

# Portable water sampler *liqui-box 2 / liqui-compact 2*

## Automatic sampling for liquids



### A comfortable partner

- Automatic sampling of liquids at the touch of a button.
- Sampling sequences, time, quantity or event controlled.
- Liqui-Box 2 for simple wall mounting or for retrofitting into empty housings.
- Stand or suspension system available for the Liqui-Box 2.
- Liqui-Compact 2 as complete unit with integrated cooler box.
- 230 V mains version or 12 V battery powered unit.

### Safety first

- Self contained vacuum principle, no further feed systems required.
- Built in pump has no liquid contact.
- "Air-manager", no more electro-mechanical valves, no more corrosion.

- Double overflow protection in dosing chamber.
- Large diameter hose reduces the chance of blockages.
- Lightweight.

### For universal application

- In water authorities
  - for customer control and verification
  - for monitoring water sources.
- In treatment plants
  - for monitoring each cleansing stage
  - for use outside the treatment plant.
- In industry
  - for environmental self monitoring.
- In laboratories and environmental organisations
  - portable application in remote areas.

Quality made by  
 Endress+Hauser



ISO 9001

# Endress+Hauser

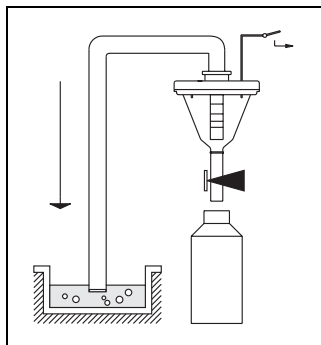
Nothing beats know-how



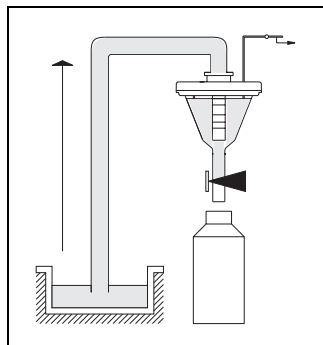
## Sampling sequence

The microprocessor controlled water sampler is fitted with a diaphragm pump. Sequence control is performed by the built-in "air-manager" (suction, blow out, hose clamp open/close, etc.)

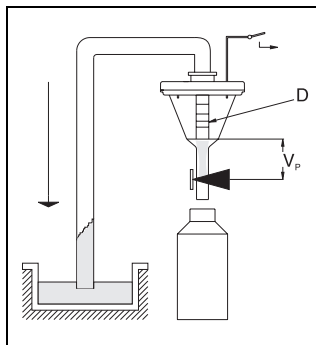
### Vacuum principle



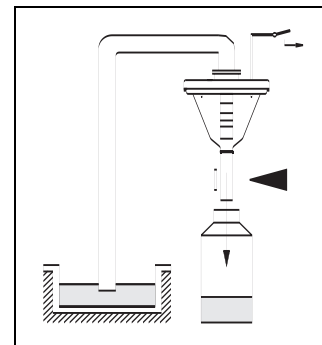
1. The dosing system is pneumatically isolated at the beginning of each sampling sequence. The diaphragm pump blows air into the dosing chamber and through the suction hose clearing any obstructions.



2. A new sample is sucked into the dosing chamber until the electrodes fitted in the dosing chamber lid are active.



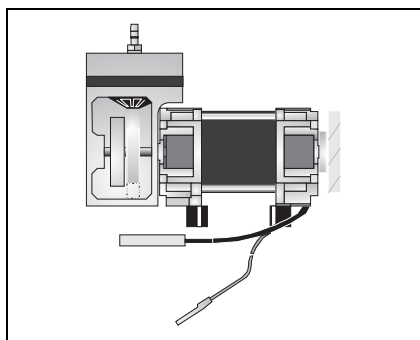
3. Dependent on the setting of the dosing tube D excess liquid flows back to the sampling point and the preset dosing volume ( $V_P$ ) is dosed.



