MLBU EN 01042019

READ AND SAVE THESE INSTRUCTIONS

ML SERIES

INSTALLATION AND OPERATION MANUAL

Adiabatic humidification system
Condair **MLBU**
English version

Humidification and Evaporative Cooling

condair

Thank you for choosing Condair

Installation date (MM/DD/YYYY):
Commissioning date (MM/DD/YYYY):
Site:
Model:
Serieal number:

Manufacturer
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1 Generelt

1.1 Foreword

This manual has been written to ensure the safe use, performance and longevity of the equipment, and is intended for use by engineers and properly trained technical personnel. Please read this manual thoroughly before specifying, designing or installing an ML-System from Condair A/S. Keep for future reference.

As our policy is one of continuous research and development, we reserve the right to amend, without notice, the specifications provided in this document. Condair A/S does not guarantee nor accept liability for the accuracy of information in this document.

This installation and operation manual is supplemented by various separate items of documentation (installation drawings, technical specifications etc.). Where necessary, appropriate cross-references are made to these publications in this installation and operation manual.

Guide to symbols used in this manual

CAUTION!

Instructions relating to the correct operation of the unit

WARNING!

Instructions relating to safety.

1.2 Health and safety

Installation, maintenance, repair work or decommissioning should only be carried out by appropriately qualified and properly trained technical personnel. The users are responsible for ensuring their suitability. The customer is responsible for ensuring that the installation of the equipment complies with all local regulations.

Any risks or hazards relating to the system, including during installation and maintenance, should be identified by a competent health and safety representative who is responsible for introducing effective control measures.

All ideograms, signs and markings applied to the unit must be observed and kept in a readable state.

Symbols used in this manual

WARNING!

Always isolate all supplies to the system before commencing any maintenance or repair.

1.3 Hygiene

Please observe the local health and safety executive's technical guidance on the control of Legionellosis in water systems.

The user is responsible for ensuring that the water system complies with local regulations, byelaws and guidelines (such as the HSE ACoP L8, VDI 6022, ISO22000, HACCP or equivalent). If inadequately maintained, water systems, of which any humidifier is a part, can support the growth of microorganisms, including the bacterium that causes Legionnaires' disease.

The MLBU is produced according to the ISO22000 standards, which means that we have considered all aspects of this equipment to reduce the risk of Legionnaires' disease and other similar conditions. However, the user is responsible for ensuring that the installation, operation and maintenance work on the equipment is performed in a manner ensuring that the system stays clean!

Any risks or hazards relating to the system, including during installation and maintenance, should be identified by a competent health and safety representative who is responsible for introducing effective control measures.

WARNING!

The MLBU must be installed, operated and maintained in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.

1.3.1 Guidelines to ensure your system stays clean and prevent the growth of Legionella

- Carry out a risk assessment of the water system using a competent person, and implement an appropriate monitoring and control programme.
- Initiate procedures for checking the cleaning of tank, changing filters, disinfection etc.
- The MLBU must be connected to a clean, potable mains water supply.
- Enter into a service contract that suits your company.
- Stop the system if polluted drinking water is found in your area.
- Avoid water temperatures between 25°C and 45°C that favour the growth of Legionella.
- Do not stop the system unless it is faulty or leaking (avoid water stagnation).
- Have water samples taken and tested for harmful bacteria at least once a year.
- Conduct follow-up measurements until the system is clean if bacteria have been detected in the system.

The Condair service team can help. Condair has expert technicians who can provide:

- Bacteriological troubleshooting on site. *
- Cleaning and disinfecting.
- Preventive maintenance.
- Repair and faultfinding.
- Training and guidance.

*Condair uses a quick method for measuring bacterial activity in the water: This is approved and patented from BactiQuant. Once the water sample has been taken, we can read the bacteriological quality of the water within 30 minutes, and disinfect the system if necessary.

Please contact your local Condair representative for further information about our services.

1.4 Intended use

The MLBU is intended as a boosting unit for adiabatic humidification cooling and process water. Any other, or further, application is not considered use for the intended purpose. Condair A/S cannot be made liable for any damage or injury attributable to inattentive, inappropriate, negligent or incorrect operation of the equipment, whether or not caused deliberately.

Operation of the equipment in the intended manner requires that all the information in this installation and operation manual be observed (in particular the safety instructions).

Potential danger related to the MLBU.

WARNING!

Risk of electric shock! A person may come in contact with live parts when the pump station/control unit is open. Touching live parts may cause severe injury or death.
Prevention: Before carrying out any work on the system, disconnect power and water supply.

WARNING!

Poorly maintained humidification systems may be hazardous.
Prevention: Read, understand and follow maintenance guidelines to ensure your system stays safe.

WARNING!

The booster unit delivers water up to 7 bar. Inappropriately fastened hoses may be forced out of the screw connections when pressurised. Newer loosen hoses or screw connections in a pressurized system.

1.4.1 Ensure safe operation

If it is suspected that safe operation has been compromised, the MLBU should immediately be shut down and secured against accidental power-up.

Shut down the MLBU if:

- MLBU components are damaged, worn or very soiled.
- The MLBU does not work correctly.
- Joints, pipes or hoses are leaking.

No modifications must be made on the MLBU without the manufacturer's consent. All persons working with the MLBU must report any alterations made to the MLBU to the owner immediately.

Use only original accessories and spare parts available from your Condair representative

1.5 Warranty

MLBU parts are covered by a two-year warranty from the invoice date with the exception of the replacement parts listed in the routine maintenance section. Failure to observe the manufacturer's installation and maintenance recommendations and instructions will invalidate the warranty. Condair A/S cannot be made liable for damage or injury attributable to failure to observe the manufacturer's installation and maintenance recommendations and instructions.

1.6 Delivery and storage

To ensure consistent quality, each MLBU is tested and preserved before leaving the factory. If put into storage prior to use, the MLBU must be covered and protected from physical damage, dust, frost and rain.

It is recommended that the MLBU be kept in its transit packaging for as long as possible prior to installation.

Inspection

Upon receipt, remove the transit packaging and inspect the unit to ensure that no damage has occurred during transit. Any visible damage must be reported to your Condair distributor immediately. If the unit is put into storage, the packaging should be replaced.

1.7 Correct method of lifting

Lifting or handling must only be carried out by trained and qualified personnel. Ensure that the lifting operation has been properly planned and risk-assessed, and that all equipment has been checked by a skilled and competent health and safety representative.

The customer is responsible for ensuring that operators are trained in handling heavy goods, and to enforce the relevant lifting regulations. Refer to the weights and measures section for system weight

1.8 Disposal

You must observe local laws and regulations when disposing of your MLBU at the end of its working life. The piping is constructed from stainless steel, which may be fully recycled.

1.9 Inlet water – quality guide

The quality of water being used in the MLBU system should be checked prior to system commissioning. Condair A/S recommends that the MLBU system be connected to a clean, potable (drinking water quality) mains water supply.

Water supply	Drinking water quality
Conductivity	0.2 -1000 µS/cm
Silt index	Max. 3
Potassium permanganate (KMnO4)	Max. 10 mg/l
Turbidity (NTU)	Max. 1
Temperature	Max. 15°C
Iron (Fe)	Max. 0.2 mg/l
Manganese (Mn)	Max. 0.05 mg/l
Max Hardness	Max. 20º dH
Free Chlorine	Max. 0.1 mg/l

Water monitoring

The MLBU water system must be monitored for hygiene as part of the maintenance programme. Please refer to the maintenance section for further guidance.

Disinfection

Depending on the system hygiene, it is advised that preventative disinfection fluid be added to the MLBU water tank at an appropriate frequency, but at least once a year.

Condair A/S recommends adding the disinfection fluid SANOSIL S010 AG 5% (our code: 155404000) to the tank, desired concentration 0.1%. SANOSIL is safe, non-toxic and eco-friendly which provides a prophylactic, disinfection dose and is effective against all types of microorganisms, including Legionella and E.coli.

Please read the Maintenance section for more information on disinfection.

If you are in any doubt about the suitability of water quality, please contact your Condair distributor who will be happy to support you.

2 Product overview

2.1 MLBU description

The MLBU is a multifunctional unit, used for various water treatment processes. It is a pressure booster, storage tank and can be fitted with options for, Mixed-Bed (DI), Conductivity measurement, CIP and CO2 adding.

The MLBU comes with a 200 l or 500 l reservoir tank, automatic filling, and booster pump. There are two different sizes of booster pumps to chose from 1 or 5 m3/h both providing 5 bar outlet pressure.

The tank is equipped with a sterile breath filter and a tight closing lid, which can be locked.

The filling of the tank, is controlled by an automatic level control located at the top of the tank. The automatic opens and closes for a solenoid valve on the water inlet. The level control also acts as a dry-running protection for the booster pump, which only can start when there is sufficient water in the tank.

The container is provided with overflow safety and must therefore be connected to drainage.

The booster pump is equipped with a pressure control, which ensures that there always is constant discharge pressure on the water. The pressure is stabilized by a hydrophore.

The picture shows MLBU 201/205 with option mounted.
If no option is required, there will not be installed a HMI screen.

