

IMPORTANT! Read and save these instructions. This manual to be left with the equipment.



INSTALLATION AND OPERATION MANUAL

Adiabatic Humidification System
Condair MLP
US version

Thank you for choosing Condair

Installation date (DD/MM/YYYY):

Commissioning date (DD/MM/YYYY):

Site:

Model:

Serial number:

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1 Introduction

1.1 Before You Start!

Thank you for purchasing the Condair ML direct room high pressure adiabatic humidification system.

The Condair ML adiabatic humidifier incorporates the latest technical advances and meets all recognized safety standards. Never-the-less, improper use of the Condair ML adiabatic humidifier may result in danger to the user or third parties, and/or damage to property.

To ensure safe, proper and economical operation of the Condair ML adiabatic humidifier, observe and comply with all information and safety instructions contained in this manual, as well as all relevant documentation of components of the installed humidification system.

If you have additional questions, contact your local Condair representative. They will be glad to assist you.

1.2 General

Limitations

The subject of this manual is the Condair ML direct room humidification pump stations and associated equipment whether ancillary or supplementary. The various options and accessories may only be described in-so-far as is necessary for proper installation and operation of the equipment. Additional information on available options and accessories can be obtained in the instructions that are supplied with them.

This manual is restricted to the installation, operation, technical data and parts of the Condair ML direct room humidification pump stations, and is intended for well trained personnel who are suitably qualified for their respective tasks.

Symbols Used in This Manual



CAUTION!

The word "CAUTION" in conjunction with the general caution symbol is used to provide safety instructions that, if neglected, may cause damage and/or malfunction of the unit or damage to property.



WARNING!

The word "WARNING" in conjunction with the general warning symbol is used to provide safety instructions that, if neglected, may cause injury to personnel. Other specific warning symbols may also be used in place of the general symbol.



DANGER!

The word "DANGER" in conjunction with the general danger symbol is used to provide safety instructions that, if neglected, may cause severe injury to personnel or even death. Other specific danger symbols may also be used in place of the general symbol.

Other Related Publications

This manual is supplemented by other publications such as the ML Heads Installation Guide, which are included in the delivery of the equipment. Where necessary, appropriate cross-references to these publications have been added in this manual.

Storage of Manual

Keep this manual in a place where it is safe and readily accessible. If the equipment is moved to another location, make sure that the manual is passed on to the new user.

If the manual is lost or misplaced, contact your Condair representative for a replacement copy.

Language Versions

This manual is also available in other languages – contact your Condair representative.

2 For Your Safety

2.1 Safety



DANGER!

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

General

Every person who is tasked with the installation, operation or maintenance of the Condair ML adiabatic humidifier must read and understand this manual before performing any work. Knowing and understanding the contents of the installation manual and the operation and maintenance manual is a basic requirement for protecting personnel against any kind of danger, preventing faulty operation, and operating the unit safely and correctly.

All labels, signs and marking applied to the Condair ML adiabatic humidifier must be observed and kept in a readable state.

Personnel Qualifications

All procedures described in this manual must only be performed by personnel who are adequately qualified, well trained and are authorized by the customer.

For safety and warranty reasons, any activity beyond the scope of this manual must only be performed by qualified personnel authorized by Condair.

All personnel working with the Condair ML adiabatic humidifier must be familiar with, and comply with the appropriate regulations on workplace safety and prevention of accidents.

Intended Use

The Condair ML humidification heads are intended exclusively for adiabatic humidification and/or evaporative cooling using a RO water supplied (by others) Condair MLP high pressure pump station within specified operating conditions (refer to the Condair MLP IOM for details). Any other type of application, without the express written consent of Condair, is considered to be not conforming to its intended purpose, and may lead to dangerous operation and will void the warranty.

In order to operate the equipment in the intended manner all information contained in this manual, in particular the safety instructions, must be observed closely.

Safe Operation

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

Shut down the Condair ML Humidification System if:

- Components are damaged, worn or very soiled
- Fans have stopped or are noisy
- Joints, pipes or hoses are leaking
- Unusual or very loud noise

No modifications must be made on the ML-System without the manufacturer's consent. All persons working with the system must report to the owner if any alterations are detected.

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

2.2 Health & Hygiene



DANGER!
Risk of infection or serious illness

The Condair ML System 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.



DANGER!
Risk of water contamination

To prevent water stagnation and microbial contamination, the systems power supply should be left switched on. If the system is switched off for more than 48 hours, the pipework and system must be disinfected as per the instructions, and a full risk assessment must be undertaken to ensure safe operation.

Health Risks

Please observe the local health and safety codes, standards and technical guidance on the control of Legionella in water systems.

The user is responsible for ensuring that the water system complies with local regulations, bye-laws and guidelines (such as the HSE ACoP L8, VDI 6022, ISO 22000, 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.

Condair ML systems, products and components are produced according to the ISO 22000 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.

Water monitoring

The quality of water being used in the Condair ML Humidification System should be checked prior to system commissioning and comply with the guidelines in the high pressure pump manual.

The Condair ML Humidification System must be monitored for hygiene as part of the maintenance program. Please refer to the maintenance section for further guidance.