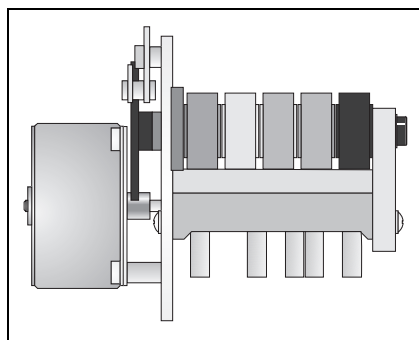
4. The hose clamp is opened and the sample is released into a container.

### Pneumatic components

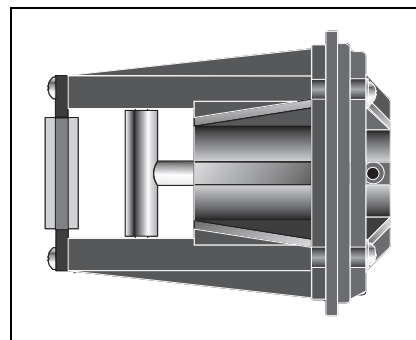
The vacuum diaphragm pump supplies the "air-manager" and the hose clamp valve.



Vacuum diaphragm pump

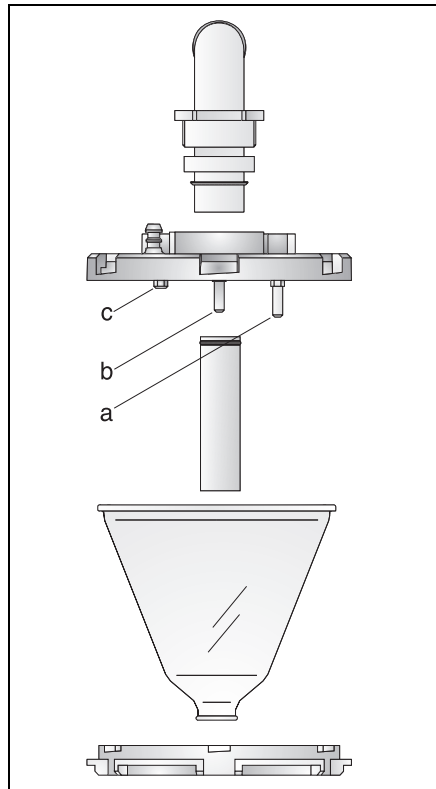


"air-manager" pneumatic controller constructed as a stepped cam switch



Pneumatic hose clamp valve with cylindrical membrane

# The dosing system



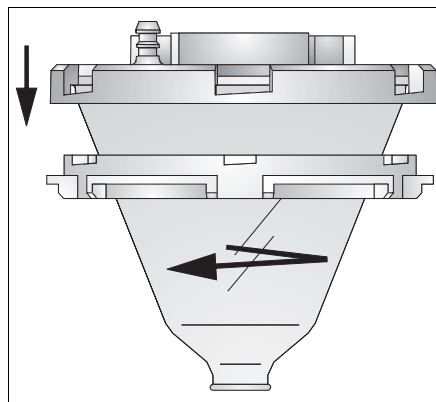
Dosing chamber, dosing tube and lid with conductivity level electrodes (a,b,c).

## Double safety

There are three pins (conductivity level electrodes) in the lid of the dosing chamber, each of a different length. In the suction phase the sample reaches the two longest electrodes (a and b). The controller recognises that the dosing chamber has been filled and the suction phase has ended. The shortest electrode (c) should normally not be reached.

Should the liquid reach the short electrode this means the other electrodes are dirty. The unit initiates an emergency stop and displays this as a message.

To remove this fault simply clean the conductivity electrodes.



