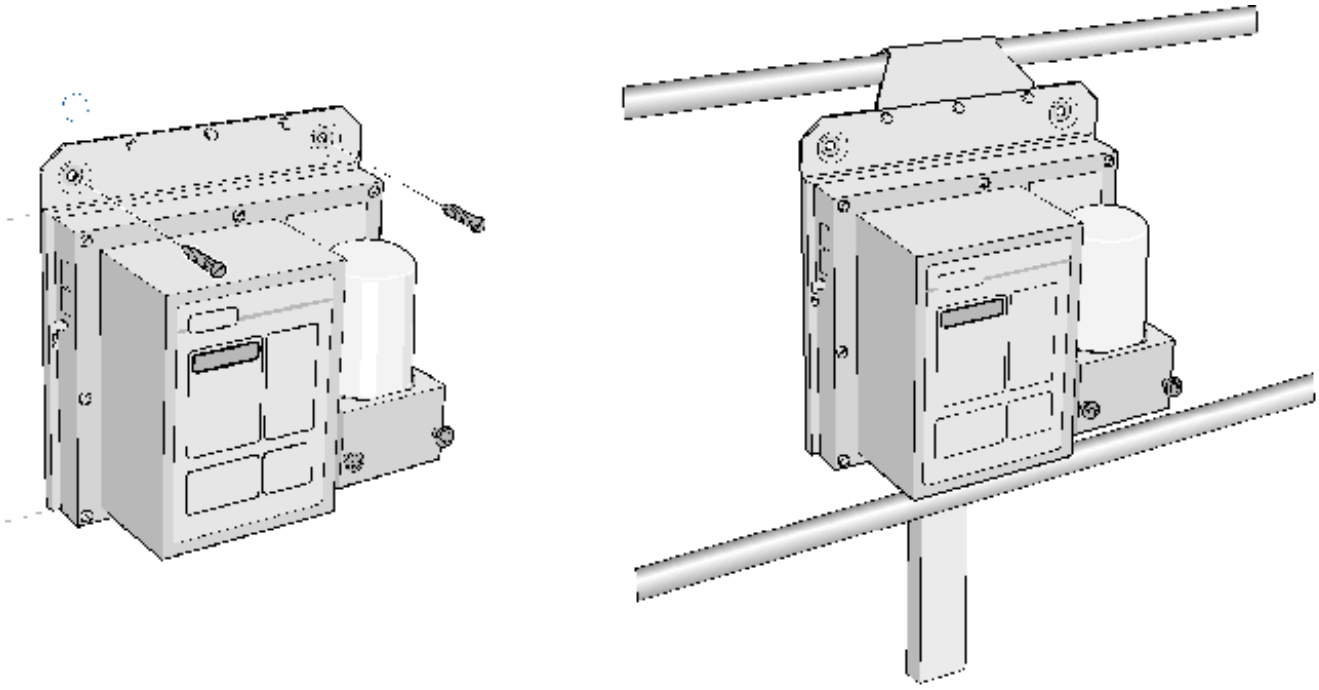


Figure 1: Installation on wall or handrail.

Wall installation.

Attach the sampler to the wall with two 1/4” screws through the holes on top of the mounting plate. Position the unit so that there is at least 2,5 m / 8` to the left of the unit for the cover to open.

Handrail installation.

Reverse the handle to hang the COW from the handrail. Make sure that it is supported on in the back and is kept upright. Place the COW with room to open the cover to the left.

Installation on top of a refrigerator.

Mount the console on the refrigerator using the attached sheet metal screws and the two stays to the back of the refrigerator. Attach the sampler to the console using screws and nuts (2 holes ∅ 6mm).

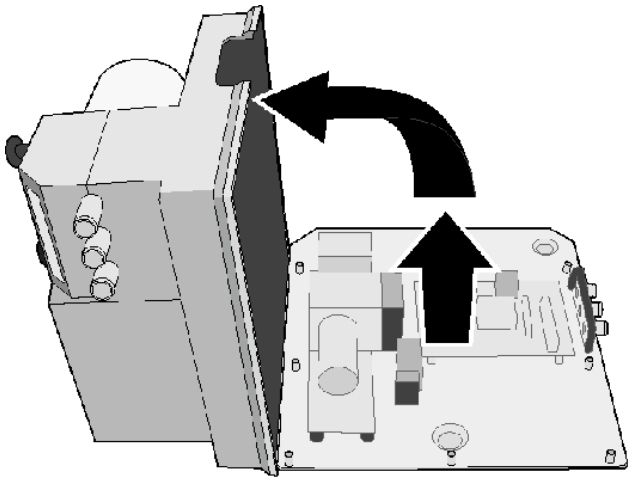
7. Electrical installation

The Cerlic COW water sampler can be powered by 115V/ 60 Hz, 230 V/50 Hz or an optional 12 V battery.

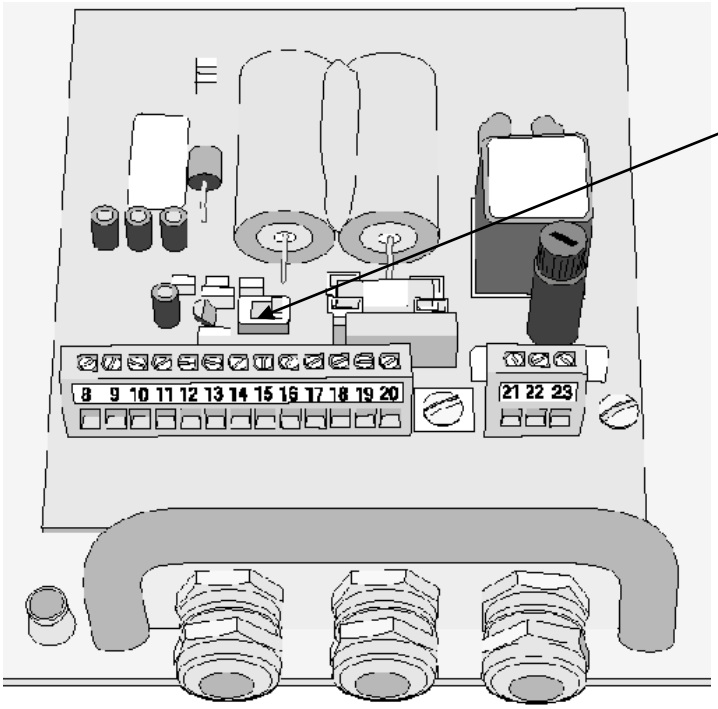
Only authorized personnel may open the cover. Power supply should be supplied with manual local switch. The live line must be connected to terminal L, even when a plug connection is used! Installation with a plug connection requires a strain reliever and a bend protection to be safe.

Opening the front panel

- Loosen the screws.
- Pull the cover towards you
- Open it leftwards like a book.



Label terminals on picture with +- & GNL



Connect the control signal to terminals 17(+) and 18(-) when using a pulse or a dry contact. Choose control mode with the switch SW1 on the power board. Use for dry contact or for pulse.

When an external closing contact is used to control the sampler the menu is temporarily looked. This is normally not a problem but if the external pulse is to long it can help to install a pulse shortening relay to enable access to the menu.

Connect mA signal to terminals 15(-) and 16(+) if an analog signal from a flow meter is used.

Connect ground to terminal 21, neutral to terminal 22 and power to terminal 23 when using 110VAC/60Hz power.

Connect the 12V battery negative (-) to terminal 19 and positive (+) to terminal 20.