Guidelines for a Hygienic System

- Carry out a risk assessment of the water system using a competent person, and implement an appropriate monitoring and control program.
- Initiate procedures for changing filters, disinfection etc.
- 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 77 °F (25°C) and 113 °F (45°C), which favour the growth of Legionella.
- Do not stop the system unless it is faulty or leaking (avoid water stagnation).
- Refrain from closing nozzles or sections, unless there is leakage or a fault (avoid water stagnation).
- Disinfect the high-pressure system at least once a year and after every maintenance or repair. Always carry out a complete system disinfection if it has been turned off for more than 48 hours.
- 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.

Disinfection

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

Condair Ltd. recommends using the disinfection fluid HaloSpray or Sanosil S010 AG 5% (part number: 155404000) to the System via the high pressure pump, desired concentration 0.1%. HaloSpray or 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 pump manual 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.

3 Receiving and Storage

3.1 Inspection

All Condair products are shipped F.O.B at the factory. All damage, breakage or loss claims are the responsibility of the shipping company. Upon receipt, remove the transit packaging and inspect the components to ensure that no damage has occurred during transit. Inspect the goods as follows:

- Inspect the shipping boxes for damage. Report any shipping box damages to the shipping company without delay.
- Check the goods against the packing slip to ensure that all items have been delivered. Report any shortages to your Condair representative within 48 hours of receipt of the goods. Condair does not assume responsibilities for any shortages beyond this period.
- Unpack the parts/components and check for any damage. If parts/components are damaged, notify the shipping company immediately.
- Verify the model type on the specification label to ensure that it is suitable for your installation.

3.2 Storage and Transportation

Storage

Store the Condair ML adiabatic humidifier in its original packaging inside a protected area that meets the following requirements until it is installed. These requirements also apply if the unit needs to be stored for an extended period of time. If put into storage prior to use, the components must be covered and protected from physical damage, dust, frost and rain. Avoid below freezing temperatures as this can degrade certain wet parts and components.

For storage Condair recommends:

- Room temperature: 41 to 104°F (5 to 40°C)
- Room humidity: 10 to 75% RH

Transportation

For optimum protection always transport the unit and components in their original packaging, and use appropriate lifting/transporting devices.

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.

Packaging

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

Keep the original packaging of the unit/components for later use. If the packaging needs to be disposed of, observe local regulations on waste disposal. Recycle packaging where possible.

Disposal

You must observe local laws and regulations when disposing of your Condair ML system at the end of its working life.

4 Site Planning

4.1 Prior to Starting

The basic principles for planning described below are theoretical ones. In practice, the necessary humidification capacity is influenced by parameters that cannot be covered by this documentation. For this reason, the values that were determined in theory have to be complemented by practical values or corrected in many cases. Condair's technical service team will be pleased to assist you.

Notes on the planning of direct room air humidification systems in one or more zones.

Proceed as follows when selecting and/or dimensioning the air humidification system:

- Determine the volume of the room and the air changes
- Determine the set points (temperature and humidity/relative humidity)
- Determine the humidification areas
- Calculate the maximum humidification capacity
- Define the device requirements
- Determine the placement of zone valves and hygrometers

4.2 General Notes on Positioning

The positioning of a system is always determined during planning and noted in the system documents. Prior to mounting the ML Direct Room Humidification heads, ensure that all hose layouts, distances between heads and atomization clearances have been considered and adhered to, as per the ML Heads Installation Guide.

The recommended hose layouts, distances between humidification heads and atomization clearances, are shown in the ML Heads Installation Guide. Consult local and national installation regulations. Condair does not accept responsibility for violations of the installation codes.

The following general positioning notes, however, have to be read and complied with in any case:

- Make sure that the construction (rafter, beam, wall, pillar, ceiling construction, etc.) on which the devices and/or system components will be mounted disposes of a sufficient load-carrying capacity and is suitable for fixing
- Position the Condair ML Direct Room Heads in such a way to enable the atomized mist to spread freely. When the mist is prevented from spreading by obstacles (e.g. ceilings, beams, ventilation ducts, airflow, machinery, etc.), turbulences can build up and condensation may occur as a result.
- ML Heads Installation Guide shows the recommended clearances, of the expansion of the atomization stream, and the clearances that have to be maintained. These are ideal and recommended maximum capacities using ML nozzles. Different weather, climate and indoor conditions can alter the spread and distance of the mist.
- As shown in ML Heads Installation Guide, when the nozzles and humidification heads are placed one opposite the other, make sure that a minimum distances are adhered to. This will avoid the streams to condensate each other.
- Pay close attention to the airflow of the room. Do not install humidification heads or nozzles in the immediate vicinity of a supply, return or exhaust system or of a cold-air inlet.

- Do not point humidification heads or their nozzles at cold parts of a building, e.g. outside walls, windows, etc. (risk of condensation).
- Insulate cold-water pipes in the area of the atomizing stream (risk of condensation).
- The evaporation process absorbs heat from the ambient air. For this reason, make sure that the atomized stream is not directed on persons or on places directly above workplaces.
- In order to guarantee optimum humidification, ensure that the atomizers are sensibly distributed in the room.
- The system components have to be mounted in such a way to provide enough space for operation and maintenance.