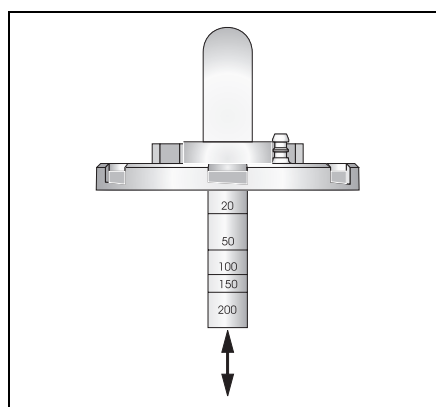
Opening the dosing chamber

## Easy handling

By twisting and pulling (bayonet fitting) the cover ring connection to the dosing chamber lid is removed.

The dosing chamber can now be removed from the lid.

The chamber and electrodes can now be cleaned in a sink without any obstructive cable connections.



Varying the dosing tube

## Setting up sample volume

The sample volume is dependent on the position of the dosing tube.

Engraved markings on the side of the dosing tube assist in setting the volume. Sample volumes of 20 ml to 200 ml can be set (option: 20 - 350 ml).

## Choice of two controllers

### Standard controller A:

Operating the AUT push button starts the automatic sample cycle. This can be initiated on a timed sequence, quantity proportional or by an external event.

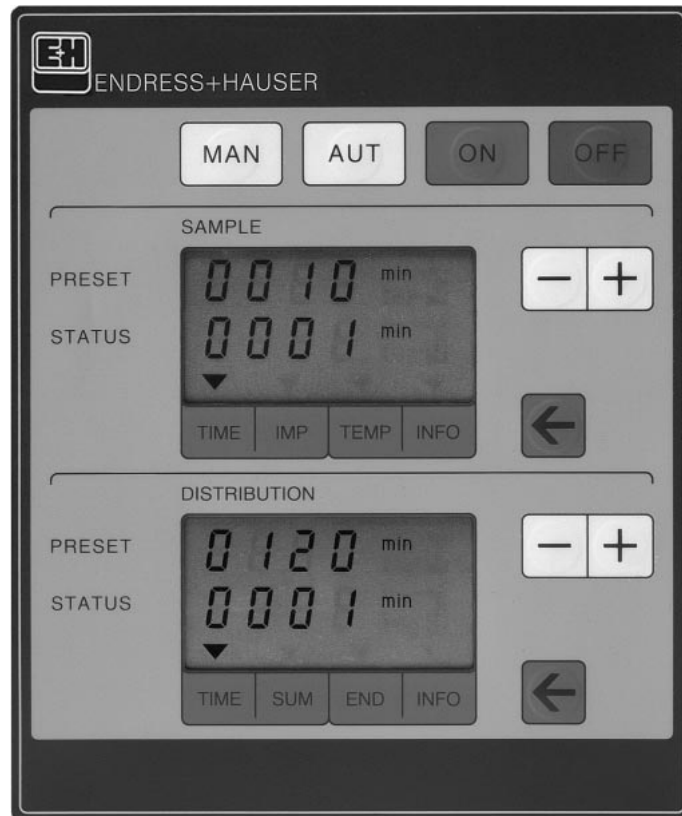
Sample distribution is done either on a preset time (...minutes to bottle change) or after a preset number of samples per bottle.

Example:

Sampling is required every 10 minutes: The preset value is set to 10 min. The actual (status) value is increased by 1 every minute, sampling occurs once both counters register the same value. The status counter is reset to zero and the sequence is repeated. Sample distribution is to be filling time per bottle every 2 hours. Set the preset value in the lower display to 120 min, the sample distribution system moves to the next container after 2 hours.

Other features:

1 impulse input for flow, 1 stop input, 2 outputs (sequence end and alarm). Presettable sample start time delay "count-down".