Connection to a PC

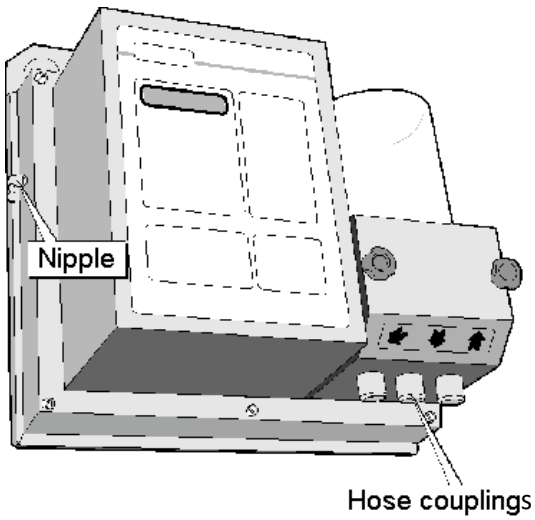
Terminals 8–12 are a RS232 serial port where a PC can be connected to collect the event log. The serial port uses 4800 baud, 1 stop bit, no parity, no handshake. See the chapter “Log” for more information on what can be transferred.

8. Connection of hoses

The COW is delivered with three 3/4”ø (19 mm) hoses and one 1/4” (5 mm) flush hose. The 19 mm hoses are to be connected to the valve assembly and the 5 mm to a nipple on the left side of the sampler.

Sampling temperature above 35 °C / 95 °F

To prevent the sample hose from softening and collapsing when the liquid temperature is above 35°C, it is recommended attaching a special high temperature reinforced hose at the end of the hose, with a length of approximately 1 meter (3’).



Connect the reinforced hose to the coupling marked ⬆. This is the suction hose that has to reach down into the sampled liquid to get a representative sample.

Connect the short non-reinforced 19mm hose to the coupling marked ⬇. This hose delivers the sample taken to the sample container.

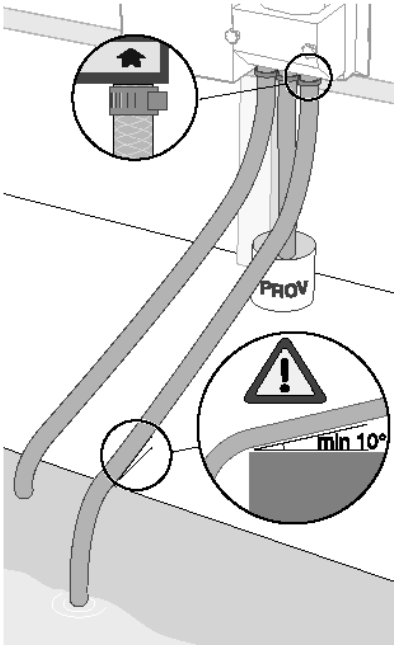
Connect the other non-reinforced 19mm hose to the coupling marked 🖐. This hose disposes of manual samples and flushing liquid. The end of the hose must not be submerged if the sampler is to properly function.

Connect the flushing liquid hose to the nipple marked on the left side of the COW.

Connect the suction hose to the coupling using a hose clamp. This is the only hose where a hose clamp is usually needed.

The suction hose must have an angle of at least 10 ° if it runs over a floor or other horizontal surface. This is to make sure that it drains properly after each sample.

If the sample hose is long and horizontal, e.g. over a floor, it is important to provide a steep passage (at least 1 m at more than 45° angle) below the sampler to get the sampling to work well and give representative samples.



9. Sample volume

Sample volume can be adjusted from 28-500 ml by changing the height of the level tube. To adjust level height, change the length of the level tube. Standard length is 25 mm which gives 120 ml sample volume. Maximum volume is 500 ml which equals 91 mm level tube length. A change of the length with 1 mm corresponds to approximately 5 ml change of sample volume. See chart below.

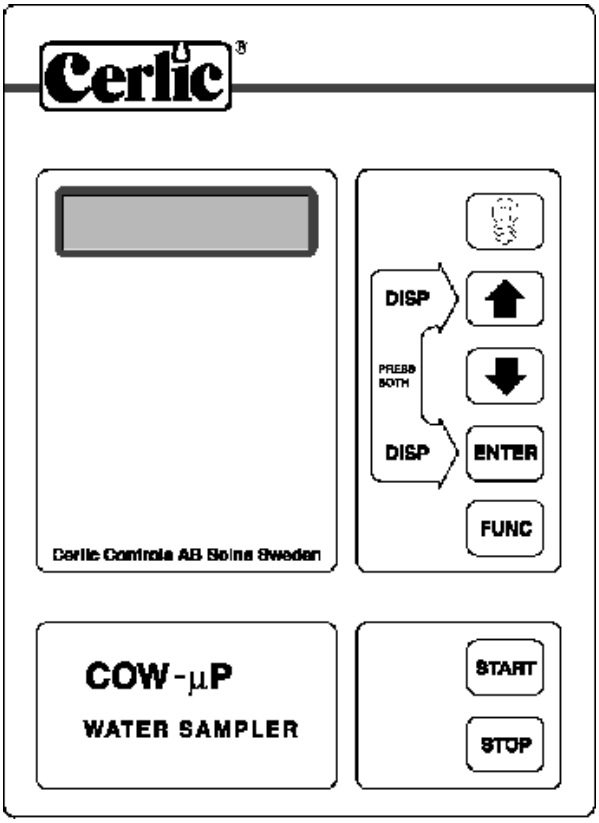
Level tube length	**Sample volume**
Without level tube	28 – 30 ml
25 mm (default)	120 ml
40 mm	200 ml
57 mm	300 ml
74 mm	400 ml
91 mm	500 ml

The chosen sample volume must be entered in the setup menu to get the container volume calculation to work. If the **sample volume is more than 300 ml** the stop delay parameter in the service menu must be increased so that the liquid level reaches well above the level tube. The value to be entered can be found by testing. Make sure to start with 1 second. A bigger value than 3 seconds is rarely required.

Try increasing the number in small steps, and be prepared to push STOP button if the level reaches the ring (splash protection) on the vacuum tube. It is recommended to pull up the splash protection hat approximately 10mm when using large sample volumes in order to further avoid that liquid being sucked into the vacuum tube.

10. Key functions

The display has two modes, ”MENU” for setting parameters and ”DISPLAY” for taking samples. Below is a short description of the basic key functions:



	Turns display light ON / OFF.
	Changes numerical value or options within a function.
ENTER	Stores data input and confirms a menu choice.
FUNC	Steps forward to next function.
ENTER +	Switches mode from ”MENU” to ”DISPLAY”.
ENTER + FUNC	Switches mode from ”DISPLAY” to ”MENU”.
START	Starts a manual sampling or restarts COW from ”STOP”.
STOP	Interrupts the cycle and stops the sampling.

The text **Startup X.xx** is shown in the display at first power up of the COW. If not; press ENTER and FUNC simultaneously. The COW has to be configured at start-up.

Total reset

COW can easily be ”cleared” by a total reset. To do a total reset, press ↑ while power is switched on. Language and base unit selections are not affected by a total reset.

After a total reset The Setup menu is automatically entered. Before the standard setup menu two extra entries are shown.

Language	**Swedish** or **English**
Base unit	**SI** (metric) or **US**.

COW menus

This is a step by step description of the menu choices. Set the numerical values and functions with ⬆ and ⬇. Enter and store the values with ENTER and proceed to the next function with FUNC.