Please contact Condair's Technical Service Team in case you have questions on positioning and clearances.

4.3 Experts on Site

Condair has expert technicians employed by Condair who can provide:

- Pre-site analysis
- Positioning and site assistance or recommendations
- Installation support
- Start-up and commissioning
- Bacteriological troubleshooting on site *
- Cleaning and disinfecting
- Preventive maintenance
- Repair and fault finding
- Training and guidance

*Condair uses an industry leading method for measuring bacterial activity in the water; the approved and patented BactiQuant test. This, unique to Condair, field test takes water samples from critical project locations. Thereafter, the bacteriological quality of the water can be read within 30 minutes, and the system can be disinfected if necessary.

Condair follows the guidelines in VDI 6022 for colony forming units (CFU) counts in humidifiers. The CFU count in the humidification water must not exceed 150 CFU/ml, corresponding to a maximum BQ value of 52. Please contact your local Condair representative for further information about our services.

5 Product overview

5.1 General description

The MLP series is a high-pressure pump station for direct room humidification it's developed by Condair Group AG with focus on reliable and hygienic humidification solutions.

The MLP comes in five basic models, MLP 100, 300, 500, 800 and 1000. The number indicates the maximum continuous water outlet (high-pressure) at 943 psi (65 bar). If a larger capacity than 264 gal/hr (1000 l/h) is needed the MLP's is made in versions with double or triple high pressure pumps called e.g. MLP 2x800 or MLP 3x1000.

Important:

All components exposed to water are made of corrosion-resistant material. All hoses are steel-reinforced and drinking water-approved.

The high-pressure pump is directly mounted on the electric motor. Power is supplied to the 3-phase asynchronous motor via a magnet-operated protective motor switch. The high-pressure pump is protected against dry running by a pressure switch in the inlet manifold. A temperature sensor monitors the temperature inside the pump and protects it from overheating.

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

From the touch screen, the operator can easily change humidity set point in each section, adjust alarm limits and view hour counters, logged alarms, trend curves, etc.

The pump station is electrically wired at the factory. At the installation site, main power supply, humidity signal, external safety chain, step valves and additional options must be electrically connected to the control unit.

5.2 Model Designation

The specification label on the side of the Condair ML adiabatic humidifier shows its model number, year made, serial number, power supply and ratings. The breakdown of the model number is shown in [Figure 1](#).

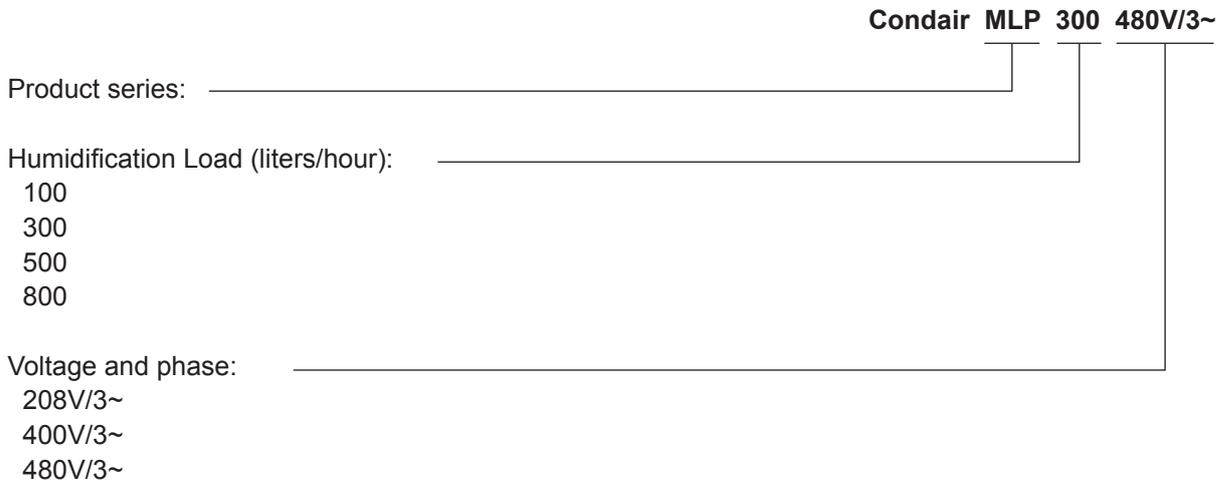


Figure 1: Model designation

Electrical Schematics and Wiring Diagrams

A copy of the electrical schematics and wiring diagrams can be found on the inside panel of the control panel.