Liqui-Box A2 controller  
The upper display indicates sampling sequences, the lower one the sample distribution

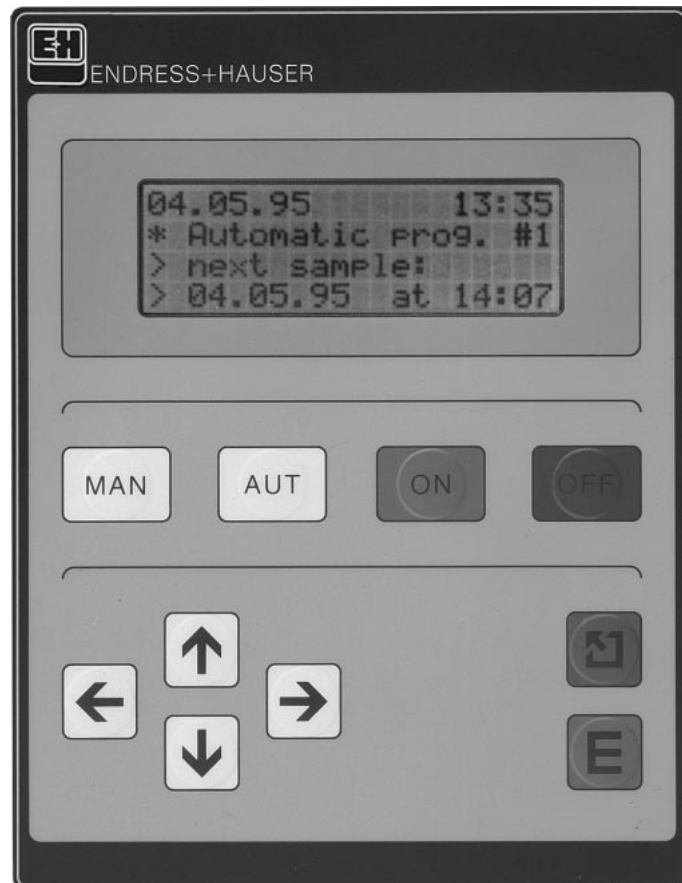
### Multi functional controller D:

Expanded functions:

- Four line LC-Display
- Operator information for sample sequence programmes
- 6 user programmes
- Programme change criteria
- Timer functions
- Matrix operation

Other features:

1 impulse input for flow, 1 analogue input (eg. 0/4 to 20 mA), 1 stop input, 1 control input for event control or programme change, 3 presettable outputs for alarm, messages and signals.



Liqui-Box D2 controller  
Matrix operation with alphanumeric display

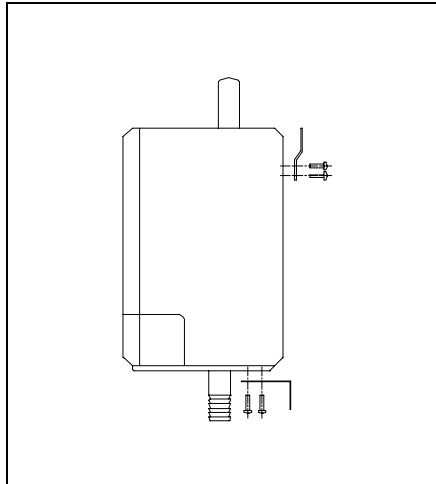
# Installation and accessories

## Instructions

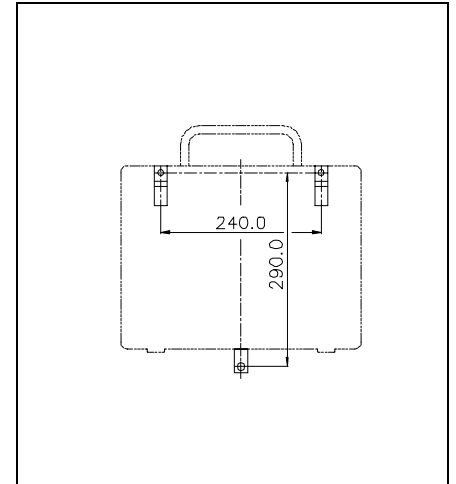
- Maximum hose length 30 m. Suction height up to 6 m.
- Hose connections 13 mm and 15 mm.
- Sampling point level must always be below the sampler.
- Avoid creating syphons.
- Sampling from pressure lines is not possible.
- Install on level ground, vertically and protected against tipping or falling over.