COW Ver X.XX	This is where the menu starts, X.XX is the software version.
Setup menu	Choose **YES** if you want to enter the Setup menu. If the default values should be used, choose **NO** to skip the setup menu.
Daylightsave	**EU** and **US** automatically changes between summer and winter time according to EU or US rules. **Yes** selects fixed summer time (+1 h if winter time before). **No** selects fixed winter time (-1 h if summer time before). Select **No** if you don't want the time to change.
Date	Sets date in order yymmdd. Example: **061130**.
Time	Sets time in order hh:mm. Example: **14:31**.
Sample point	Label identifying the sample tag number, 3 digits.
Samp vol	Enter the sample volume 0-500 ml, which is chosen by the length of the level tube.
Container	Volume of the sample container, 0-99.99 litres. When using multiple containers with carousel, then, set the total volume. To select an infinite container (to avoid that the sampler stops due to full container) the choice "**Off**" is available as the largest container size.
Presample	Set the mode for pre-sampling. **NO** deactivates the function, **ALWAYS** gives a pre-sample at every sampling, **AFTERFLUSH** gives a pre-sample only after flushing.
Prevacuum	Sampling is done with pre-vacuum if **YES**. This shortens the sample time for longer runs and lifts.
Samp./Cleaning	Sets the number of samples before flushing. Normal value is 10-20. Setting the value to zero deactivates the flushing. Don't flush more often than necessary to avoid reducing the lifetime of the membrane pump.
Power Up	Selects the mode after a power fail. **Stop** will start the COW in STOP-mode. **Run** will start the COW in the mode it was prior to the power failure.
Serialport	Controls what is sent out on the serial port. **Empt.** sends the log information when the log is emptied. **Immed.** sends new log information when it is registered. **Service** sends sensor signal information during sampling to help trouble shooting difficult applications.

Control	**mA / TIME / PULSE / OFF** Sets the control mode. **OFF** deactivates, **PULSE** activates control with pulse or dry contact, **TIME** gives sampling according to preset time, **mA** activates control via mA-input from flow sensor. When using pulse control there is a limitation that reuires that each sample is always separated by at least 4 minutes. This limit does not apply to calibration or manual sampling. This keeps the motor from overheating.
mA-signal	Sets type of mA control. **0-20** sets 0 mA as lower limit while **4-20** sets 4 mA..
Unit	Sets the flow unit for mA-signal control. It is **m3/h** or **l/s** if SI base units are chosen and **GPM** or **MGD** if US base units are chosen.
Range	Sets the maximum flow rate, 0-9999, in above unit corresponding to 20 mA. This makes it possible to calculate sampler interval in given unit.
SampInt	Flow volume between samples 0-9999 in above given unit when using mA control.
SampInt	Time interval between samples 4-999 min (time control).
Pulses/Samp	Pulses required per sample (pulse control).
Start	**DATE / DAY / CONT. / PULSE** Sets start conditions. **CONT.** means that the sampler is ready for sampling if not stopped by stop conditions. **PULSE** starts the sampler at first external pulse. **DATE** starts the sampler at a specified date. **DAY** starts at a specified day of the week.
StaDate	Sets start date in order yymmdd (date).
StaDay	Sets start weekday (day).
StaClo	Sets start time in order hh:mm. (date and day).
Repeating	Yes / No. Start on specified day of the week shall be repeated every week (day)
Stop	**DATE / DAY / SAMPLES / CONT. / PULSE** Sets stop conditions. **CONT.** continues the sampling sequence. **SAMPLES** stops the sampler after a number of samples. **DATE** stops a date **DAY** stops at a day of the week. **PULSE** stops at pulse.
StoDate	Sets stop date in order yymmdd (date).
StoDay	Sets stop weekday (day). This is only possible when Start is set to Day. StoDay is then the first matching day after StaDay.
StoClo	Sets stop time in order hh:mm. (date and day).
Samples	Number of samples to be taken before the sampler stops.

Weekendctrl **Yes / No** Selects if a special program shall be run during weekends and holidays.

- **Weend Start** Start day for weekend program.
- **Start time** Start time for weekend program.
- **Weend End** Day for end of weekend program.
- **End time** Time for end of weekend program.
- **W-Cont.** Container volume for weekends.
- **Control** **mA / TIME / PULSE / OFF**
  Set the control mode during weekend. **OFF** deactivates the sampler during weekends.
  - **W-mAsignal** Sets type of mA control. **0-20** sets 0 mA as lower limit while **4-20** sets 4 mA.
  - **W-int** Flow volume between samples, 0-9999 (mA control).
  - **W-int** Time interval between samples, 4-999 min (time control).
  - **W-Pulse/Samp** Pulses required per sample (pulse control)**.**

Service menu **Yes / No**, Opens the following entries if yes is selected.

- **Stopdelay** **0- 10 s**. Increases the liquid level in the sampler cup by adding a delay between the detection of a liquid level and stopping the pump.
- **Blindtime** **1 to 20 s.** Sets the time during which the level sensor is deactivated when sampling with pre-vacuum. Normal time is 1 second.
- **DoneService** **Yes / No.** Acknowledge the request for service in the event log.

COW Ver X.XX The menu starts from the beginning again. To leave the menu at any point, press ENTER and ⇧ simultaneously.

11. Log

The log functionality records events like number of samples, addition of the container volume and several operational events. This can be of help in case of malfunction when the log will give information about what happened and when. The log is accessible in both stop and run mode by pressing ⌂. The log can also be read on the sampler's serial port. The log is able to store 20 events, when the log is full no more events can be stored.

Below is a description of the log format, and explanations to the different texts. Alarm state means the sampler stops and waits for an operator to acknowledge the alarm before any more samples are taken. Alarms are acknowledged by pressing STOP.

Every log entry consists of a string AA:BBCC DDDDD where AA = day in the month, BB = hour, CC = minute, DDDDDD = text.

Log text	**Alarm state**	**Explanation**
START		• Sampling was started manually. • Change over from Menu to display state • The log was emptied during running
STOP		Sampling was stopped manually.
ContFull	Yes	The container is full. Either the requested number of samples has been taken or the sampled volume equals the container volume.
POWER ON		The sampler has been switched on or power has returned after a power failure.
RESET		The sampler has been reset; • The reset button has been pressed • There has been an electrical failure.
POW FAIL		The sampler has lost its power.
MOTRTIME		The motor has been running continuously for an hour. This should never happen.
SERVICE		It is time to service the sampler. (This event occurs one year after service was acknowledged in the service menu), Service includes exchanging the hose assembly and lubricating the pistons.
MAN SAMP		A manual sample was taken (Start was pressed during operation)

Log text	Alarm state	Explanation
TIMEDIFF		Large variations in suction elevation time. This can result in missed samples.
LEVSENS1	Yes	The zero level of the level switch signal is outside specification.
LEVSENS2	Yes	The sampler doesn't recognize the signals from the level sensor. This can happen when there is no water to sample, or if the level sensor is broken. Contact a service technician if the problem remains when there is water to sample.
LEVSENS3		The level switch has been triggered before sampling has begun. There could be solids build up on the inside of sampler cup triggering a false level height and cup needs cleaning. On rare occasions this might happen if there is a high degree of moisture inside or outside the sampler cup.

Clearing the log

The log records different events and can be cleared when the log has been read.

Continuous events such as time passing by, samples being taken, incoming flow etc. are logged in a special container log, see section "Exchange of sample container".

It is a good habit to check the event log regularly, e.g. when the container is exchanged. As the last step in reading the event log you are asked if you have emptied the container.
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1. Press ⬆ or ⬇ to step through the log.
2. When the display say "Ent ZeroesLogger" the log can be cleared by pressing ENTER. The content of the log is then sent out on the serial port if **Empt.** was chosen for the serial port setting.
3. When the event log is cleared the sampler asks if the container has been emptied.
4. The sampling then continues.

12. Operation and maintenance

Start of sampling

1. Set display mode ”DISP”. Press ENTER + ⌂.
2. ”**Cont empty?**” is displayed.
3. Set **YES** or **NO** and press ENTER.
4. Before sampling starts the COW will run an automatic calibration cycle.
5. COW will then start sampling according to the programmed choices.

Always let the sampler finish the sample before power is disconnected otherwise the hose valve assembly may be damaged by the pistons stopping in the wrong position.

Exchange of sample container

There is a sample container counter making sure the container is not over filled.