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

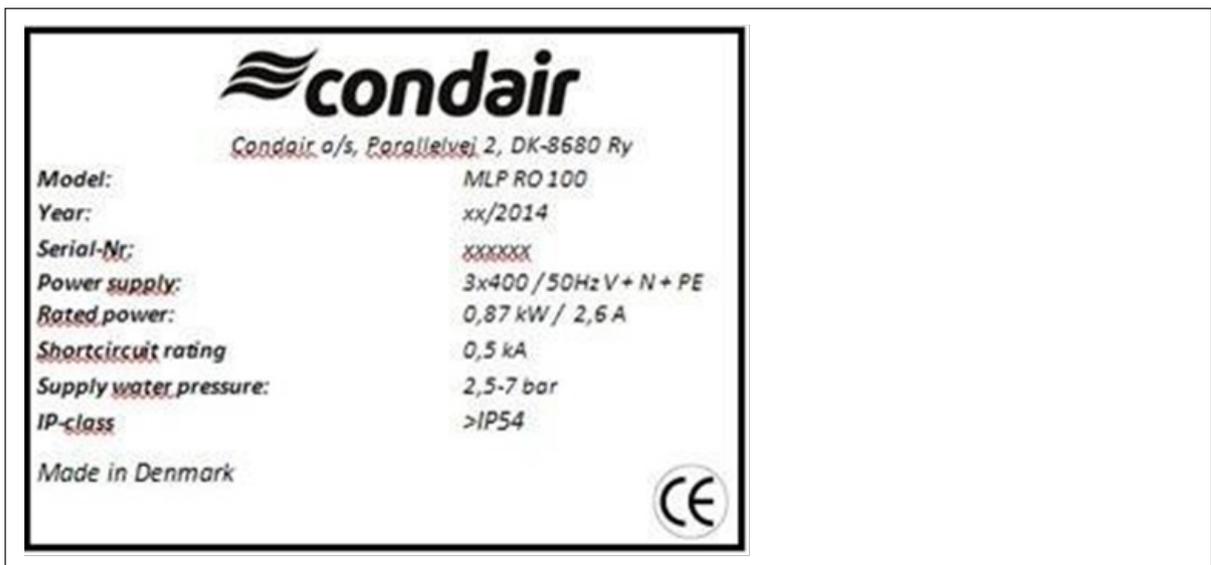


Figure 2: Rating plate

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 unit.

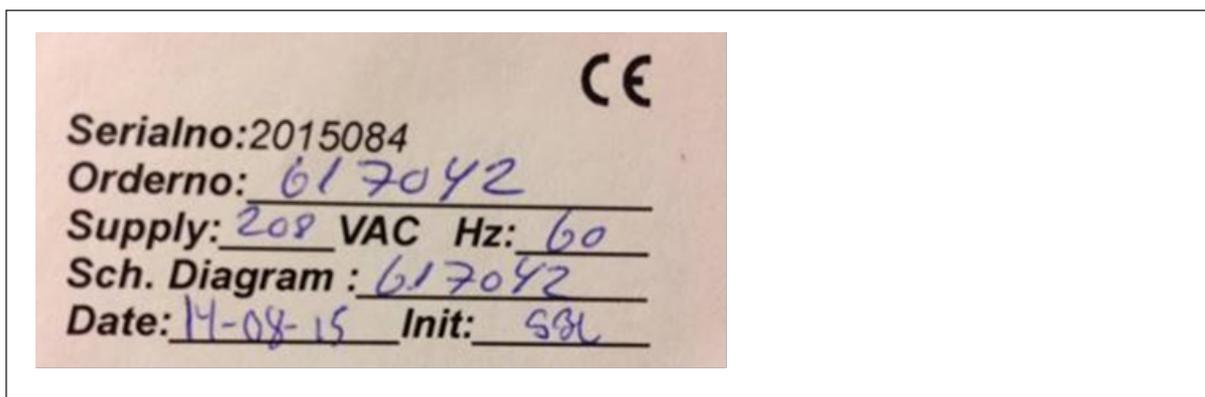


Figure 3: Label with the internal order number and electrical schematic diagram number