## Accessories

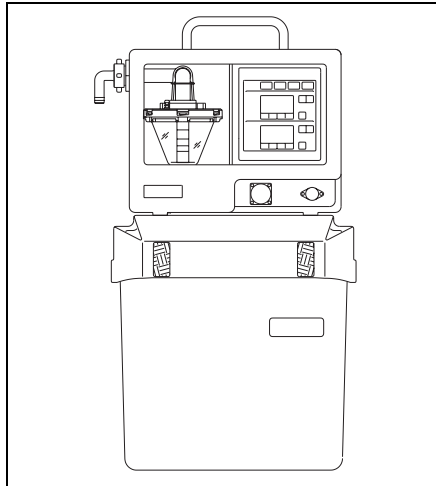
- Suction hose 13 mm or 15 mm.
- Hose weight or suction filter.
- Glass dosing chamber (350 ml).
- Heating (30 VA), only for use with 230 V<sub>AC</sub> unit.
- Additional cooler box (Liqui-Compact 2)
- Only for Liqui-Box 2:
  - 13 l or 30 l composite container.
  - Wall mounting kit.
  - Stand and weather roof
  - Suspension system



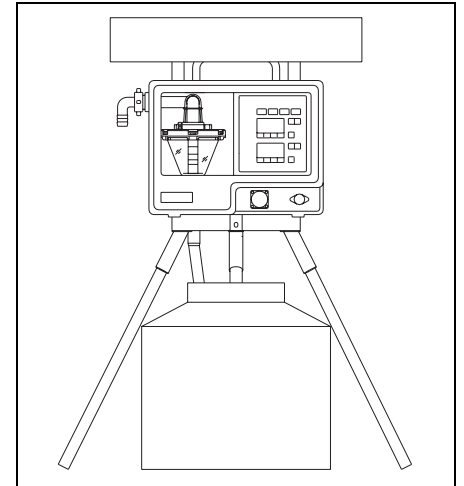
Accessory:  
Wall mounting kit (1 angle bracket, 2 straps, 6 fixing screws) for Liqui-Box 2



Drilling template for wall mounting, (dimensions in mm), hole diameter 7.5 mm



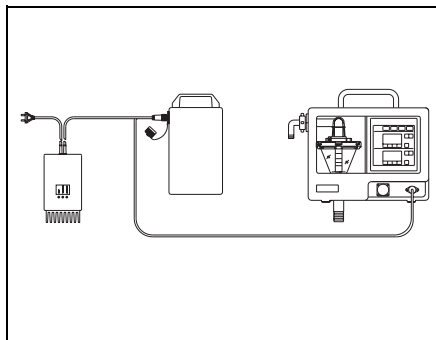
Liqui-Compact 2  
with integrated exchangeable cooler box and internally mounted freezer packs.



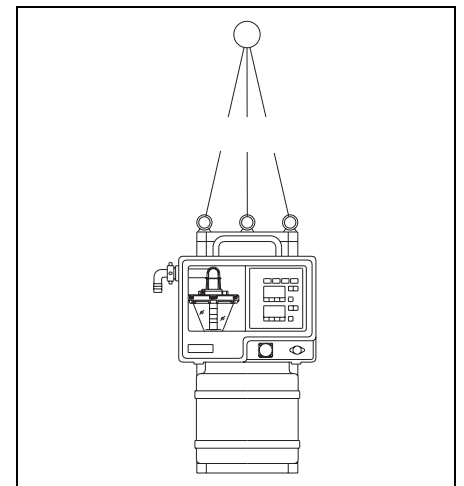
Accessory:  
Tripod stand for Liqui-Box 2 with roof and composite container (30 l).

## Battery operation

Battery capacity approx. 400 samples in 5 minute cycle with 3.5 m hose length.