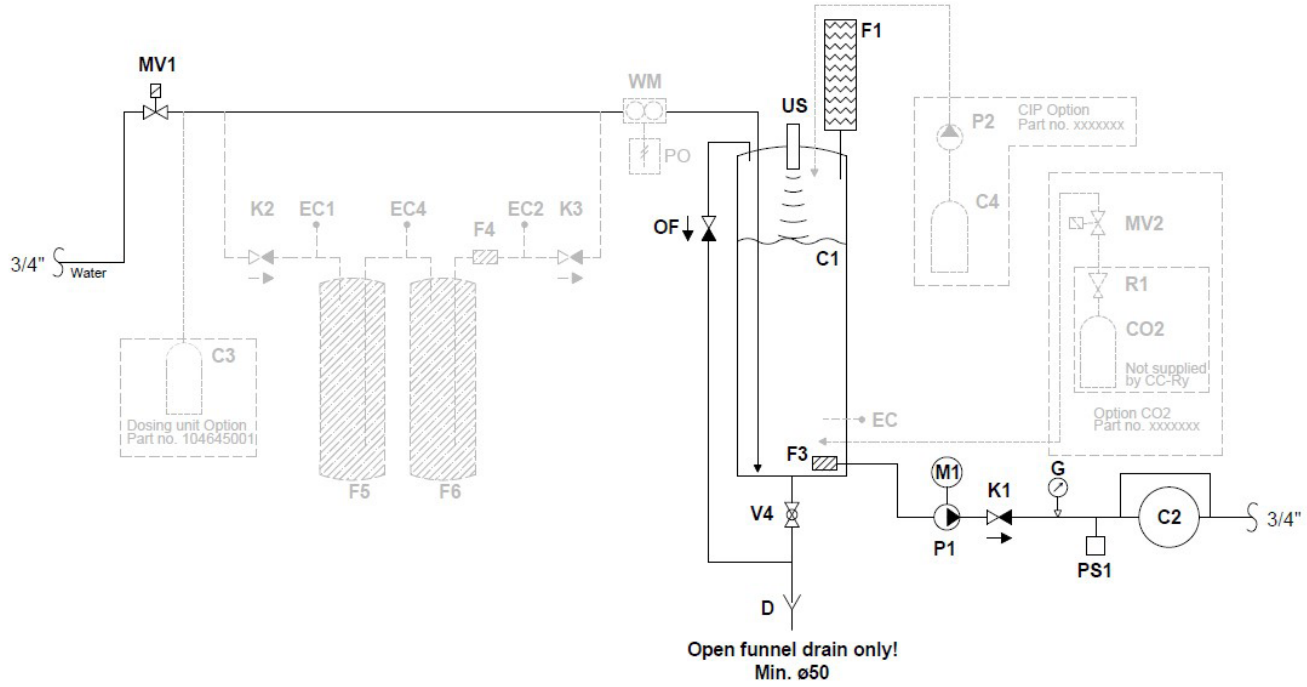
If an option is later required after delivery, the HMI screen have to be installed with that option. (Then it is called ADD-ON)

The basic MLBU version comes without HMI screen if no option has been ordered.
If there later on is required an option, the HMI screen have to be installed with this option.
(Then it is called ADD-ON)

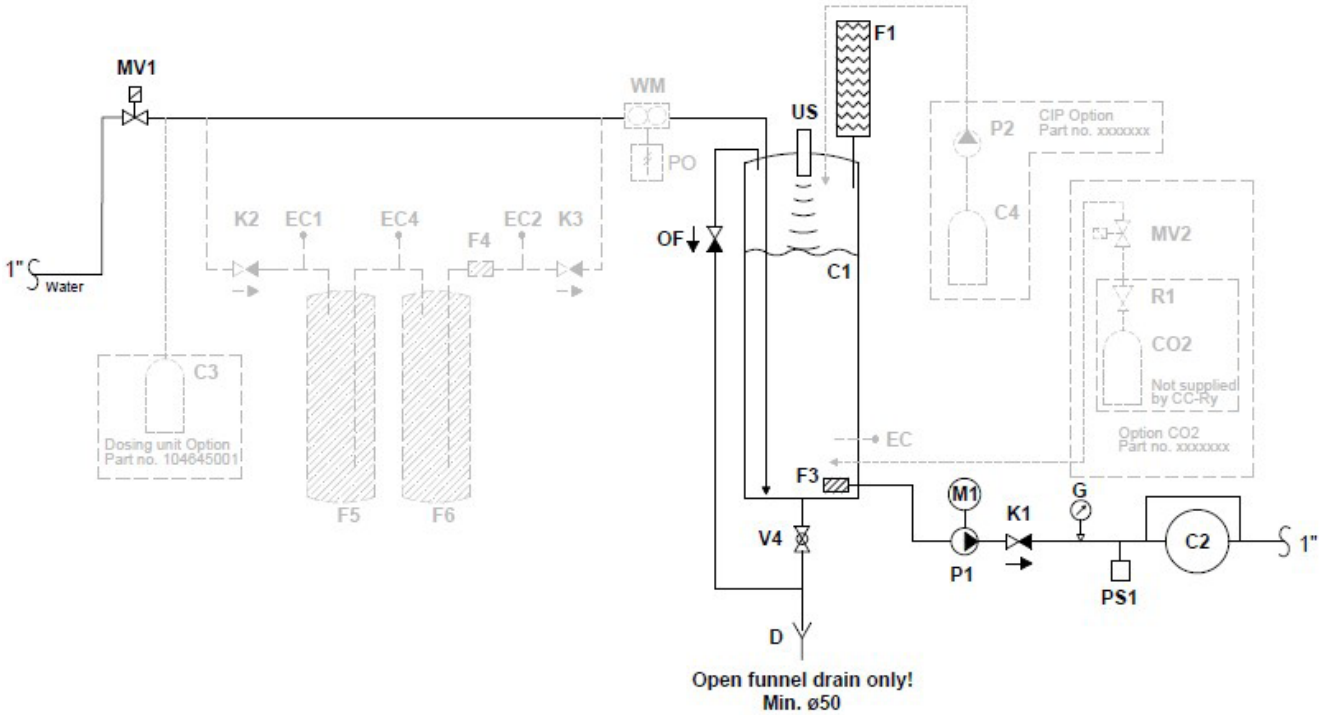
The control unit consists of a PLC mounted in the IP 65-rated electrical cabinet as well as a power board for control of the pump and connection terminals for power supply (208...480V/3N~/50-60Hz).
When an OPTION is added, the control cabinet will have a touch display.

2.2 MLBU 20x/50x overview

Flow drawing with possible options for MLBU 201/501



Flow drawing with possible options for MLBU 205/505



Component description for flow drawing with possible options for MLBU 20x/50x

C1 Permeate tank
C2 Hydrophore, Through Flow
D Drain pipe
F1 0,2 µ breathing filter
F3 Suction filter in permeate tank
G Pressure gauge, after Booster pump
K1 Check valve, low pressure
M1 Electric motor for Booster pump
MV1 Solenoid valve water inlet
OF Check valve in overflow from permeate tank
P1 Booster pump
PS1 Pressostat for Booster pump, discharge pressure
US Ultrasonic level meter
V4 Sampling valve from the permeate tank

C3 Antiscalant container for softening
C4 Container for disinfection
CO2 CO2 bottle
EC1 Conductivity sensor before Mixbed1
EC2 Conductivity sensor after Mixbed1
EC3 Conductivity sensor after Mixbed2
EC4 Conductivity sensor in permeate tank
F4 Filter after Mixbed, 5" (5 µm)
F5 Mixbed, ion exchange bottle
F6 Mixbed, ion exchange bottle
K2 Check valve, low pressure
K3 Check valve, low pressure
MV2 Solenoid valve for CO2
PO Pulse counter for water meter
P2 Dosing pump for CIP
R1 CO2 pressure regulator
WM Water meter

2.3 MLBU types

There is possibility to choose between the tank size, the outlet capacity and the voltage and frequency.

MLBU type	Description
MLBU201 208V60Hz	With 200 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU201 230V50Hz	With 200 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU201 400V50Hz	With 200 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU201 480V60Hz	With 200 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU205 208V60Hz	With 200 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU205 230V50Hz	With 200 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU205 400V50Hz	With 200 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU205 480V60Hz	With 200 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU501 208V60Hz	With 500 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU501 230V50Hz	With 500 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU501 400V50Hz	With 500 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU501 480V60Hz	With 500 liter tank and booster pump for 5 bar and 1 m3/h.
MLBU505 208V60Hz	With 500 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU505 230V50Hz	With 500 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU505 400V50Hz	With 500 liter tank and booster pump for 5 bar and 5 m3/h.
MLBU505 480V60Hz	With 500 liter tank and booster pump for 5 bar and 5 m3/h.

2.4 Optional equipment for MLBU

Choosing the right water treatment and measurement is essential for successful use of MLBU. In the ML-System programme, there is a large variety of water treatment and optional equipment to choose from.

The ML-System is designed to meet the requirements, be it essential water treatment or features. It is possible to combine ML-Systems, water treatment and optional equipment in many different combinations and it is thus impossible to describe all of them here. In the following, the most commonly used ancillary and optional equipment for the MLBU system is listed.

When ordering a MLBU there is a possibility to add more Options or on already installed MLBU add ADD-ON to upgrade the existing MLBU.

Options means, equipment that can be mounted while building the new MLBU. Options cannot be retrofitted and must therefore be listed when ordering.

ADD-ON means, equipment that can be ordered to an existing MLBU.

Below here, there are listed the possible Options and ADD-ON, which are available for the MLBU.