5.3 MLP 100/300 Overview

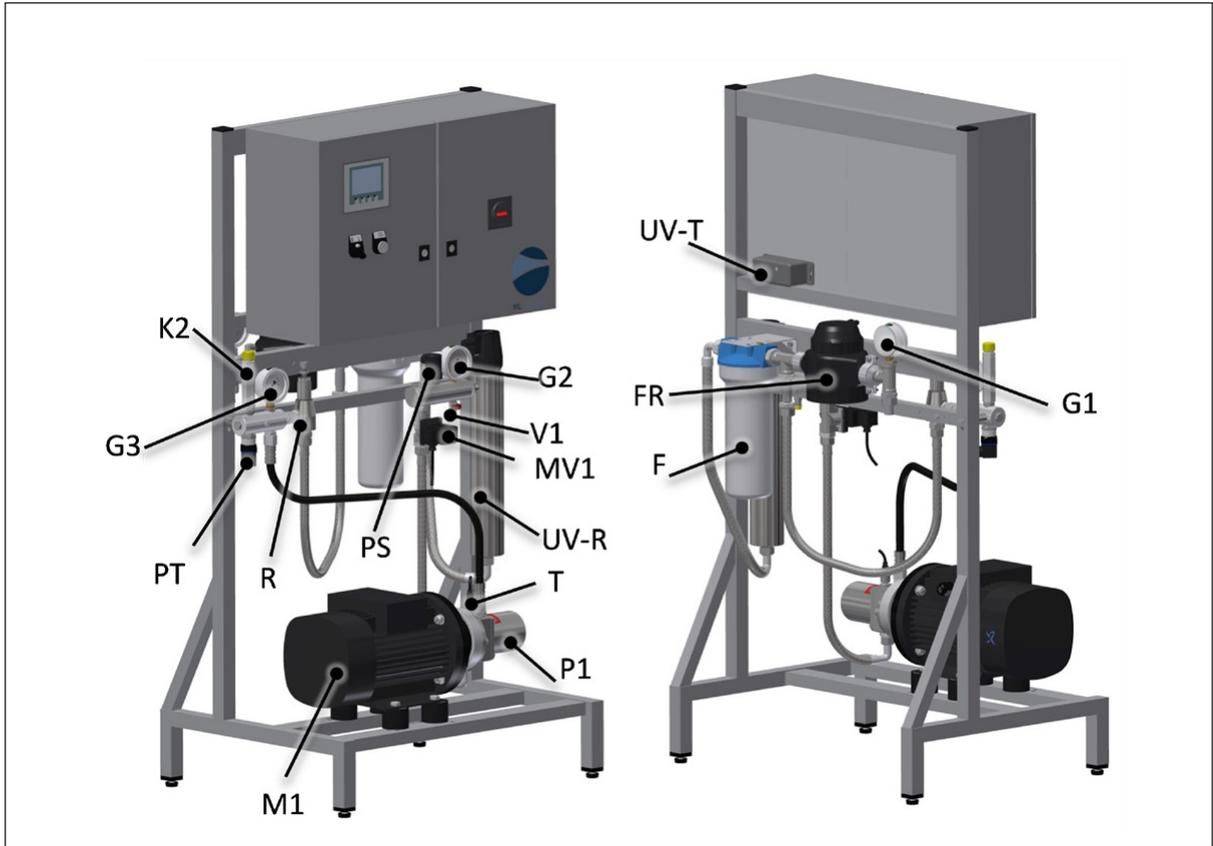


Figure 4: MLP 100/300 Overview

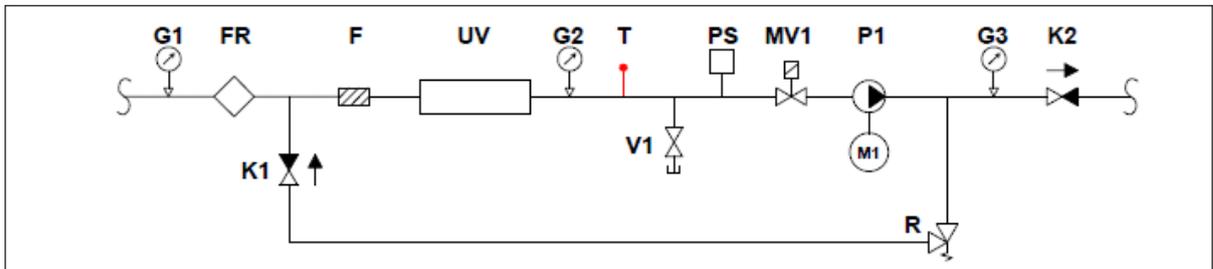


Figure 5: Hydraulic diagram MLP 100/300

F	Filter 10", 1 µm	MV1	ON/OFF valve 1/2" 0-145 psi (0-10 bar)
FR	Water meter	P1	PAH high-pressure pump 1015 psi (70 bar)
G1	Pressure gauge, 0-145 psi (0-10 bar)	PS	Pressure switch
G2	Pressure gauge, 0-145 psi (0-10 bar)	PT	Pressure transmitter (Option)
G3	Pressure gauge, high-pressure 0-2321 psi (0-160 bar)	R	Pressure reduction
K1	Check valve	T	Thermostat
K2	Check valve	UV	UV system
M1	Motor, high pressure pump	V1	Test water tap