Sample volume and container volume shall be entered in the setup menu. This information is used to determine when the container is full. A container volume of 1 liter will take eight 120-ml samples before it stops. The sampler then stops and the event “container full” is recorded in the event log. To disable the container calculations the container size can be set to infinite by selecting Off (maximum size) in the menu.

The container volume counter is reset when the question “Cont. empty?” is answered with yes. The question comes up when you go from stop or menu state to run state and when the event log has been cleared.

1. Press STOP. The sampler cycle is interrupted.
2. Change the container.
3. Press START. **” Cont. empty?”** is displayed.
4. Change to **”YES”** and press . The COW goes back to normal cycle.
5. The container volume counter is now zeroed and the sampling continues.

Calibration

When the sampler goes from stop or menu state to running state, an automatic level calibration is performed. The automatic calibration is usually successful at adjusting the sampler. If however the automatic calibration fails a manual calibration can be done to adjust operational parameters. A manual calibration will automatically set a number of parameters in the sampler, some of which can be manually adjusted in the service menu at a later time. Consult a service technician before changing the parameters in the service menu. Wrong values may cause the sampler to overfill so water reaches the valves and the pump.

Manual calibration

In Run-state

- Press STOP to stop the sampling.
- Press FUNC until the display shows “START=Manual CAL“.
- Press START to start the calibration. During elevation the display shows “STOP AT REQ LEVL“.
- Press STOP when the liquid reaches the requested level. This must be above the level switch. The software then calculates the right values for several parameters.
- Wait until the calibration cycle is finished.
- Press START to start the programmed sampling.

Cleaning and maintenance

Wash the sample cup and rinse the valve assembly regularly. An extra cup is supplied with the COW.

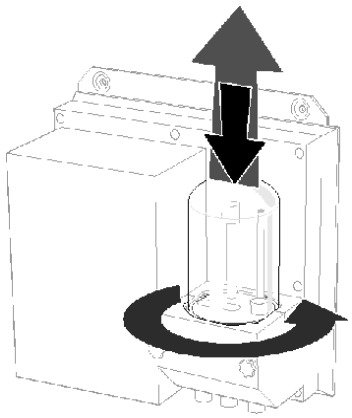
Check the flushing liquid container every week, ordinary water is normally sufficient. A solution with up to 1,5% HCL can be used in demanding applications.

Remove the valve assembly and wash it once a month.

In liquids with a high fat content the vacuum tube needs to be cleaned regularly.

The valve assembly should be exchanged once a year, the rubber ages which can lead to leakage and malfunction.

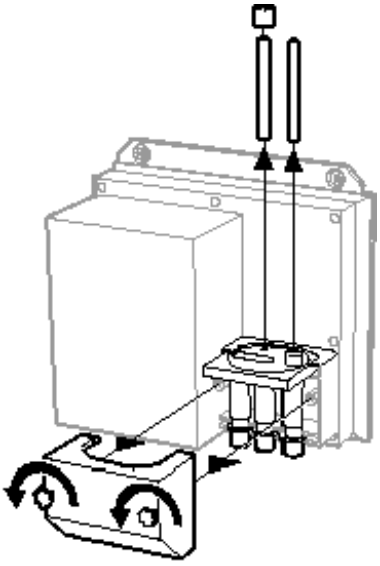
Removal of the sample cup



The sample cup has a bayonet fitting.

- Grasp the cup from above and press it down.
- Turn it counterclockwise.
- Lift off the cup.

Grease the rim of the test cup with the sealant that has been supplied with the equipment. Do this to enhance tightness and flexibility in the joint.

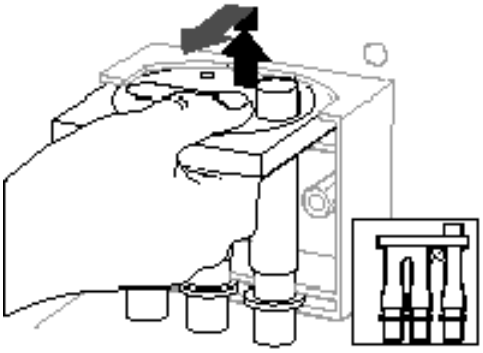


Removal of tubes and cover

- Loosen vacuum, flush and sample tubes by turning and pulling at the same time.
- Unscrew the fastening screws of the holder and remove it.

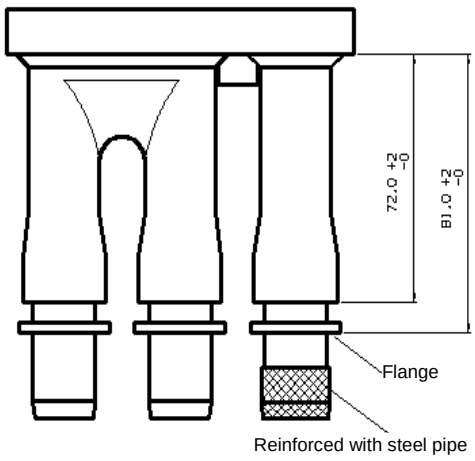
Removal of the hose valve assembly

- Grasp the valve assembly with thumb on top and forefinger between the two tubes at the right.
- Press upwards until the nipples come free of their holes.
- Pull the valve assembly out of the COW.



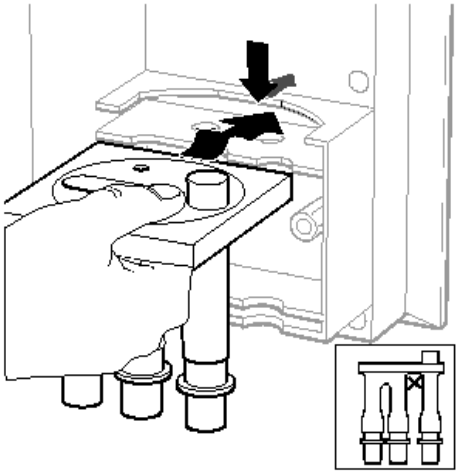
Mounting the couplings

New hose valve assemblies have their couplings pre-mounted. If the couplings are removed it is important that they are remounted at the right distance from the top of the valve assembly to avoid leakage.



- Lubricate the coupling using silicon grease or soap before mounting them.
- The reinforced coupling shall be mounted on the single hose.
- The distance from the top of the valve assembly (underside) to bottom of the flange shall be 81 (-0 / +2) mm. See drawing on the left.

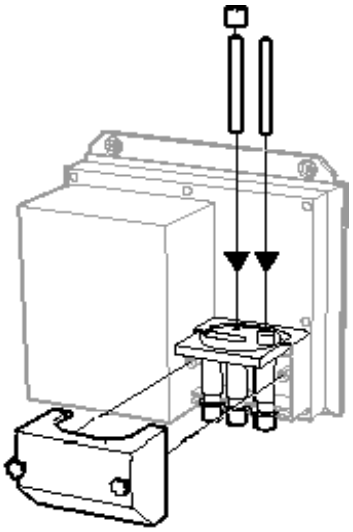
Mounting of the hose valve assembly



- Grasp the valve assembly with thumb on top and forefinger between the two tubes at the right.
- Push the valve assembly between the guides while pressing the middle part upwards to make sure it passes the outer rim.
- When the valve assembly stops near the back, press down the back edge and push it further. Ensure that the Nipples fit in their holes.

NOTE: The nipples must be lubricated with silicon grease after removal and cleaning to make them easier to align.

Mounting of tubes and cover



- Fit the cover, and tighten the fastening screws.
- Lubricate the tubes with some water or silicon prior to mounting. New tubes have a mark showing how far they shall be pressed into the hose valve assembly.
- Make sure that the sample tube is pressed firmly into its hole, if not the volume may be incorrect.
- First mount the flush ring on the vacuum tube, then the hat. Press the hat down as far as possible. Fit the flush ring to the splash protection hat and finally lift the hat 5mm.