<u>Options: Only available when ordering a new MLBU</u>

ECR1 inlet EC sensor >1m3 Y7

ECR1 T200L EC sensor Y7

ECR1 T500L EC sensor Y7

ECR2 T200L EC RWMIX Y7

ECR2 T500l EC RWMIX Y7

ECR6 T200-500l EC CO2MIX Y7

ECR7 T200-500l CO2MIX+1MB Y7

ECR8 T200-500l CO2MIX+2MB Y7

Connections for ion exchanger (Mix. bed)

Water meter with IO pulse Y7

CIP T200-500l MLBU Y7

<u>ADD-ON: Only available on already installed MLBU</u>

ADD-ON BOX EC-REG1 COMPLETE ALL SIZE

ADD-ON BOX EC-REG2 RWMIX

ADD-ON BOX EC-REG6 CO2

ADD-ON BOX EC-REG7 ONE MIXBED + CO2

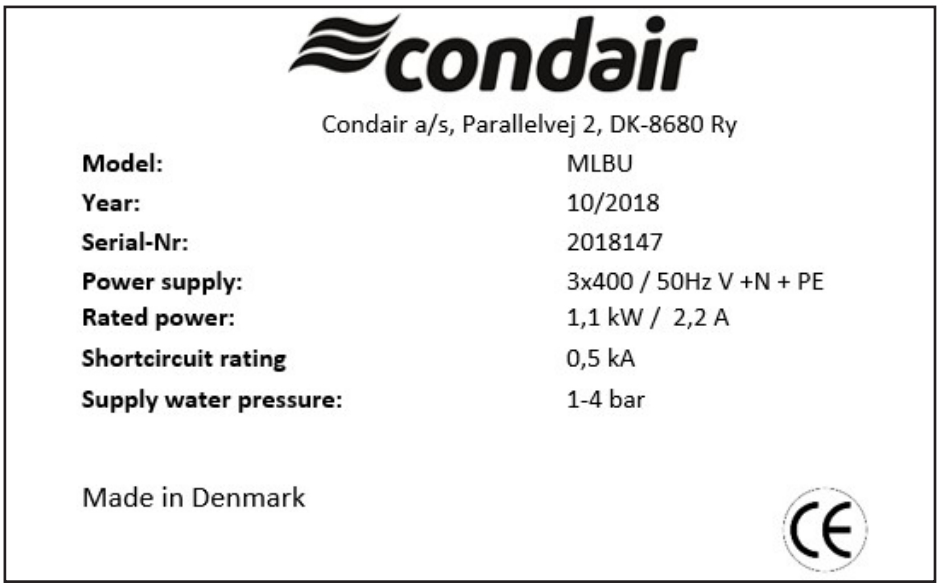
ADD-ON BOX EC-REG8 TWO MIXBED + CO2

ADD-ON WATER METER W/ PULSE

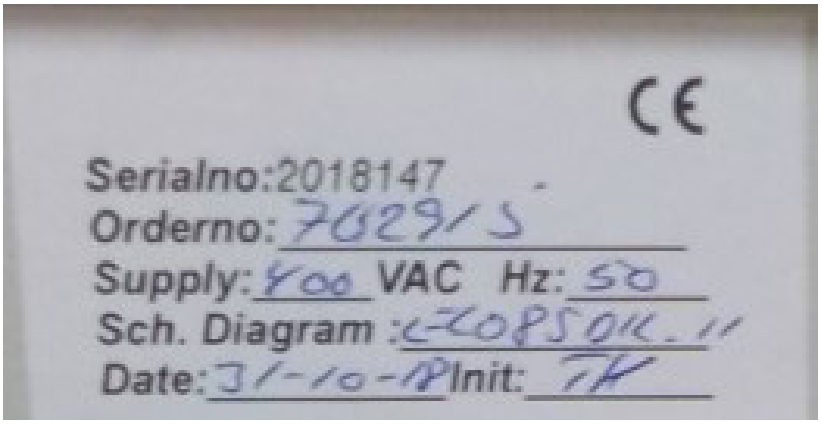
ADD-ON BOX CIP

2.5 Rating plate and markings

The rating plate is placed in the upper left corner on the side of the control cabinet (when facing the front).



A label with the internal order number and electrical schematic diagram number is placed on the inside of the left-hand cabinet hatch (when facing the front) on the control cabinet.



3 Installation

3.1 Important notes on installation

Qualification of personnel

All installation work must be performed only by persons familiar with the ML-System pump station and sufficiently qualified for such work. All work on electric installations must only be performed by adequately qualified electricians.

Safety

The pump station and any control units may only be connected to the mains after all installation work has been completed. All statements relating to correct positioning and installation must be followed and complied with. When installing components of the MLP RO, use the materials and hoses supplied with the unit. In case of doubt, please contact your Condair supplier.

WARNING!

Do not retighten/unscrew hoses while the system is pressurized!.

CAUTION!

Do not use oil, grease, glue, Teflon, silicon, O-ring lubrication, etc. when assembling pipe or hose connections.
All of the above products can act as food for bacteria and are thus pose health risks.
Only approved lubricant: Dish soap.
Wash your hands before or wear clean gloves while assembling parts in direct contact with water. Keep dust covers on pipes and hoses until just before assembly.

CAUTION!

Do not fasten the pump station or hoses/pipes to vibrating installations.

Tools needed for installation work:

- Screwdriver set
- Bubble level
- Polygrip pliers
- Wire cutters
- Spanner set
- Tape measure
- Marker
- Box cutter

Please observe the following on positioning and installation:

- The MLBU must be installed only in a location with a drain in the floor.
- The site must be freely accessible with sufficient space for convenient operation and maintenance (min. free space around pump station: laterally 0.5 m, 0.8 m front / back).
- The MLBU is designed for operation in a frost-free and dry environment, never outdoors.
- Do not install the MLBU in exposed locations or locations with heavy dust loads.
- The MLBU is designed for installation on a load-bearing floor.

3.2 Positioning the pump station

Before positioning the MLBU station, it is important to know the purpose the MLBU in the water production.

As the MLBU can be used as booster unit by insufficient water supply pressure or as a buffer tank required between water supply and humidification systems or as a moisture tank, it must be considered the best position where there is sufficient water supply and where the MLBU can give enough pressure and flow to the subsequent installations.

If water treatment is installed before the MLBU, it has to match the capacity of the subsequent installations.

Start by examining the types of water treatment systems to be installed and read their installation instructions as regards location and any requirements for supply and drainage.

Mark the location of the different systems in the room and note any missing supply or drains for the systems. Make sure you have the necessary fixing equipment available: cable ties, cable trays, screws and wall anchors.

Place the MLBU on a hard floor with a drain with the minimum capacity of the system before the MLBU but a minimum drain pipe of ø50 mm.

3.2.1 Drain

Connect the MLBU to the floor drain with a tube or hose of minimum 1".

The drain must have a minimum capacity of the system before the MLBU, but a minimum drainpipe of ø50 mm.

The drain must have an appropriate down-slope to allow the water to flow freely and without pressure from the drain connector.

3.2.2 Water connection

WARNING!

Do not open and fill hoses, pumps, filters or tanks with water if the system is not to be started immediately after installation (48 hours). Stagnant water acts as a breeding ground for potentially dangerous microorganisms.

Before connecting the MLBU to the water supply of the building or the water treatment system, it must be ensured that the incoming water is as clean as possible. This is done by running a hose from the supply to the drain and open the shut-off valve completely. Let the water run for at least 10 minutes. Shut off the water again and connect MLBU to the water supply with a hose (minimum 3/4" on MLBU 201/501 and minimum 1” on MLBU 205/505).

3.3 Electrical installation

DANGER!
Danger of electrical shock!

Installations and electrical connection must only be done by trained technicians and according to local standards.
High voltages, danger of electric shock! Touching live parts may cause severe injury or death.

All Connections must be made according to the electrical documentation, which is found inside the control unit of the electrical cabinet / main box.

Notes on electrical installation:

- Installation must be carried out according to local rules and regulations.
- The electrical installation (power supply, humidity control) must be carried out according to the wiring diagram supplied with the unit and the applicable local regulations. All information given in the wiring diagrams must be followed and observed.
- All cables must be run into the control unit via the cable openings and the use of cable glands.
- Make sure the cables do not rub against vibrating parts.
- The supply voltage must comply with the voltage in the wiring diagram.
- Study the system set-up part to get an overview.
- Power consumption and size of pre-fuse can be found in chapter with product data.

4 Commissioning

WARNING!

Errors in the start-up phase may ultimately result in illness, injury and death of humans.

CAUTION!

When fitting equipment like water filters, hoses and other components in direct contact with water please, wear sterile gloves or touch only the packing paper to keep the filter bacteria-free.
Remember to wash your hands!

Tools and materials that can be used for commissioning work:

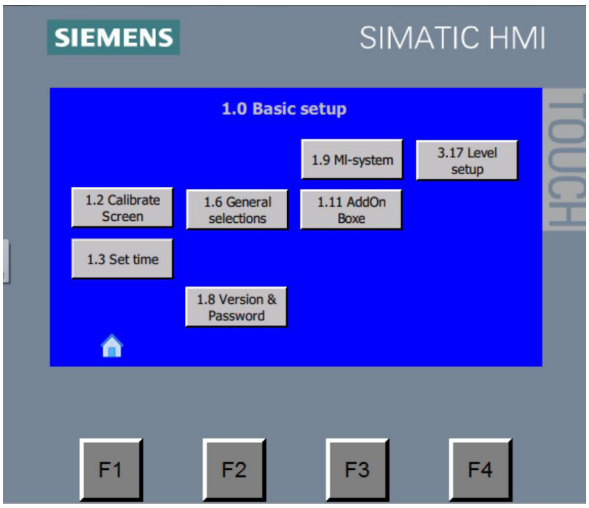
- Screwdriver set (remember small screwdriver for terminals)
- Polygrip pliers
- Spanner set
- Bucket with litre measure
- Residual hardness test kit, quick method onsite test ML-part: 150400000
- Total hardness test kit, quick method onsite test ML-part: 150401000
- Chlorine-sensitive test strips, quick method onsite test ML-part: 155407200
- Conductivity meter
- BQ water analyses set ML part: 155600010
- Multi-meter (Volt, Amp)

Disconnect the power before starting any commissioning work. Turn the main power switch and the start button to the off position.

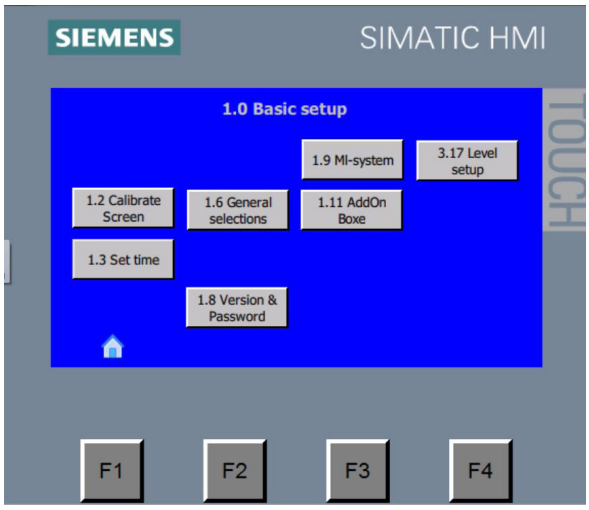
4.1 Basic set-up of the controller (Only version with HMI display)

The MLBU have been set up by factory and therefore it is not needed to change any settings.