Table 1: Legend MLP 100/300 Overview

5.4 MLP 500 Overview

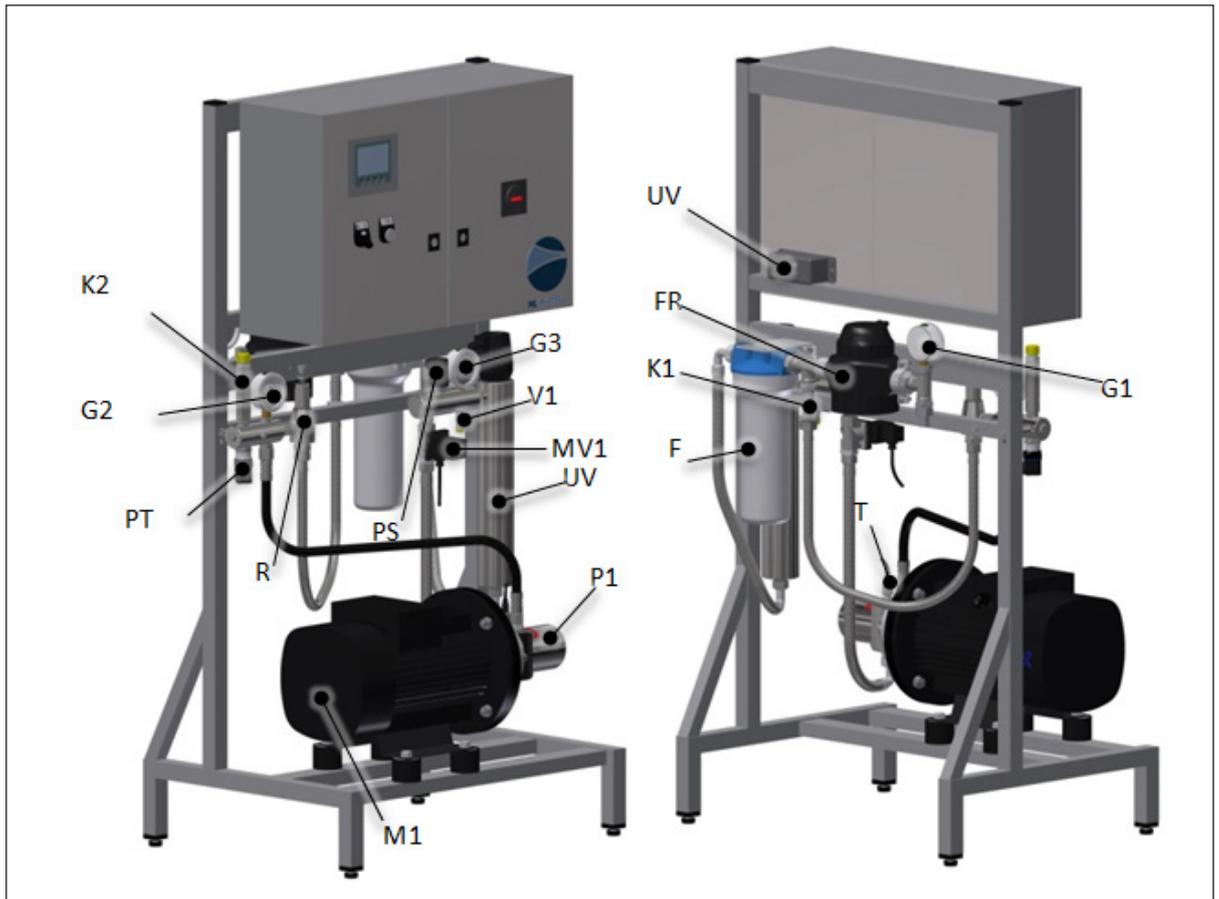


Figure 6: MLP 500 Overview

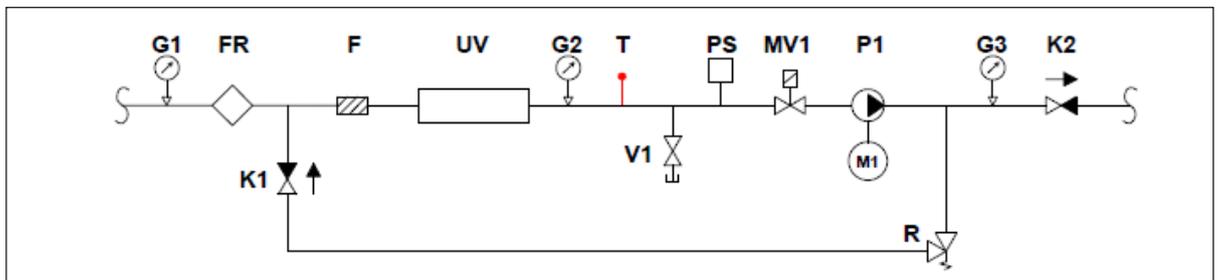


Figure 7: Hydraulic diagram MLP 500

F	Filter 10", 1 µm	MV1	ON/OFF valve 1/2" 0-145 psi (0-10 bar)
FR	Water meter	P1	PAH high-pressure pump 1015 psi (70 bar)
G1	Pressure gauge, 0-145 psi (0-10 bar)	PS	Pressure switch
G2	Pressure gauge, 0-145 psi (0-10 bar)	PT	Pressure transmitter (Option)
G3	Pressure gauge, high-pressure 0-2321 psi (0-160 bar)	R	Pressure reduction
K1	Check valve	T	Thermostat
K2	Check valve	UV	UV system
M1	Motor, high pressure pump	V1	Test water tap