Trouble shooting

When the sampler is in Stop State, some functions useful for trouble shooting are available. These functions are reached by pressing FUNC.

Start = Man.calibr	Press START to start a manual calibration, see section above.
UP=COWinfo	Press ↑ to step through the parameters below.
Motor	Shows the running time of the pump motor in hours.
DC Supply	Shows the supply voltage in volts at battery operation.
Sens1out	Shows the error of the level indicator. An ”=”-sign after the digits indicates that the value is within specified range. Contact a service technician to adjust the value if needed.
Start = Flushcycle	Press START to initiate a flush cycle, the achieved under pressure is shown on the display.

Problem	Possible cause	Solution
Difficult to loosen or tighten the sample cup.	Too little or no lubricant on the surface between the valve assembly and the cup.	Grease the surface with the lubricant supplied with the equipment. Never use mineral grease.
Samples are not sucked or are incomplete.	The valve assembly is not located to properly match the holes for level and vacuum tubes.	Press the two nipples on the valve assembly into their respective holes.
	The vacuum tube is not pressed down deep enough in its hole, causing air to leak in.	Press down on the vacuum tube until it hits a stop.
	The filter, inside the unit, on the vacuum hose is clogged	Clean the filter.
	The valve cover holding the valve assembly in place is not mounted correctly.	Tighten the screws on the front cover.
	Leakage at the suction hose connection	Tighten the hose clamp.
	The suction hose collapses due to high temperature. (Heights > 10' (3m) and temperature > 95°F (50°C))	Attach to the end of the hose, a special high temperature reinforced tube or hose, approximately 1 meter (3').
	At temperatures over 120°F (50°C) the water may boil if the elevation height is to large, the sampler will then suck steam and no water.	Lower the elevation height.
The level of the sampled liquid is too low or never reaches the sample cup.	Suction hose is too long relative to the height or horizontal hose is too long.	Shorten the hose as much as possible. Make sure that the angle to the horizontal plane is no less than 10 degrees. Perform a manual calibration.
The flushing or vacuum tubes are impossible to press down in the valve assembly.	The nipples on the valve assembly do not match their respective holes.	Press down on the nipples in respective holes.
.	The friction between a dry tube and a dry valve assembly is too high.	Grease the hose connector or the tube with water or silicon grease.
The level tube or the vacuum tube pops out of position.	A film of lubricant may cause this. A non silicon grease has probably been used.	Clean the hose connector and the tubes from all traces of lubricant. Only water or silicon grease must be used to lubricate these joints.
Air seeping into the sample cup disturbs the sampling process.	The hose clamp on the suction hose is not properly tightened.	Tighten the hose clamp.
	The hose assembly is broken	Exchange the hose assembly.

13. Technical specifications

Manufacturer	Cerlic Controls AB, Kungens Kurva, Sweden
Product name	COW
Dimensions (BxHxD)	13.8”x16.3”x7.3” (350x415x185 mm)
Enclosure	NEMA4 (IP65)
Weight	18.3 lbs (8.3 kg)
Supply voltage	115 V / 60Hz, 230 V / 50 Hz, 12 V DC
Fuse	5 A slow + 1A slow @115V (or 500mA slow @230V)
Power Usage	40 VA (during sample), < 0,5 VA (idle), Average 5 VA
Ambient temp	32 – 122 °F (0 – 50 °C)
Sample liquid temperature	32 – 158 °F (0 – 70 °C)
Inputs	0/4-20 mA (150 ohm), pulse (5-35 VDC or dry contact)
Display	LCD-with backlight, 1 line 16 characters
Parameter storage	EEPROM
Min sample interval	4 minutes
Max elevation	18’ (6 meters)
Suction hose	3/4”ø (ø19 mm) (inlet ø16 mm)
Sample hose	3/4”ø (ø19 mm) (outlet ø18 mm)
Excess hose	3/4”ø (ø19 mm) (outlet ø18 mm)
Flushing hose	0.23”ø x 0.31 ø (ø 5 x ø 8 mm)
Acid in rinse liquid	max 1,5 % HCl
Sample volume	~30 till 500 ml
Front cover	minlon plastic
Chassis	aluminium plate
Vacuum cup	macrolon plastic
Valve assembly	silicon rubber

Certificate of conformity:

The COW-µp water sampler conforms to the following EC Directive(s) when installed in accordance with the installation instructions contained in the product documentation:

73/23/EEC	Low Voltage Directive as amended by 93/68/EEC
89/336/EEC	EMC Directive as amended by 92/31/EEC and 93/68/EEC

The following standards and/or technical specifications have been applied:

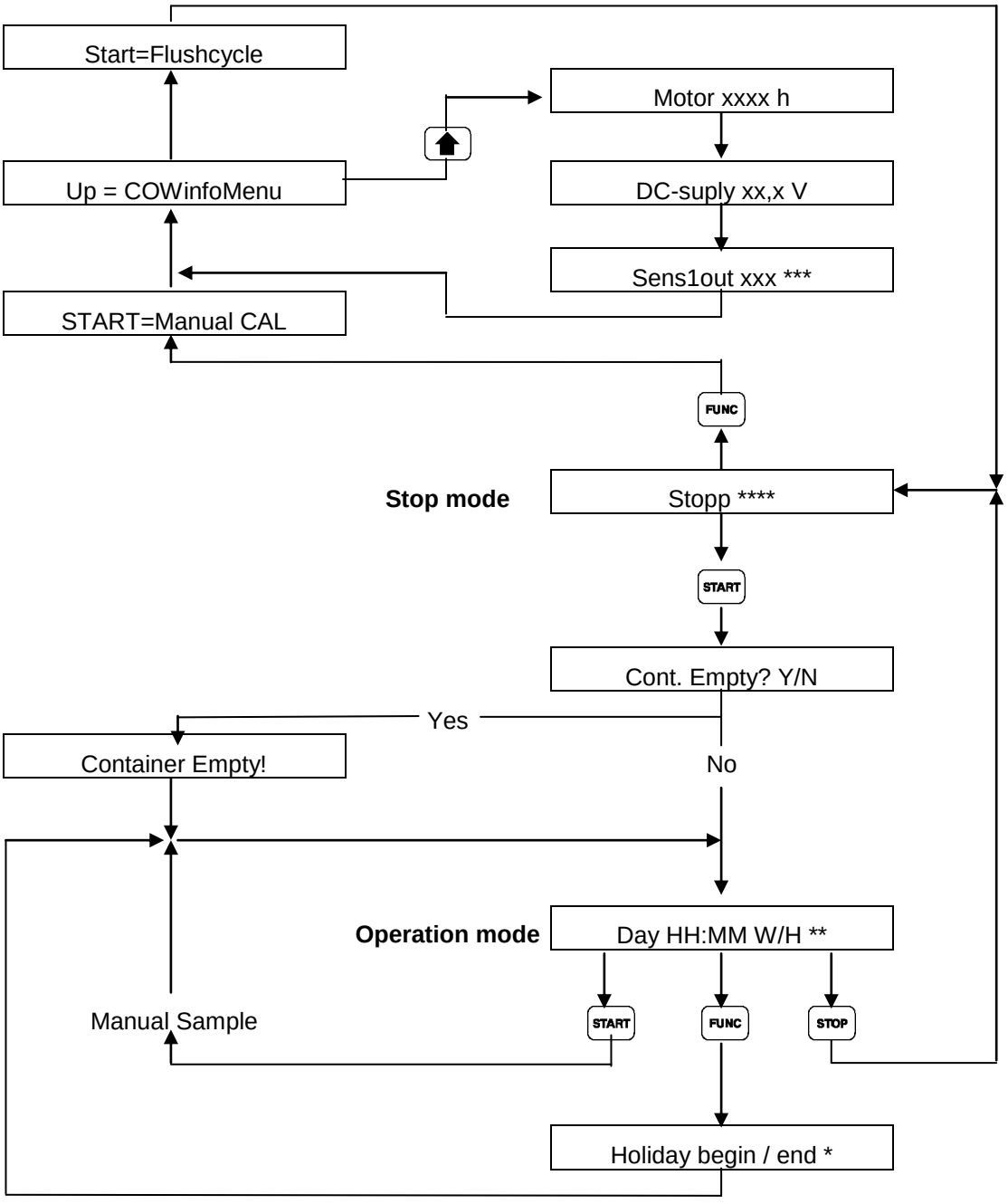
EN 61000-6-4:2001	Electromagnetic compatibility (EMC) Part 6-4 Generic standards – Emission standard for industrial environments
EN 61000-6-2:2001	Electromagnetic compatibility (EMC) Part 6-2 Generic standards - Immunity for industrial environments
EN 61010-1:2001	Safety requirements for electrical equipment for measurement, control, and laboratory use