To see all features possible in the controller menu, please see section 5.4 Controller menu.



- Check language is set to desired language. (English/ Danish)
- Calibrate the screen to fit upright position.
- Set the time and date.



- Check the pump type and serial number are correct according to the label on the left side of the electrical cabinet.

This should under normal circumstances be the basic setup needed.

If any other changes are needed, please see section “Controller Menu”.

5 Operations

Persons operating the MLBU's controller must have read and understood this manual.

Knowing and understanding the contents of the manuals is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation and to operate the unit safely and correctly.

All safety notes in the installation and operation manual for the MLBU must be observed and adhered to. All work described in this controller manual may only be carried out by properly trained personnel which is authorized by the customer.

If you have questions after reading this documentation, please contact your Condair representative who will be happy to assist you.

5.1 Equipment protection

Level controller

The MLBU has a level controller, which monitors the water level in the tank.

If the water level comes under a certain level, the pump cannot run and is therefore protected against dry running.

Overload

The pump is protected against overload by a thermal relay, which will cut the power to the pump motor if the current reach the adjusted limit on the thermal relay.

5.2 Protection against unwanted changes

On the display, the control unit settings are password-protected against unwanted changes. The different user groups have different passwords and different rights.

There are four password levels.

Normal user : Password is not needed. Can read operational information and alarms.

User+ : As Normal user + changing of set points.

Technician : As User+ changing of operational parameters.

Master : As Technician + selectable options and reset to factory settings.

Password are provided in a separate envelope to one chosen by costumer person. (E.g. Technical Manager).

Additionally, there are areas of the screen that are protected by extra passwords, to which only Condair Denmark has access.

When a password is required in order to change parameters, a screen will appear where the password can be entered. Parameters can be changed using the numerical keyboard. (Keys 0-9).

Once the password has been entered, the system is unlocked at the relevant level for five minutes.

5.3 Controller menu (Only version with HMI display)

Description of touch screen

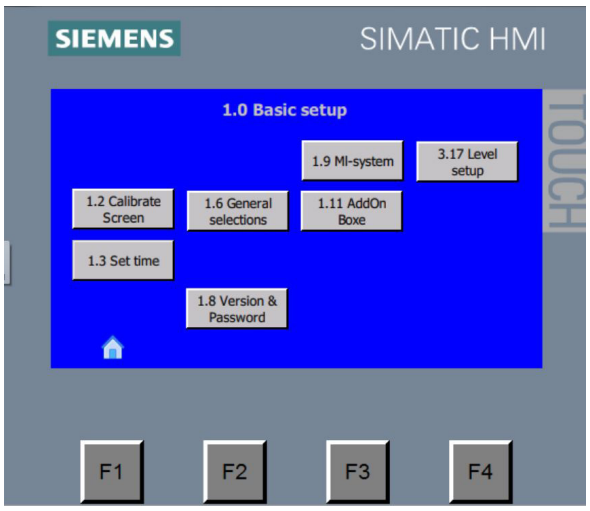
The screen has four F keys. (F1, F2, F3, F4). Each of the keys is used to navigate between the different screen images. When these are used, the individual key function is indicated in the description directly above the key.

The actual touch screen can be operated by gently tapping the relevant screen 'buttons' with your finger.

If you want to change a numerical value, press the relevant number key. This will make a numerical keyboard appear on which the new value can be entered.

Remember to enter any comma that may be needed.

Any incorrect entry can be deleted using the Backspace button on the numerical keyboard. Once a new value has been entered, press Enter at the bottom right of the image using the numerical keyboard.



Screen 1.0 – Basic Setup

Screen for Basic Setup gives access to underlying pages and selectable features:

1.1 Change Language

1.2 Calibrate Screen (Please follow the onscreen instruction)

1.3 Set time and date

1.6 General Selections (Option, ADDON)

1.8 Version and password (Pump type and change password)

1.9 ML-System (Factory Setting)

1.11 Shows AddOn modules connected to the pump.

3.17 Level Setup on RO tank

NB! Some of the buttons are only visible when certain choice have been made.

F1 – HOME (Screen 2.0)

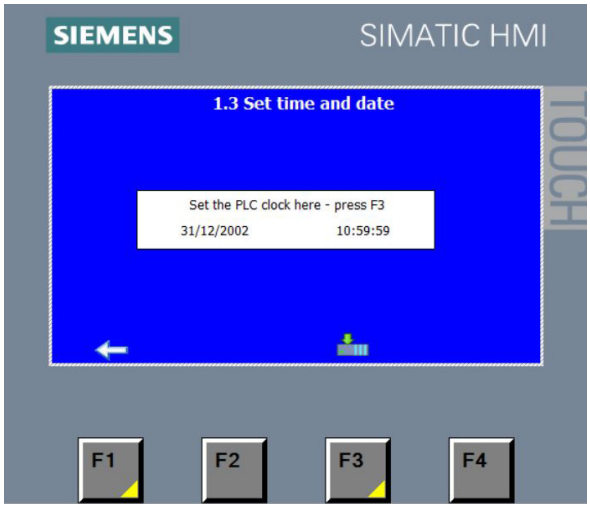
F2 – #

F3 – #

F4 – #

Screen 1.2 (No picture)

Calibration Screen: Adjust the viewing angle so that it is possible to stand upright and operate the screen. When calibrating, do not lean forward to get a better view. It will not produce the desired effect.



Screen 1.3

Adjust time and date

Following format has to be used DD/MM/YYYY

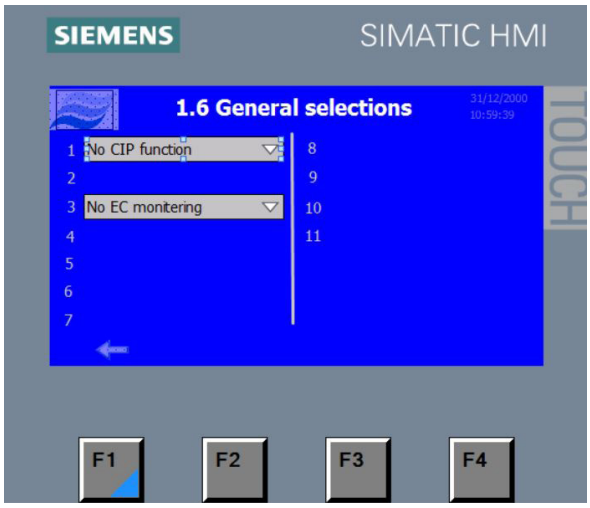
NB! To transfer date / time to PLC, press (F3).

F1 – Basic Setup (Screen 1.0)

F2 – #

F3 – Transmit (Sending time and date to the PLC)

F4 – #



Screen 1.6 – General Selection

General setup and option for the pump station. Please note that some of the options require hardware to be ordered with the pump.

Default setting is what appears at the top of the scroll menu. (Here in bold)

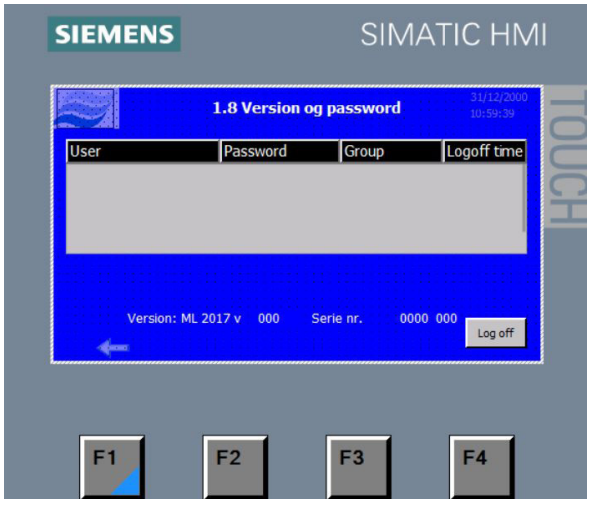
- No CIP function / CIP function normal (Internal)
- No EC monitoring / EC REG1 / EC REG6/ EC REG7 / EC REG8.

F1 – Basic Setup (Screen 1.0)

F2 – #

F3 – #

F4 – #



Screen 1.8 - Version & Password

Under normal circumstances, this site will be set up at the factory.

If this is not set, then select the size of the MLBU.

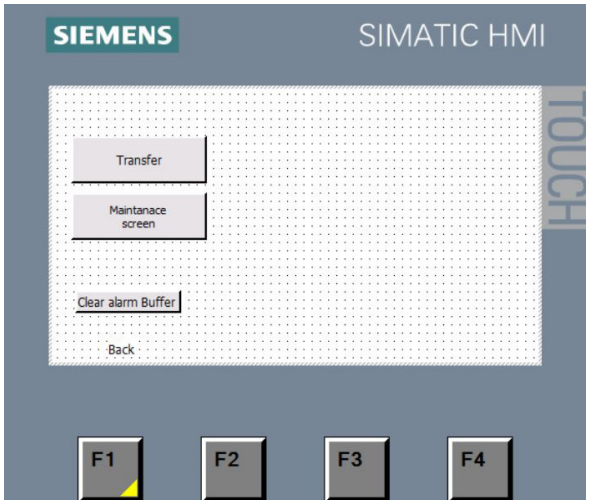
Check that the pumps serial number have been entered and matches the serial number on the left side of the cabinet.

F1 - Basic Setup (Screen 1.0)

F2 - #

F3 - #

F4 - #



Screen 1.9

Under normal circumstances, these choices should not be changed.