Table 2: Legend MLP 500 Overview

5.5 MLP 2x800 overview

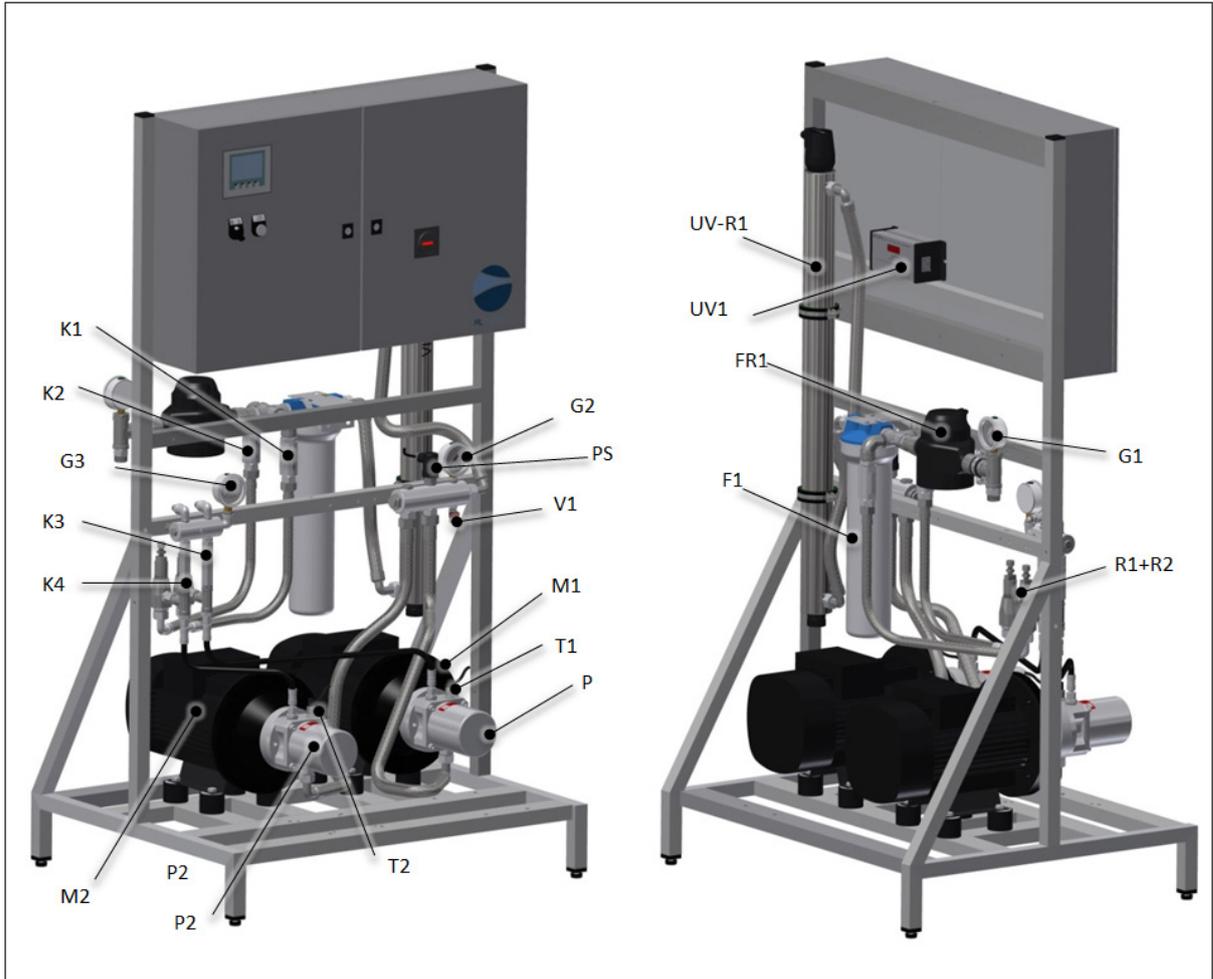


Figure 8: MLP 2x800 Overview

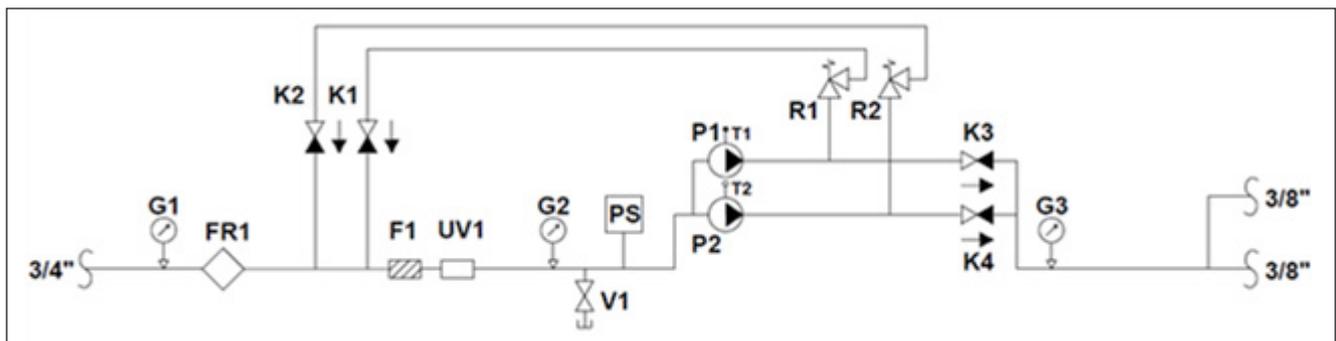


Figure 9: Hydraulic diagram MLP 2x800

F1	Filter 10", 1 µm	K3+K4	Check valve
FR1	Water meter	P1+P2	PAH high-pressure pump 1015 psi (70 bar)
G1	Pressure gauge, 0-145 psi (0-10 bar)	PS	Pressure switch
G2	Pressure gauge, 0-145 psi (0-10 bar)	R1+R2	Pressure reduction
G3	Pressure gauge, high-pressure 0-2321 psi (0-160 bar)	T1+T2	Thermostat
K1+K2	Check valve	UV1	UV system
		V1	Test water tap