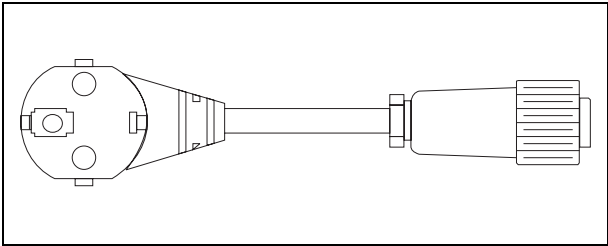
Options:  
Charger, battery pack, Liqui-Box 2 / 12 V<sub>DC</sub> or Liqui-Compact 2 / 12 V<sub>DC</sub>



Accessory:  
Stand with suspension system for Liqui-Box 2 with composite container (13 l).

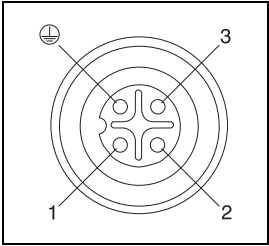
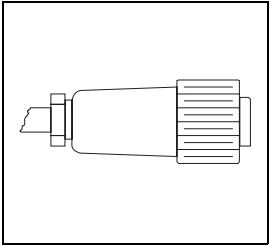
# Electrical connections

## On mains versions (AC)



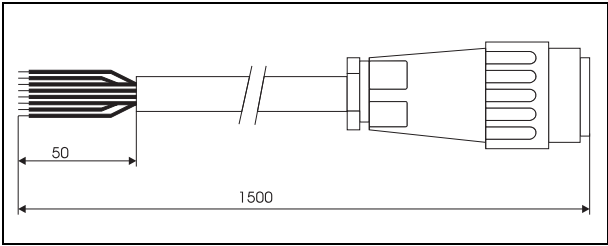
Connections marked on the amphenol connector:  
1 = L  
2 = not used  
3 = N  
⊕ = PE

## On DC versions (12 V DC)



Connections:  
1 = not used  
2 = Plus pole  
3 = not used  
⊕ = Minus pole

## Signal cable with plug



Dimensions in mm

## Plug connections:

### Controller version A:

|   |          |   |
|---|----------|---|
| 1 | = white  | Auxiliary voltage (-)<br>0 V, common          |
| 2 | = brown  | Auxiliary voltage (+)<br>8 to 18.5 V (output) |
| 3 | = green  | Quantity impulses<br>(input)                  |
| 4 | = yellow | External stop<br>(input)                      |
| 5 | = grey   | Do not use                                    |
| 6 | = pink   | Alarm (output)                                |
| 7 | = blue   | Sequence end (output)                         |
| 8 | = red    | Do not use                                    |

### Controller version D:

|   |          |   |
|---|----------|---|
| 1 | = white  | Auxiliary voltage (-)<br>0 V, common          |
| 2 | = brown  | Auxiliary voltage (+)<br>8 to 18.5 V (output) |
| 3 | = green  | Quantity impulses<br>(input)                  |
| 4 | = yellow | External stop<br>(input)                      |
| 5 | = grey   | Do not use                                    |
| 6 | = pink   | Output 1                                      |
| 7 | = blue   | Output 2                                      |
| 8 | = red    | Do not use                                    |

Cable LiYY 8 pole. (approx. 1.5 m long)  
Cores 7 x 0,23 / 0,25

|    |                |   |
|----|----------------|---|
| 9  | = black        | Auxiliary voltage (+)<br>8 to 18.5 V (output) |
| 10 | = violet       | Analogue input (-)                            |
| 11 | = white/black  | Analogue input (+)                            |
| 12 | = white/red    | Output 3                                      |
| 13 | = white/green  | Control input                                 |
| 14 | = brown/green  | TXD   |
| 15 | = white/yellow | RXD (+)                                       |
| 16 | = white/blue   | RXD (-)                                       |
| 17 | = white/grey   | 0 V TTY                                       |
| 18 | = white/brown  | +U TTY  |