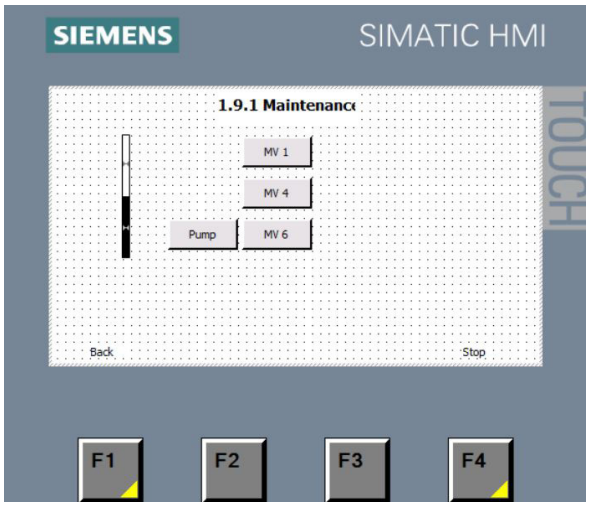
- Transfer – HMI setup side.
- Maintenance Screen – Changes to Screen 1.9.1 and shut down everything.
- Clear Alarm Buffer – Removes all stored alarms and warnings from the log.

F1 – Basic Setup (Screen 1.0)

F2 – #

F3 – #

F4 – #



Screen 1.9.1 - Maintenance

Manual operation of all valves and pumps.

Used mainly during commissioning when testing systems / compartment valves.

Example:

- Pressing e.g. (MV1) this valve will open until it is pressed again.
- Pressing (Pump) the booster pump will start.
- Pressing (Pump) again, will stop the booster pump. The button will light green when enabled.

WARNING !!!

All safety devices are deactivated in this setting and therefore there is a danger of dry running the high booster pump.

F1 - Basic Setup (Screen 1.0)

F2 - #

F3 - #

F4 - Stop (Stops pump and deactivate valves)

Screen 1.10 - Alarm Log

Alarms are shown here with time and date for when the alarm occur and when the alarm disappeared.

Under normal circumstances, the alarm log will not be reset after an interruption of the power supply.

F1 - Home (Screen 2.0)

F2 - Setting (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - #

Screen 1.10.1 – Warning Log

Warnings appear here with the time and date when the warning occur and when the warning disappeared.

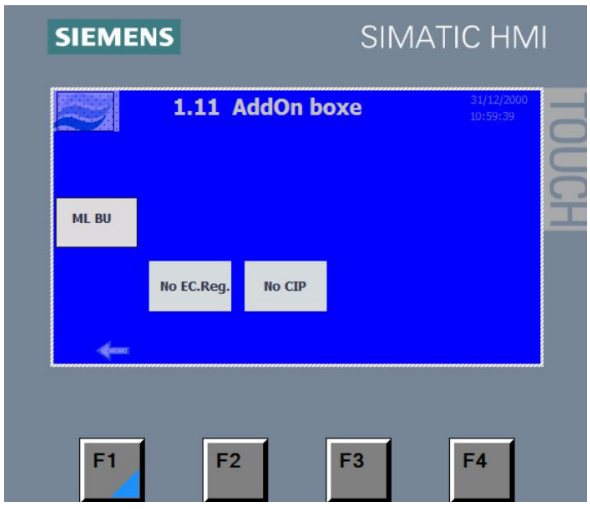
Under normal circumstances, the warning log will not be reset after an interruption of the power supply.

F1 - Home (Screen 2.0)

F2 - Setting (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - #



Screen 1.11 - AddOn Box

When an add-on is added and installed correctly, it becomes visible and is displayed on this screen.

If the field is green, it means the module is connected.

By pressing the screen button, it will be possible to setup the chosen add-on.

F1 - Basic Setup (Screen 1.0)

F2 - #

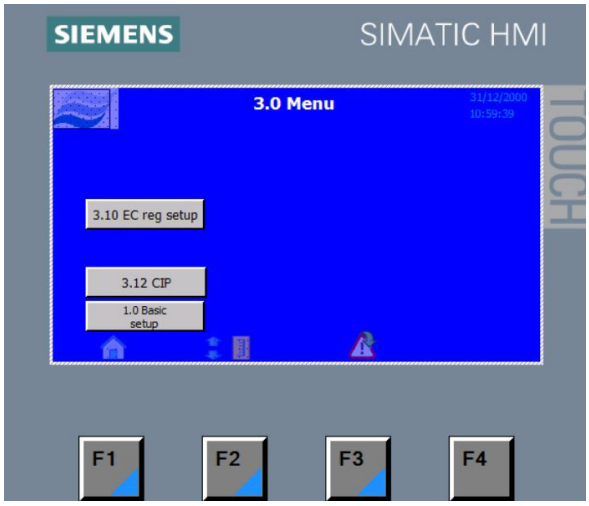
F3 - #

F4 - #

Screen 2.0 - Home

The screen give overview over the system like, conductivity measures, tank level and if any alarms and warnings occur.

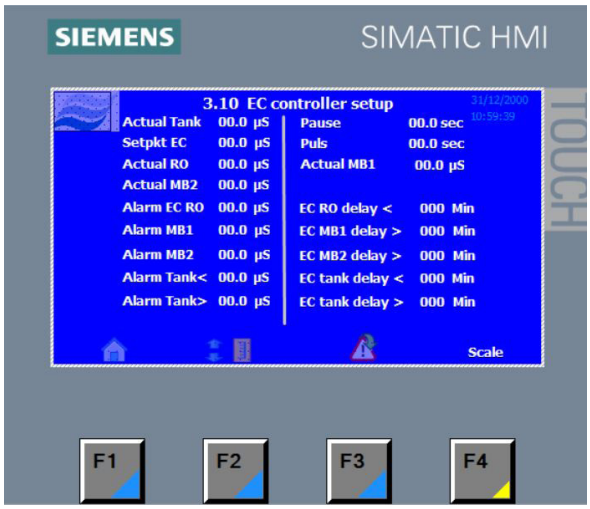
F1 – Home (Screen 2.0)
F2 – Setting (Screen 3.0)
F3 – Alarm List (Screen 1.10)
F4 – Trend



Screen 3.0 - Menu

Here it is possible to choose setup of the installed Add-On.

F1 – Home (Screen 2.0)
F2 – Setting (Screen 3.0)
F3 – Alarm List (Screen 1.10)
F4 – #



Screen 3.10 - EC Controller Setup

This image is only available on systems with EC measurement option installed.

It shows the electrical conductivity measured on the various conductivity sensors.

Here it is possible to set EC alarms and delays.

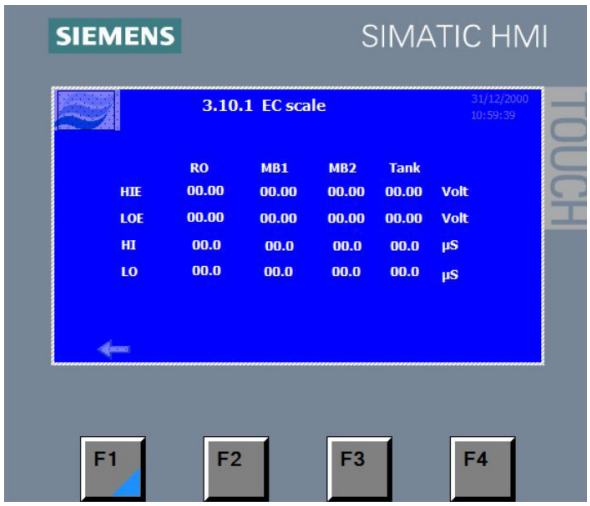
- Actual tank: The current conductivity measurement in the tank.
- Setpkt EC: The desired conductivity in the tank.
- Actual RO: The current conductivity after RO membranes.
- Actual MB2: Current conductivity after Mixbed 2.
- Alarm EC RO: Setpoint on high conductivity alarm after RO membranes.
- Alarm MB1: Setpoint on high conductivity alarm after Mixbed 1.
- Alarm MB2: Setpoint on high conductivity alarm after Mixbed 2.
- Alarm Tank<: Setpoint on low conductivity alarm in tank.
- Alarm Tank>: Setpoint on high conductivity alarm in tank.
- Pause: Pause length between pulses when adding CO2.
- Pulse: Pulse length for adding CO2. Default 2 sec.
- Actual MB1: Current conductivity after Mixbed 1.
- EC RO delay<: Delay time before low "Alarm EC RO".
- EC MB1 delay>: Delay time before high "Alarm MB1".
- EC MB2 delay>: Delay time before high "Alarm MB2".
- EC tank delay<: Delay time before low "Alarm Tank<".
- EC tank delay>: Delay time before high "Alarm Tank>".

F1 - Home (Screen 2.0)

F2 - Settings (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - Scale (Screen 3.10.1)



Screen 3.10.1 - EC scale.

Here it is possible to adjust the individual EC sensors in relation to the type of sensor used.

If, for example, MB1, MB2 is not installed, they will not be displayed.

HIE - Highest electrical signal from EC sensor

LOE - Lowest electrical signal from EC sensor

HI - Conversion of HIE to µS value.

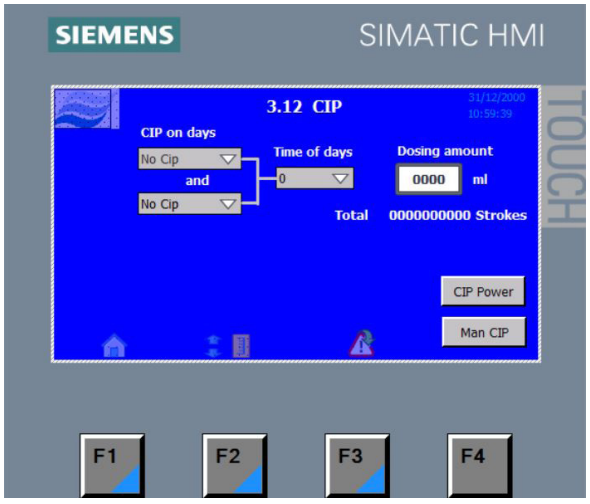
LO - Conversion of LOE to µS value.