Spare parts:

10205420	Hose valve assembly including 1 steel sheathed nipple
10705096	Flushing bottle including 1/4" hose
11105206	Screw, hose valve assembly front panel
10203198	Front panel, hose valve assembly
11205402	SS sleeved plastic nipple
10203200	Sample cup
10203203	Cap for vacuum pipe
10203204	Vacuum pipe
10205085	Level pipe, length 25mm, 100ml
10205093	Level pipe, length 100mm, 500ml
10203239	Flushing liquid pipe
10205201	Sample outlet hose Ø 3/4" 1m, clear
10203469	Suction hose Ø 3/4" 5m, reinforce
10205202	Discharge hose Ø 3/4" 2,5m, clear
11205559	Mounting bracket for COW on Refrigerator
21705194	Vacuum pump
10205204	Air filter
20205370	Pump membrane Ø 54 mm
20205367	Pump membrane Ø 16 mm

Appendix 1, Flowcharts

Run and stop state



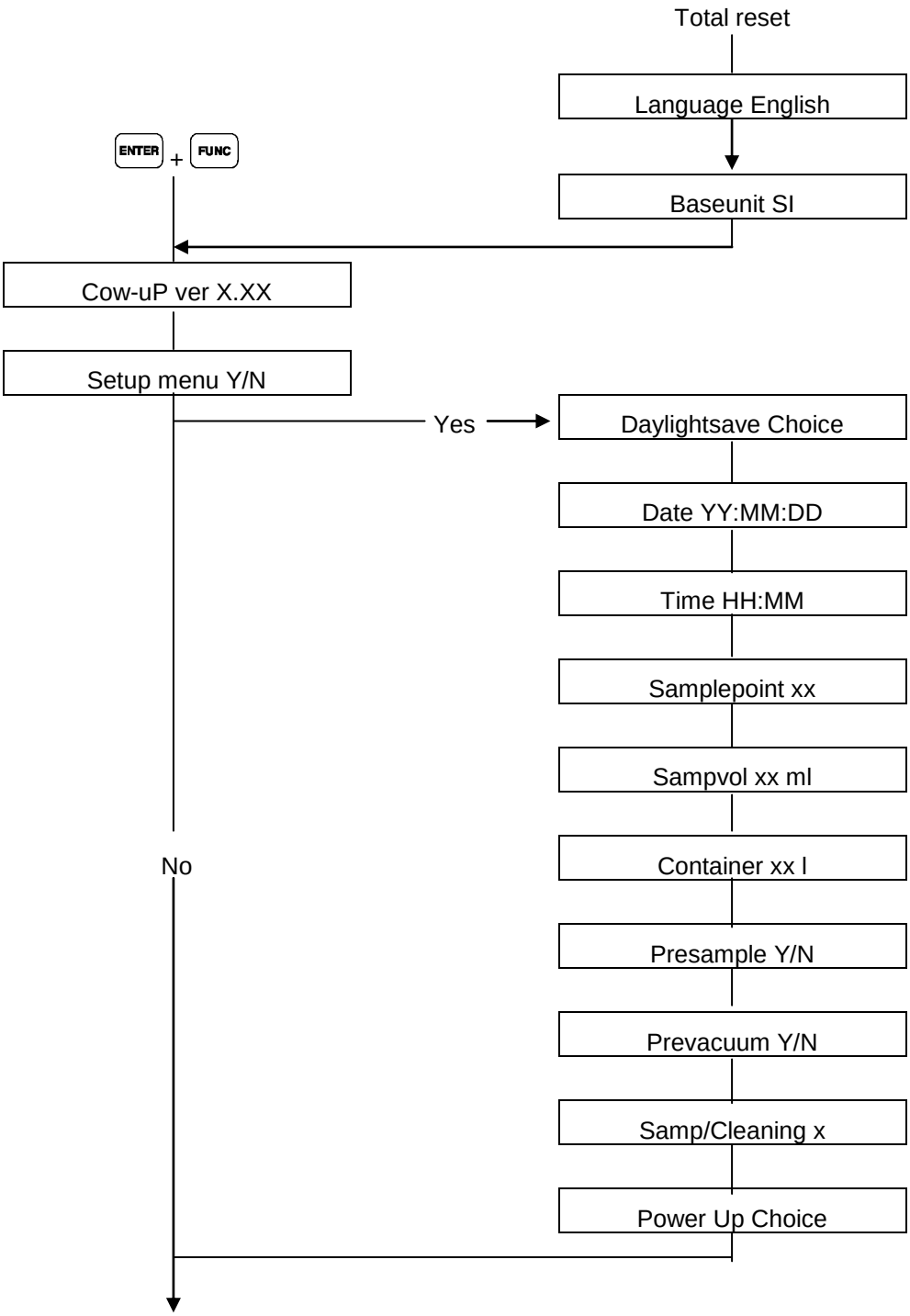
* Holiday question is only available if weekend program is programmed. Press Enter to start the weekend program. The sampler will then use the weekend program until holiday is ended