Cable LiYY 18 pole. (approx. 1.5 m long)  
Cores 7 x 0,23 / 0,25

# Technical data

## Housing:

Protection class: Controller IP 55 to DIN 40050, Wet compartment IP 44  
**Liqui-Box 2:**  
Dimensions (without handle and hose connections): H x W x D approx. 280 x 380 x 190 mm  
Material ABS  
Weight approx. 10 kg  
**Liqui-Compact 2:**  
Dimensions (complete): H x W x D approx. 780 x 430 x 330 mm  
Weight approx. 15 kg (empty)

## Temperatures:

Allowable medium temperature:  
> 0 °C to + 50 °C

## Ambient temperature:

Without heater +5 °C to +40 °C  
With heater -10 °C to +40 °C  
Storage temperature: +5 °C to +40 °C

## Minimum medium conductivity:

> 30 µS/cm (others on request)

## Power supply:

230 V<sub>AC</sub>, + 10% - 15%, 50/60 HZ  
Option: 12 V<sub>DC</sub>, range 11 - 14 V  
Off < 9.8 V, On > 10.8 V

## Power consumption:

Controller version A+D:  
12 V<sub>DC</sub> version: 45 W,  
OFF approx. 20 mA, ON approx. 25 mA,  
during sampling approx. 3.3 A.  
AC version 50 VA, with heater 80 VA.

## Safety:

To EN 61010-1

## EMC-immunity:

To EN 50082-1

## RF:

To EN 50081-2

## Data security:

> 500 h during power failure  
Condition: 7 days on power before failure.

## Transfer:

Transfer system: Built-in diaphragm pump  
Transfer conditions: Height max. 6 m at 1013 hPa, distance max. 30 m at 1013 hPa, suction speed 0.6 m/s at 4 m suction height and 4 m hose length, 13 mm hose diameter.  
Sampling from pressure lines is not possible.

## Dosing:

Volume per sample presettable from 20 ml to 200 ml.  
(option 20 - 350 ml suction speed < 0.6 m/s)

## Sample distribution:

Presettable fill time per bottle or number of samples per bottle. Presettable cycle end or continuous operation.

## Controller version A:

### Sampling using the vacuum principle:

Time proportional 1 min. to 9999 min.  
Quantity proportional 1 imp. to 9999 imp.  
Event controlled 1 Imp.  
Manual start using MAN push button.

### Count down:

Presettable time delay before automatic sample start  
0 ... 9999 minutes.

### Impulse input (for quantity impulses):

Optocoupler input positive edge controlled, galvanically isolated.  
Min. impulse length 10 ms,  
Low 0 ... + 3 V, High + 7 ... + 27 V.

### Stop input:

Optocoupler input positive edge controlled, stop when High.  
Low 0 ... + 3 V, High + 7 ... + 27 V.

### Two outputs:

Transistor outputs NPN open collector  
I<sub>max</sub> 50 mA, U<sub>max</sub> + 25 V<sub>DC</sub>  
Deactive during alarm and power failure.

### Auxiliary output voltage:

U<sub>ext</sub> + 8 ... + 18.5 V<sub>DC</sub> (200 mA).

## Controller version D:

### Sampling:

6 presettable programmes, presettable programme change criteria (eg. Q-t changeover etc.)  
Sample types:  
Time proportional 1 min. to 9999 min.  
Quantity proportional  
Event controlled 1 Imp.  
Manual start using MAN push button.

## Timer:

Individual start/stop operation or daily/weekly switch functions.

## Impulse input:

Optocoupler input positive edge controlled, galvanically isolated.  
Min. impulse length 10 ms,  
Low 0 ... + 3 V, High + 7 ... + 27 V.

## Analogue input:

Switchable as current or voltage input  
Current input: 0 ... + 20 mA  
+ 4 ... + 20 mA  
Input impedance 50 Ohm  
Voltage input: 0 ... + 1 Volt  
0 ... + 10 Volt.  
Impedance 1 Megaohm

## Stop input:

Optocoupler input, galvanically isolated, stop when High.  
Low 0 ... + 3 V, High + 7 ... + 27 V.