F1 – EC Controller Setup (Screen 3.10)

F2 – #

F3 – #

F4 – #



Screen 3.12 – CIP (Extern)

Here is displayed the setup of CIP if it is installed

"External" CIP. (With DDA pump).

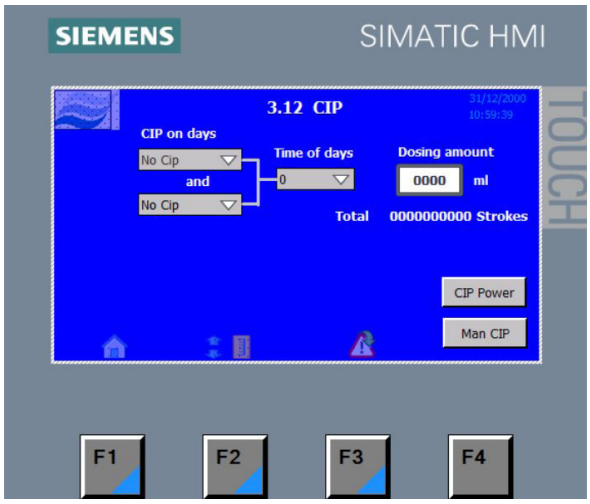
- CIP on days - Here it is possible to choose up to two days where the system should be cleaned. (CIP) It is possible to choose CIP two times per week, but not twice in the same day.
- Time of days - Here it is possible to choose which time of the day you want the CIP.
- Dosing amount - Here it is possible to choose how much should be dosed in the tank per CIP. The maximum number of ml that can be entered is adapted to the actual tank size.
- CIP Power - Power switched ON to the CIP pump. It is then possible to run the pump manually.
- Man CIP - The CIP pump is run manually (Is only used if the hose have to be emptied for air).
- Total - This shows the total number of pump strokes the CIP pump has been running.
  (1 stroke = about 0.8 ml).

F1 - Home (Screen 2.0)

F2 - Settings (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - #



Screen 3.12 - CIP (Internal)

Here is displayed the setup of CIP if it is installed "Internal" CIP. (Spoon version).

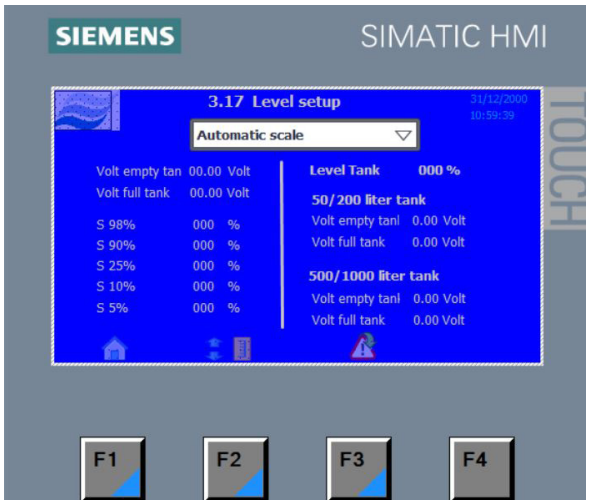
- CIP on days - Here it is possible to choose up to two days where the system should be cleaned. (CIP) It is possible to choose CIP two times per week, but not twice in the same day.
- Time of days - Here it is possible to choose which time of the day you want the CIP.
- Dosing amount - Here it is possible to choose how much should be dosed in the tank per CIP. The maximum number of ml that can be entered is adapted to the actual tank size. (10ml/100 liters - 20ml/100 liters - 30ml/100 liters).
- Dosing amount - The number of flips of the spoon is shown here in total. (Cannot be reset).
- Dosing amount - The number of flips of the spoon is shown here since last reset. (Can be reset).
- Man CIP - The CIP pump is run manually (Is only used if the hose have to be emptied for air).

F1 - Home (Screen 2.0)

F2 - Settings (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - #



Screen 3.17 – Level Setup

Standard is “Automatic Scale” and should always be used on standard systems.

Normally it is not needed to change anything on the screen

However it’s possible to manually scale the sensor by altering the voltage at full and empty tank.

- Voltage empty tank: Changeable.
- Voltage full tank: Changeable.
- S 98% : Overflow alarm
- S 90% : Closing inlet valve
- S 25% : Booster Pump can start
- S 10% : Minimum limit for CO2 dosing
- S 5% : Low limit alarm. The pump will not start
- Level Tank: Actual tank level.

50/200 liter tank

- Volt empty tank: 3,5 Volt, Standard
- Volt full tank: 0,5 Volt, Standard

500/1000 liter tank

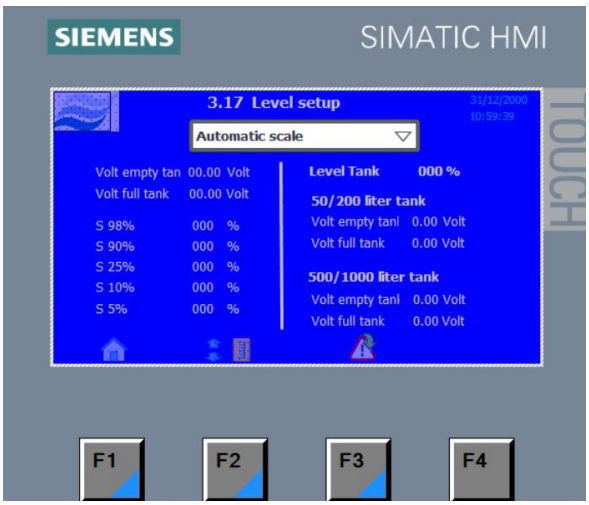
- Volt empty tank: 4,2 Volt, Standard
- Volt full tank: 0,5 Volt, Standard

F1 - Home (Screen 2.0)

F2 - Settings (Screen 3.0)

F3 - Alarm List (Screen 1.10)

F4 - #



Trend

Trend curve of water level in percentage of full tank.

Display one hour back.

F1 - Home (Screen 2.0)

F2 - #

F3 - #

F4 - #

5.4 Weekly inspection

During operation, the MLBU have to be inspected weekly.

On this occasion, check the following:

- Entire system for leakage.
- Electric installation for damage.
- Operating display (If installed) for warning or error messages

If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components take the MLBU out of operation. Have a qualified specialist or Condair service technician correct the damage or malfunction.

Fill in the ‘Service form for weekly monitoring of humidifying systems’ provided in the Appendix of this manual. Failing to do so could affect your warranty.

6 Weekly inspection

6.1 Important notes on maintenance

Qualification of personnel

All maintenance work must only be carried out by qualified and trained personnel authorized by the owner.

Maintenance and repair of the electrical installation of the MLBU must only be carried out by qualified personnel (e.g. electrician) who are aware of possible dangers and implications.

It is the owner's responsibility to verify proper qualifications of the personnel.

General note

The instructions and details for maintenance work must be followed.

Only maintenance work described in this documentation may be carried out. Use only original ML-System spare parts to uphold the system warranty.

Safety

Before maintenance is initiated, the MLBU must be taken out of operation. Protect the system against unintentional switch-on.

The MLBU must be cleaned and disinfected at the intervals described in this manual and cleaning must be performed by trained and instructed personal.

WARNING!

Poorly maintained humidification systems may endanger health. Therefore, it is mandatory to observe the specified maintenance intervals and to carry out maintenance in strict accordance with the instructions.

6.2 Maintenance work

To ensure safe, hygienic and economic operation of the MLBU, vital components must be checked and maintained periodically according to the table below. The maintenance intervals and maintenance work stated below are guideline values. Local conditions, quality of the water, etc. could influence the maintenance intervals. After having carried out the maintenance work, fill in the maintenance checklist, sign it and reset any maintenance indications. The relevant personnel are responsible for any maintenance work not carried out.

Service, to be carried out	Half year	Each year	Every 2 year	Every 4 year
Review of the system				
Testing of the system's overall function	X	X	X	X
Meter reading of water consumption (if present)	X	X	X	X
Reading of pump running hours	X	X	X	X
Logbook registration	X	X	X	X
Control weekly monitoring checklist	X	X	X	X
Water treatment system/incoming water				
Analysis of water hardness (in case of water softening)	X	X	X	X
Pump unit				
Replacement of filters (if present)	X	X	X	X
Check the condition of the pump (pressure & noise)	X	X	X	X
Testing of solenoid valves and replacement if necessary	X	X	X	X
Functional testing of pressure switch (pressostat)	X	X	X	X
Service inspection of booster pump (2 years or 8000 running hours)			X	X
Control units				
Analysis and testing of programming	X	X	X	X
Transfer relay replacement		X	X	X
Testing of contact K1 and replacement if necessary		X	X	X
Hygiene				
Extraction of water sample from pump (Bacteria testing)	X	X	X	X
Disinfection of the system	X	X	X	X

6.3 Preventive spare parts chart

MLBU recommended preventive/critical spare parts list, 4 year maintenance cycle											
ML-System		MLBU 2xx	MLBU 5xx	6 month	First year	6 month	Second year	6 month	Third year	6 month	Fourth year
Description	Part number	Pcs									
Water filter (F1)											
Filter 5 micron 20" (If installed)	104551000	1	1	X	X	X	X	X	X	X	X
O-ring for water filter (If installed)	430020050	1	1				X				X
Resin filter (F4)											
Filter 5 micron 5” (If installed)	104465000	1	1		X		X		X		X
Air Filter for reservoir tank (F2)											
Sterile breather filter 0,2 my 10”	104580000	1	1		X		X		X		X
Electrical control system											
Contactor (Q1) Siemens	349010218	1	1								X
On/off valve (MV1)											
On/off valve rep kit 6213-EV-A20	2579142	1	1				X				X
On/off valve CO2 (MV2)											
CO2 Valve - Complete 24VDC (If installed)	2594029	1	1								X
Pressure switch (PS1)											
Pressostat CHI pump	470030019	1	1								X
CIP option											
Sanosil bottle (If installed)	155405000	1	1		X		X		X		X
Disinfection											

6.4 Troubleshooting

Qualification of personnel

Have faults eliminated by qualified and trained personnel only. Malfunctions caused by the electrical installation must only be repaired by authorized personnel (e.g. electrician).