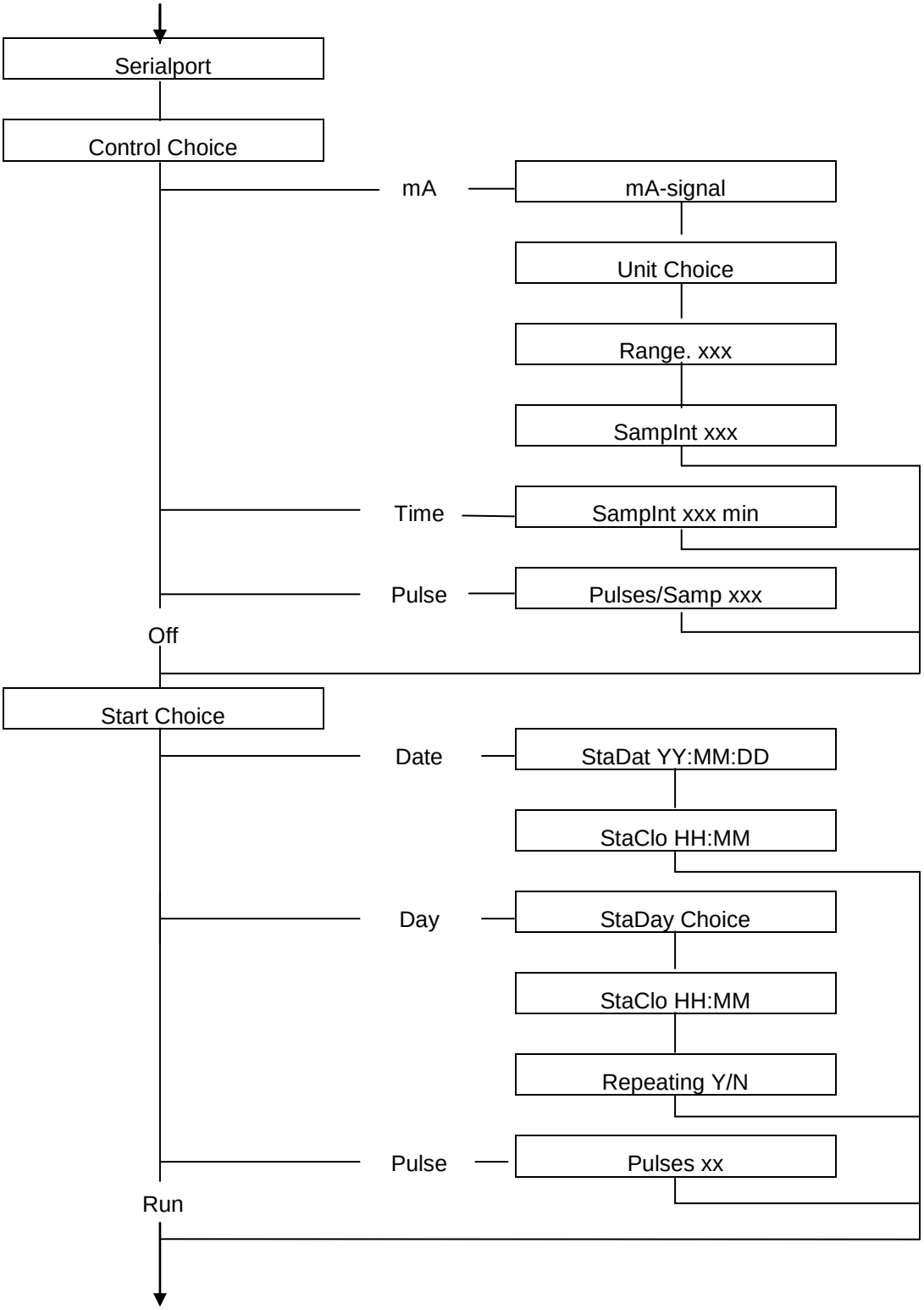
** W indicates weekend is active, H indicates holiday is active, No character at normal weekdays

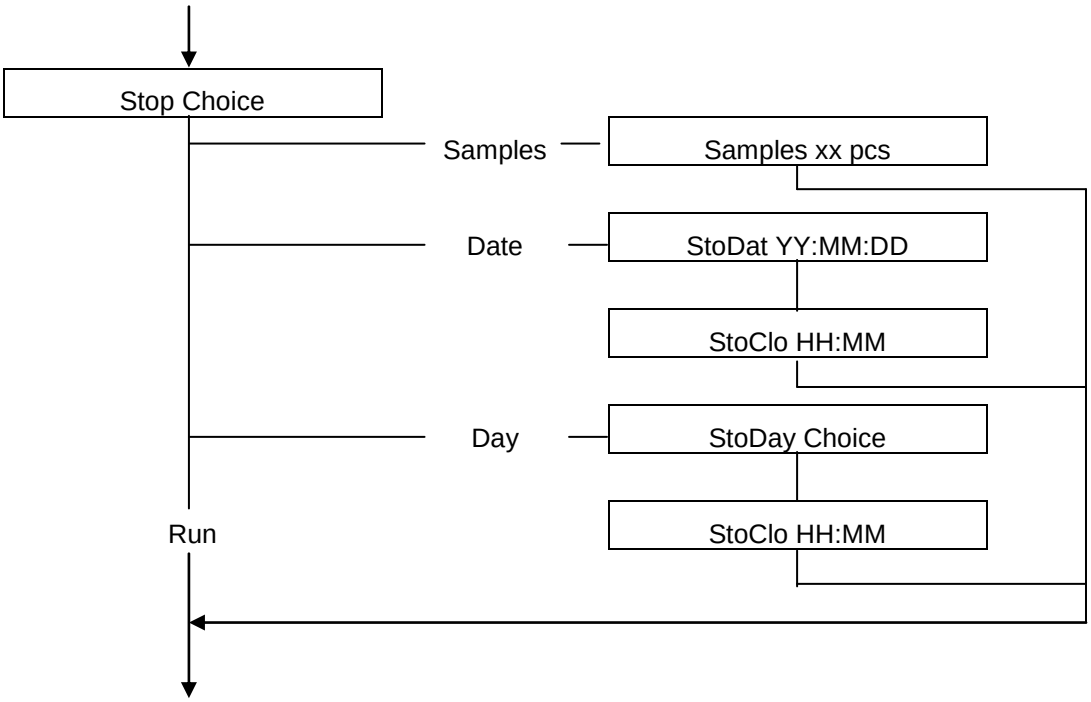
*** For more information contact a service technician.

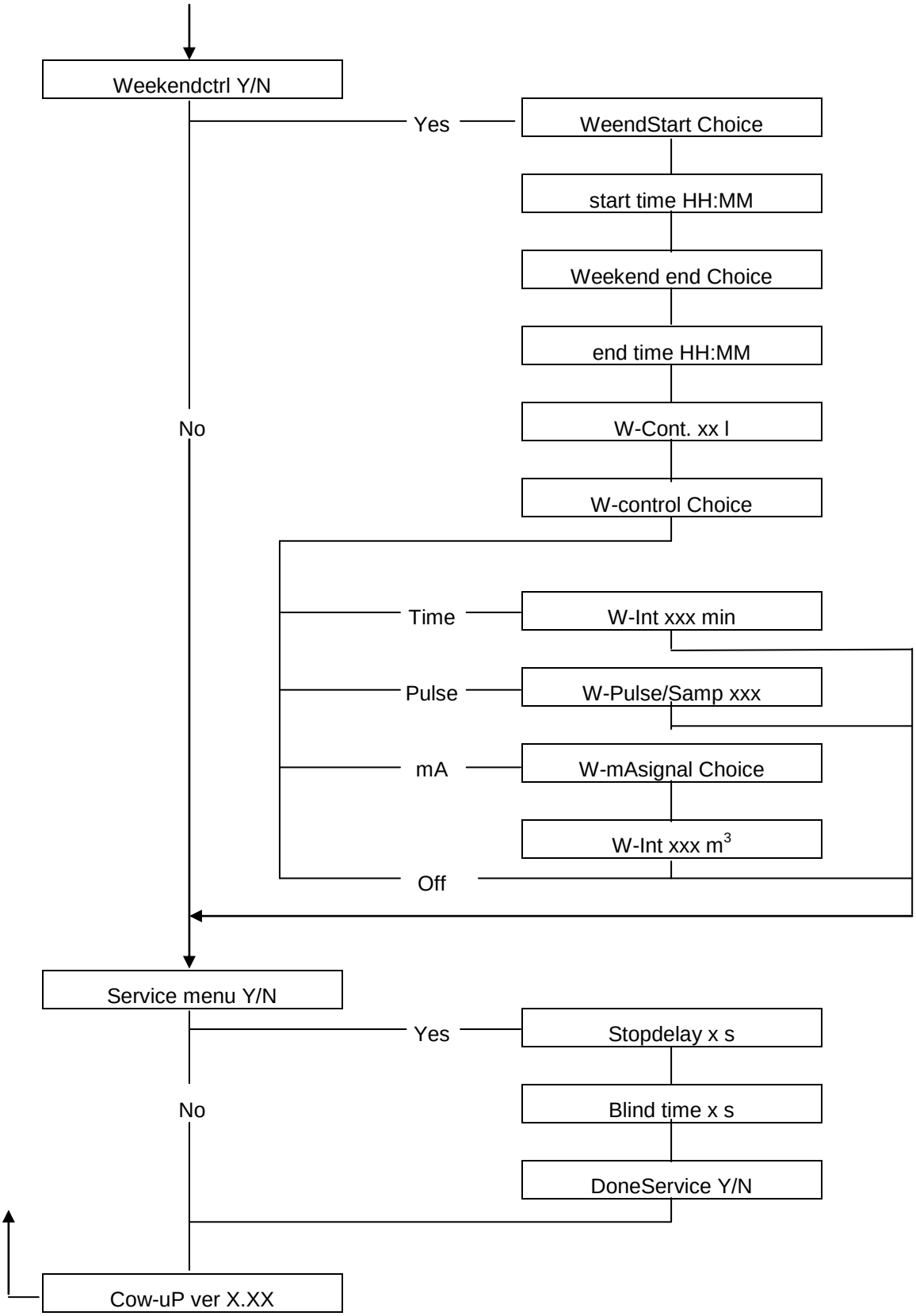
**** If the sampler enters alarm state (see the log chapter) it is acknowledged by pressing the stop button where after the sampler will go into stop state.