## Control input:

Optocoupler input, galvanically isolated, presettable as programme change or event input.  
Programme change when High, programme return when Low.  
Event command on positive edge.  
Min. impulse length 20 ms.  
Low: 0 ... + 3 Volt, High: + 7 ... + 27 Volt.

## Three outputs:

For alarms, events and signals, allocated during setting up.

## Outputs 1 and 2:

Transistor output NPN open collector  
I<sub>max</sub> 50 mA, U<sub>max</sub> + 25 V<sub>DC</sub>  
Deactive during alarm and power failure.

## Output 3:

Transistor output NPN open collector  
I<sub>max</sub> 50 mA, U<sub>max</sub> + 25 V<sub>DC</sub>.  
Switch function can be defined as "Standard" or "Inverse" during setting up.

## Auxiliary output voltage:

U<sub>ext</sub> + 8 ... + 18.5 V<sub>DC</sub> (200 mA).

## Interface:

TTY: Formated for data printers  
Uni-Bit or Primo-Bit.  
V24: Option.

## How to order

| Liqui-Box 2   |  |  |              | Liqui-Compact 2   |  |  |              |
|---|--|--|--------------|---|--|--|--------------|
| <b>Controller type</b><br>A Controller A<br>for standard applications<br>D Controller D, /Danish<br>E Controller D, /English<br>F Controller D, /French<br>G Controller D, /German<br>I Controller D, /Italien<br>N Controller D, /Dutch<br>S Controller D, /Spanish<br><br><b>Power supply</b><br><b>/ Heater</b><br>1 230 V <sub>AC</sub><br>2 230 V <sub>AC</sub><br>with heater<br>3 12 V <sub>DC</sub><br>without battery<br>4 12 V <sub>DC</sub><br>with battery<br>5 12 V <sub>DC</sub><br>with battery and charger<br><br><b>Dosing phase</b><br>A Pressureless dosing<br>B Dosing under pressure |  |  |              | <b>Controller type</b><br>A Controller A<br>for standard applications<br>D Controller D, /Danish<br>E Controller D, /English<br>F Controller D, /French<br>G Controller D, /German<br>I Controller D, /Italien<br>N Controller D, /Dutch<br>S Controller D, /Spanish<br><br><b>Power supply</b><br><b>/ Heater</b><br>1 230 V <sub>AC</sub><br>2 230 V <sub>AC</sub><br>with heater<br>3 12 V <sub>DC</sub><br>without battery<br>4 12 V <sub>DC</sub><br>with battery<br>5 12 V <sub>DC</sub><br>with battery and charger<br><br><b>Dosing phase</b><br>A Pressureless dosing<br>B Dosing under pressure |  |  |              |
| RPB10-  |  |  | ← Order code | RPC10-  |  |  | ← Order code |

## Accessories

| Accessory   | Order code |
|---|------------|
| Suction hose, internal diameter 13 mm                 | 50074496   |
| Suction hose, internal diameter 15 mm                 | 50031904   |
| Suction hose, internal diameter 16 mm                 | 50076633   |
| Hose weight 500 mm V2A 13 mm                          | UE-SDH     |
| Hose weight 400 mm V2A 15 mm                          | 50079739   |
| Submersion armature PVC, V2A pivoted                  | 50038168   |
| Hose filter complete                                  | 50079731   |
| Wall mounting kit for Liqui-Box 2                     | UE-DNB     |
| Stand with suspension system                          | UE-LGH     |
| Tripod stand  | UE-LGE     |
| Sun protection cover for Liqui-Box 2, on tripod stand | UE-LGF     |
| Glass dosing chamber with fixings (350 ml)            | 50079732   |
| 12 V / 3A/ IP 20 charger                              | 50046154   |
| 12 V / 10 Ah battery pack                             | 50046155   |
| 13 l container with lid and stopper                   | 50038012   |
| 30 l container with lid                               | 50040869   |
| Liqui-Compact 2 container complete with lid           | 50057378   |
| Single freezer packs for Liqui-Compact 2              | 50057345   |

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