Safety

When eliminating faults, the MLBU must be taken out of operation and prevented from further inadvertent operation.

Make sure the power supply to the MLBU is disconnected (test with a voltage tester) and that the stop valve in the water supply line is closed.

Error indication or alarm messages

When an error occur the button S2 will start flashing.

For resetting an error that has occurred, press the flashing reset button.

Note: If the fault has not been eliminated, the error indication reappears after a short while again.

If there is a display on the MLBU, the error messages will prompt on the screen.

If the MLBU is without a display, there is still possibility an error can occur, and the reset button will flash.

Below here is some possible fault that can be the reason for flashing reset button.

If the level in the tank will come under low level for the pump to run, a fault will occur.

- Check incoming water. Pressure and missing water.
- Check inlet valve MV1 if it is missing signal from the PLC.

If the water level in the tank is becoming too high and overflow the tank.

- Check if inlet valve MV1 is not closing correct.

Pump will not start and make pressure.

- Check if the protective motor switch for the booster pump is disengaged.
  Engage the relay and try restarting.
- Check if there is water in the tank.
- Check if the pressure switch is engaged, by checking the input in the PLC.

MLBU 201/501

TECHNICAL DATA		
TD156GB-01	08-12-17	CHRM

The MLBU 201/501 is a 200 or 500 liter reservoir tank with automatic filling and booster pump.

MLBU 201/501 are used, if there is insufficient water supply pressure or where a buffer tank is required between water supply and humidification systems or as a moisture tank. The unit can provide 1 m3/h.

The tank is equipped with a sterile breath filter and a tight closing lid, which can be locked.

The filling of the tank, is controlled by an automatic level control located at the top of the tank. The automatic opens and closes for a solenoid valve on the water inlet. The level control also acts as a dry-running protection for the booster pump, which only can start when there is sufficient water in the tank.
The container is provided with overflow safety and must therefore be connected to drainage.

The booster pump is equipped with a pressure control, which ensures that there always is constant discharge pressure on the water. The pressure is stabilized by a hydrophore.

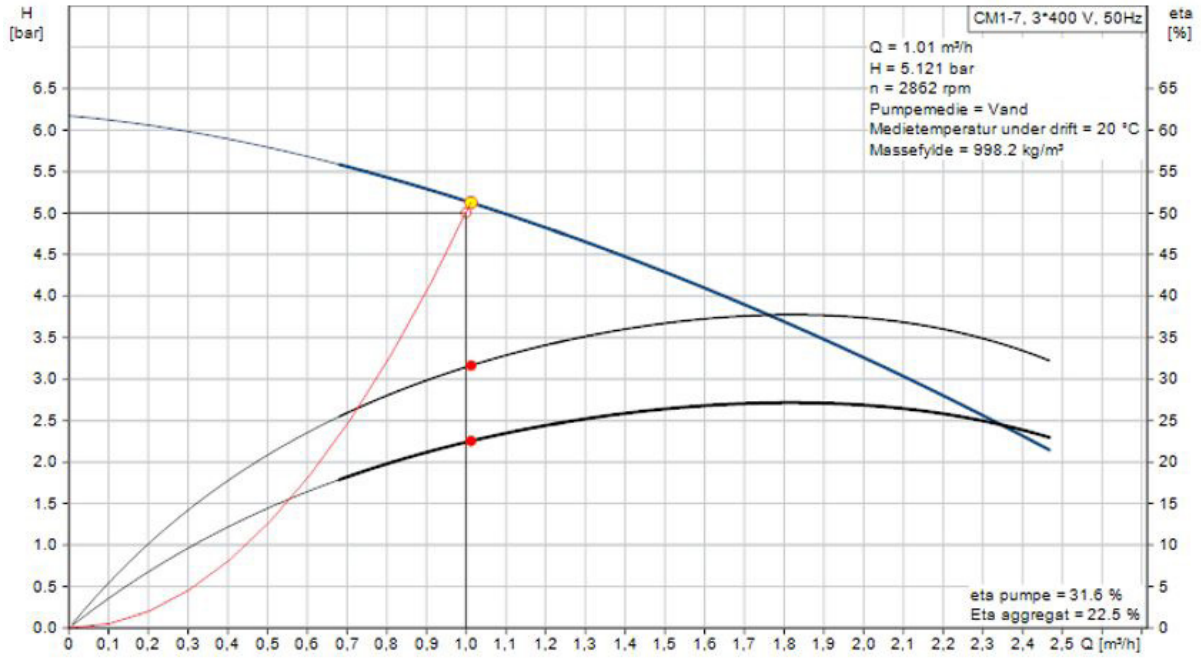
Options:
ECR1 inlet EC sensor >1m3 Y7
ECR1 T200L EC sensor Y7
ECR1 T500L EC sensor Y7
ECR2 T200L EC RWMIX Y7
ECR2 T500l EC RWMIX Y7
ECR6 T200-500l EC CO2MIX Y7
ECR7 T200-500l CO2MIX+1MB Y7
ECR8 T200-500l CO2MIX+2MB Y7
Connections for ion exchanger (Mix. bed)
Water meter with IO pulse Y7
CIP T200-500l MLBU Y7

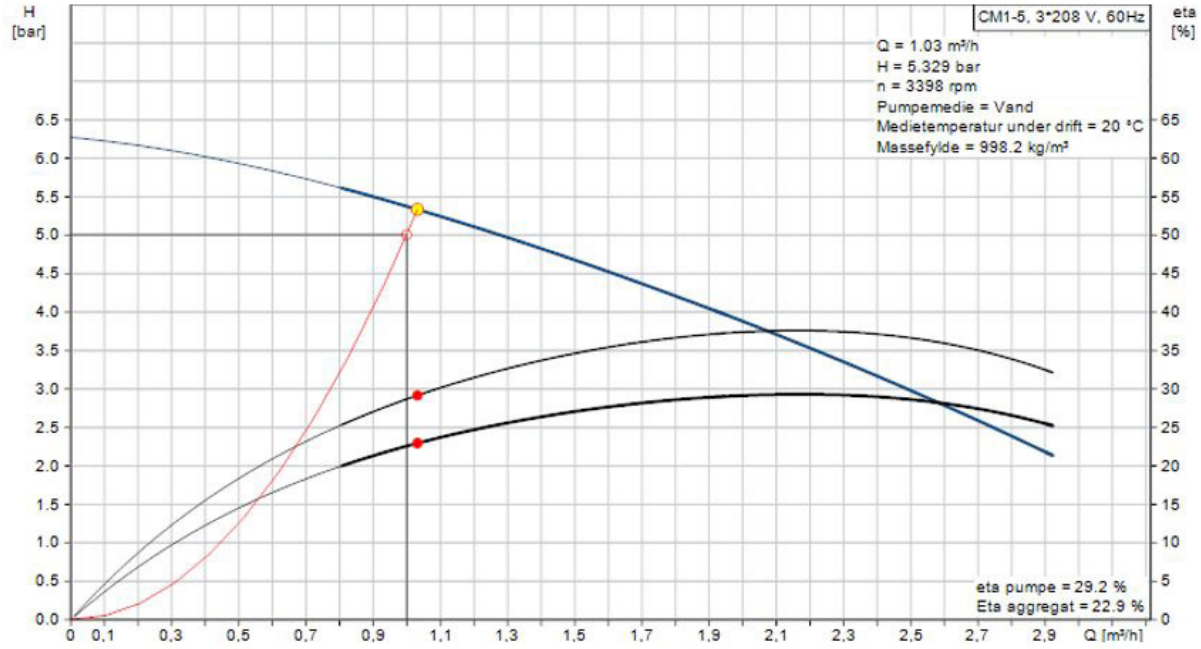
Parts:		Item no.:
Reservoir tank:	200 L, black	
Reservoir tank:	500 L, black	
Water connection, inlet:	G 3/4“ (ISO 228) or hose coupling	
Water connection, outlet:	G 3/4“ (ISO 228) or hose coupling	
Sterile breath filter:	0,2 µ (should be changed ones a year)	104 580 000
Hydrofor:	8 Liter, flow through	125 020 000
Pressure control:	Pressostat	470 030 019
Pump capacity:	1 m3/h at 5 bars	

Pump type:	Power connection:	Item no:
Grundfos CM1-7 (50 Hz)	3 x 230 / 3 x 400 VAC+N+J, 50 Hz, max.16A	2592346
Grundfos CM1-5 (60 Hz)	3 x 208 / 3 x 480 VAC+J, 60 Hz, max. 16A	2591168

MLBU 201/501 versions:	Power connection:	Item no:
MLBU 201 with pump type	3 x 208 volt, 60 Hz	2590526
MLBU 201 with pump type	3 x 230 volt, 50 Hz	2588130
MLBU 201 with pump type	3 x 400 volt, 50 Hz	2588010
MLBU 201 with pump type	3 x 480 volt, 60 Hz	2590491
MLBU 501 with pump type	3 x 208 volt, 60 Hz	2590527
MLBU 501 with pump type	3 x 230 volt, 50 Hz	2588131
MLBU 501 with pump type	3 x 400 volt, 50 Hz	2588012
MLBU 501 with pump type	3 x 480 volt, 60 Hz	2590494

MLBU 201/501 dimensions:		
MLBU 201	High: 160 cm, Wide: 65 cm, Depth: 90 cm	
MLBU 501	High: 190 cm, Wide: 90 cm, Depth: 90 cm	


H
[bar]
eta
[%]
CM1-7, 3*400 V, 50Hz
Q = 1.01 m³/h
H = 5.121 bar
n = 2862 rpm
Pumpemedie = Vand
Medietemperatur under drift = 20 °C
Massefylde = 998.2 kg/m³
eta pumpe = 31.6 %
Eta aggregat = 22.5 %
Q [m³/h]


H
[bar]
eta
[%]
CM1-5, 3*208 V, 60Hz
Q = 1.03 m³/h
H = 5.329 bar
n = 3398 rpm
Pumpemedie = Vand
Medietemperatur under drift = 20 °C
Massefylde = 998.2 kg/m³
eta pumpe = 29.2 %
Eta aggregat = 22.9 %
Q [m³/h]

MLBU 205/505	TECHNICAL DATA		
	TD157GB-01	08-12-17	CHRM

The MLBU 205/505 is a 200 or 500 liter reservoir tank with automatic filling and booster pump.