Menu state

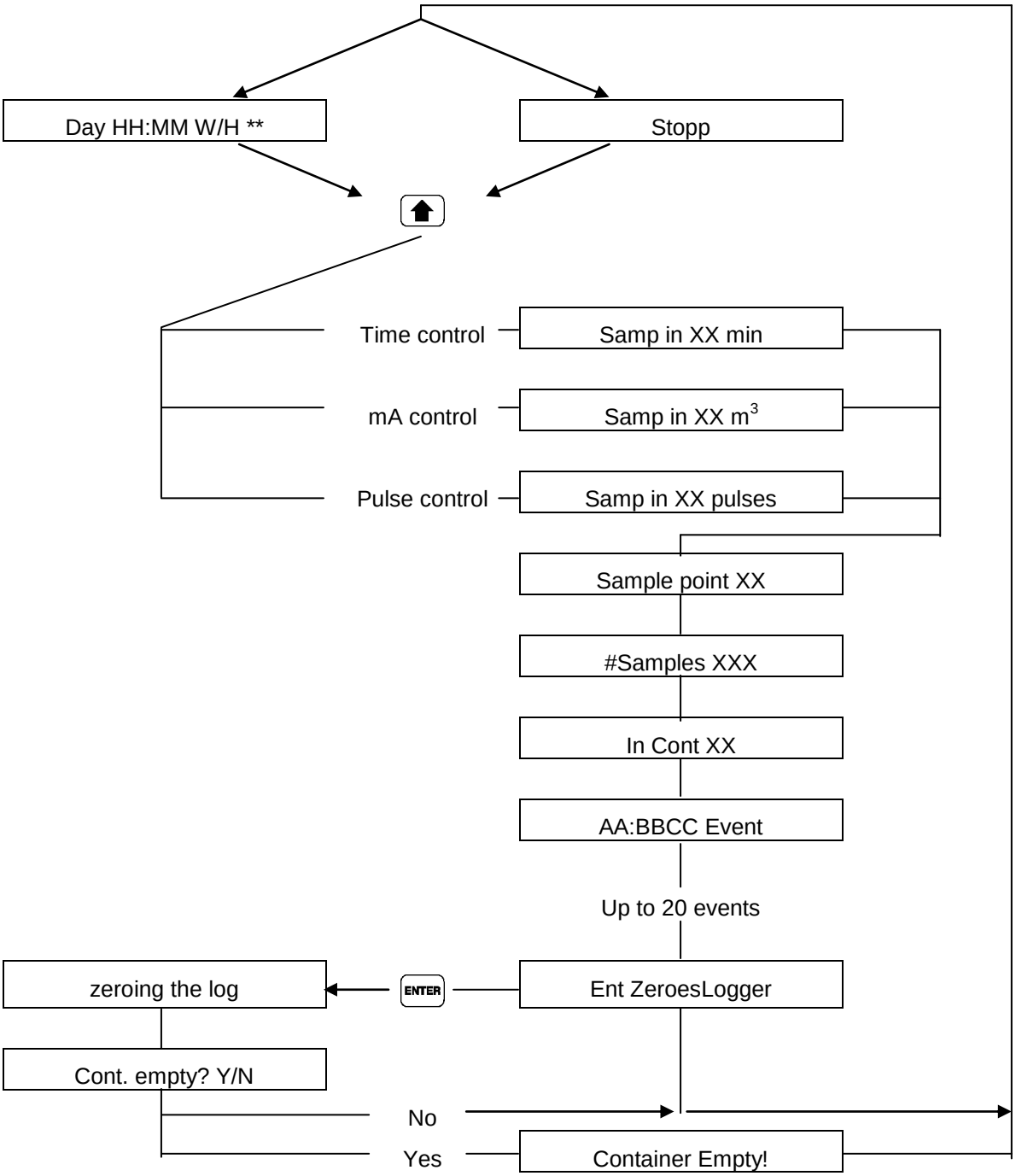

Total reset
Language English
ENTER + FUNC
Baseunit SI
Cow-uP ver X.XX
Setup menu Y/N
Yes
Daylightsave Choice
Date YY:MM:DD
Time HH:MM
Samplepoint xx
Sampvol xx ml
No
Container xx l
Presample Y/N
Prevacuum Y/N
Samp/Cleaning x
Power Up Choice


Serialport
Control Choice
mA
mA-signal
Unit Choice
Range. xxx
SampInt xxx
Time
SampInt xxx min
Pulse
Pulses/Samp xxx
Off
Start Choice
Date
StaDat YY:MM:DD
StaClo HH:MM
Day
StaDay Choice
StaClo HH:MM
Repeating Y/N
Pulse
Pulses xx
Run


Stop Choice
Samples
Samples xx pcs
Date
StoDat YY:MM:DD
StoClo HH:MM
Day
StoDay Choice
StoClo HH:MM
Run


Weekendctrl Y/N
Yes
WeendStart Choice
start time HH:MM
Weekend end Choice
end time HH:MM
W-Cont. xx l
W-control Choice
No
Time
W-Int xxx min
Pulse
W-Pulse/Samp xxx
mA
W-mAsignal Choice
W-Int xxx m3
Off
Service menu Y/N
Yes
Stopdelay x s
Blind time x s
DoneService Y/N
No
Cow-uP ver X.XX

Log reading


Day HH:MM W/H **
Stopp
Time control
Samp in XX min
mA control
Samp in XX m3
Pulse control
Samp in XX pulses
Sample point XX
#Samples XXX
In Cont XX
AA:BBCC Event
Up to 20 events
zeroing the log
ENTER
Ent ZeroesLogger
Cont. empty? Y/N
No
Yes
Container Empty!

Appendix 2, Your settings

To facilitate settings and changes in parameters this list comprises all possible menu choices and their default values. Please enter your own settings.

This list will be useful for service and maintenance. Make sure the list is up to date.

Menu	Default	Your settings
Language	English	
Base unit	SI	
Daylight saving	No	
Sample point	0	
Sample volume	100 ml	
Container volume	15,00 l	
Presample	nej	
Prevacuum	nej	
Samples/Cleaning	0	
Control	tid	
Sample intervall	10 min	
Pulsers/sample	1	
mA-signal	4-20	
Unit	m3/h	
Range	1000 m3/h	
Sample intervall	5000 m3	
Serieal port	Empt.	
Power Up	Run	
StaDat		
StaDay		
StoClo		
Repeating	No	
Stop	Run	
Samples	0 pcs	
StoDat		
StoDay		
StoClo		

Weekend control	No	
StaDay	Friday	
StaClo	16.00	
StoDay	Monday	
StoKlo	08.00	
W-Cont.	15.00 l	
W-control	No	
W-mA-signal	4-20	
W-Int	10 min	
W-Int	5000 m3	
W-Pulse/Samp	1	

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