MLBU 205/505 are used, if there is insufficient water supply pressure or where a buffer tank is required between water supply and humidification systems or as a moisture tank. The nit can provide approx. 5 m3/h.

The tank is equipped with a sterile breath filter and a tight closing lid, which can be locked.

The filling of the tank, is controlled by an automatic level control located at the top of the tank. The automatic opens and closes for a solenoid valve on the water inlet. The level control also acts as a dry-running protection for the booster pump, which only can start when there is sufficient water in the tank.
The container is provided with overflow safety and must therefore be connected to drainage.

The booster pump is equipped with a pressure control, which ensures that there always is constant discharge pressure on the water. The pressure is stabilized by a hydrophore.

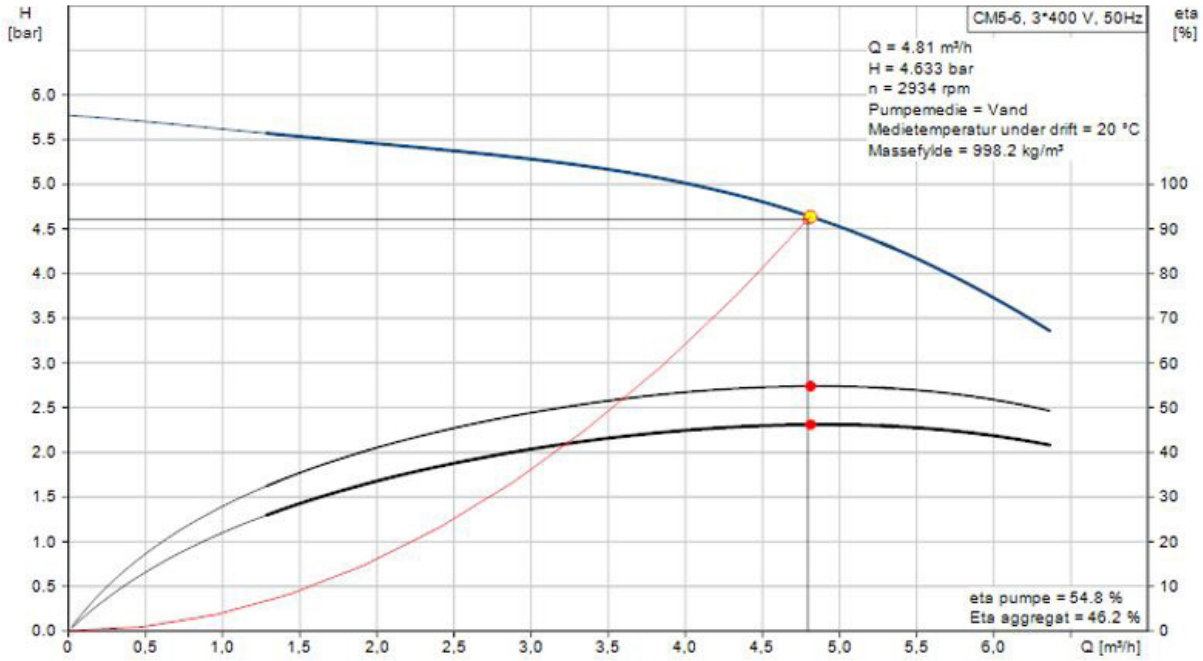
Options:
ECR1 inlet EC sensor >1m3 Y7
ECR1 T200L EC sensor Y7
ECR1 T500L EC sensor Y7
ECR2 T200L EC RWMIX Y7
ECR2 T500l EC RWMIX Y7
ECR6 T200-500l EC CO2MIX Y7
ECR7 T200-500l CO2MIX+1MB Y7
ECR8 T200-500l CO2MIX+2MB Y7
Connections for ion exchanger (Mix. bed)
Water meter with IO pulse Y7
CIP T200-500l MLBU Y7

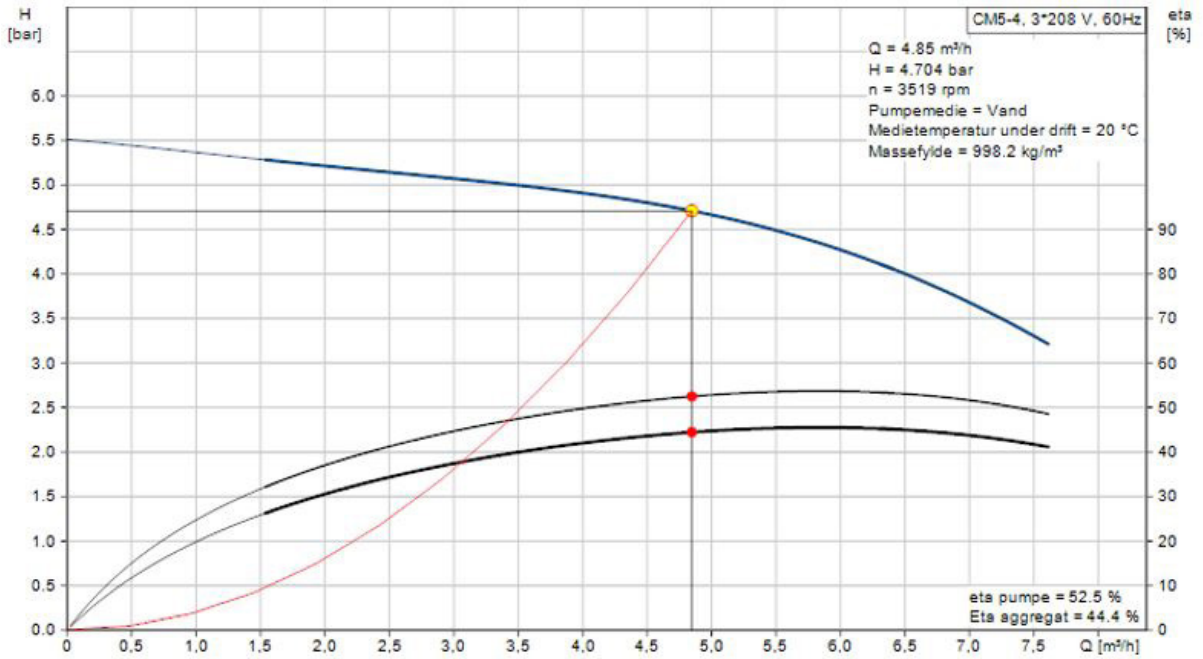
Parts:		Item no:
Reservoir tank:	200 L, black	
Reservoir tank:	500 L, black	
Water connection, inlet:	G 1“ (ISO 228) or hose coupling	
Water connection, outlet:	G 1“ (ISO 228) or hose coupling	
Sterile breath filter:	0,2 µ (should be changed ones a year)	104 580 000
Hydrofor:	18 Liter, flow through	125 020 005
Pressure control:	Pressostat	470 030 019
Pump capacity:	Approx. 5 m3/h at 5 bar	

Pump type:	Power connection:	Item no:
Grundfos CM5-6 (50 Hz)	3 x 230 / 3 x 400 VAC+N+J, 50 Hz, max.16A	2590737
Grundfos CM5-4 (60 Hz)	3 x 208 / 3 x 480 VAC+J, 60 Hz, max. 16A	2592347

MLBU 205/505 versions:	Power connection:	Item no:
MLBU 205 with pump type	3 x 208 volt, 60 Hz	2590528
MLBU 205 with pump type	3 x 230 volt, 50 Hz	2588132
MLBU 205 with pump type	3 x 400 volt, 50 Hz	2588013
MLBU 205 with pump type	3 x 480 volt, 60 Hz	2590495
MLBU 505 with pump type	3 x 208 volt, 60 Hz	2590529
MLBU 505 with pump type	3 x 230 volt, 50 Hz	2588134
MLBU 505 with pump type	3 x 400 volt, 50 Hz	2588014
MLBU 505 with pump type	3 x 480 volt, 60 Hz	2590496

MLBU 205/505 dimensions:		
MLBU 205	High: 160 cm, Wide: 65 cm, Depth: 90 cm	
MLBU 505	High: 190 cm, Wide: 90 cm, Depth: 90 cm	


H
[bar]
eta
[%]
CM5-6, 3*400 V, 50Hz
Q = 4.81 m³/h
H = 4.633 bar
n = 2934 rpm
Pumpemedie = Vand
Medietemperatur under drift = 20 °C
Massefylde = 998.2 kg/m³
eta pumpe = 54.8 %
Eta aggregat = 46.2 %
Q [m³/h]


H
[bar]
eta
[%]
CM5-4, 3*208 V, 60Hz
Q = 4.85 m³/h
H = 4.704 bar
n = 3519 rpm
Pumpemedie = Vand
Medietemperatur under drift = 20 °C
Massefylde = 998.2 kg/m³
eta pumpe = 52.5 %
Eta aggregat = 44.4 %
Q [m³/h]

CONSULTING, SALG OG SERVICE:

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