Table 3: Legend MLP 2x800 Overview

5.6 Principal installation diagram

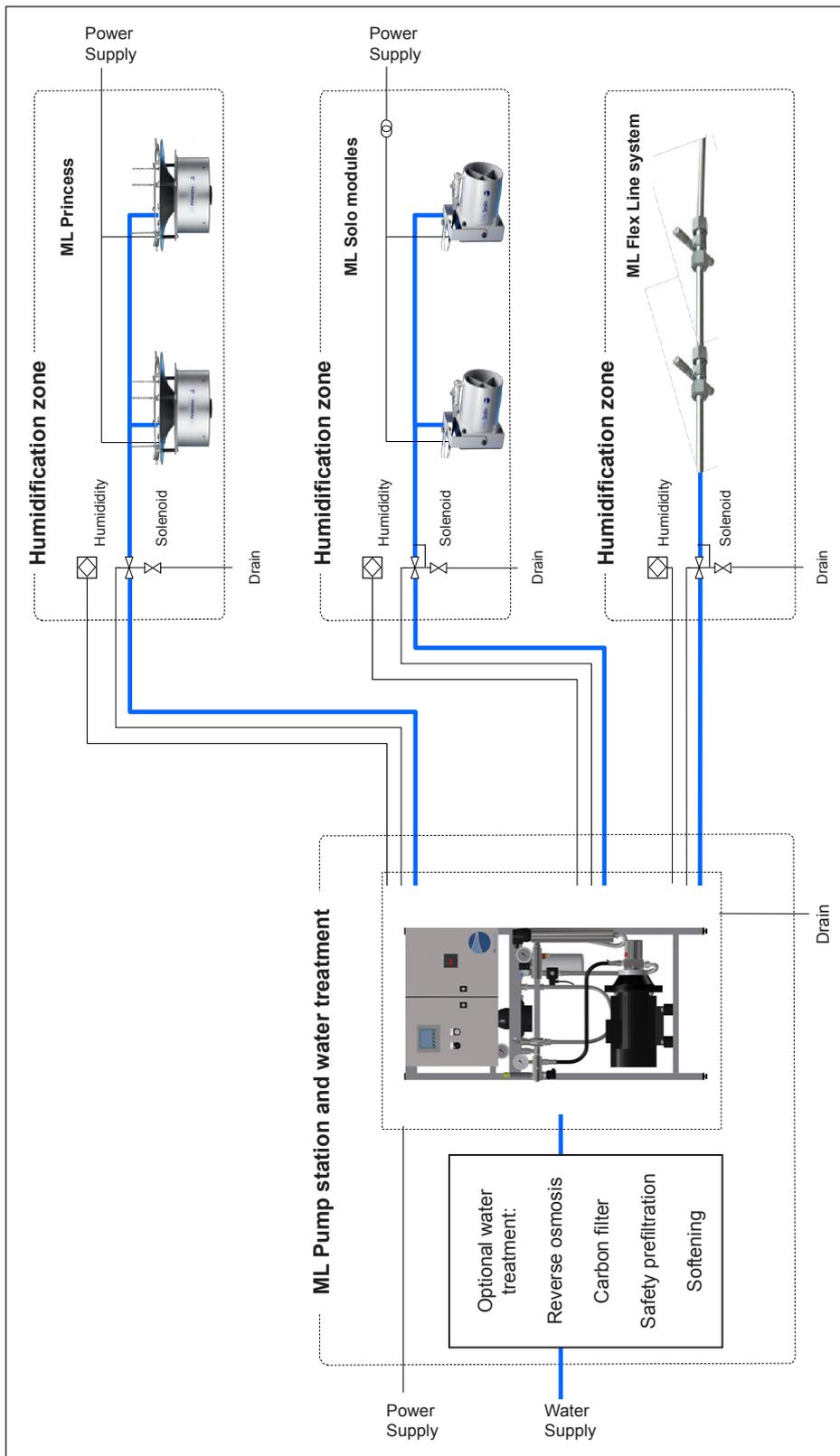


Figure 10: Principal installation diagram

5.7 Inlet water quality requirements

The quality of water being used in the MLP system should be checked prior to system commissioning. Condair A/S recommends that the MLP system be connected to a RO or DI mains water supply.

Table 4: Inlet water quality requirements

Water supply	Reverse osmosis or demineralized water
Conductivity	5-50 μ S/cm
TDS	max 35 ppm
KMnO ₄	max 10 ppm
NTU	max 1.0
Temperature	max 59°F (15°C)
Fe	max 0.2 ppm
Mn	max 0.05 ppm
Max hardness	max 1° dH
free chlorine	max 0.1 ppm

5.8 Optional equipment for MLP

Choosing the right water treatment is essential for successful humidification. 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 be customised to meet the specifications, be it essential water treatment or features. It is possible to combine ML Systems, water treatment and optional equipment in numerous 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 MLP system is listed.

Optional and ancillary equipment can be divided into the three following main groups:

MLP options: Added features which are intergraded into the controller of the MLP or placed on its frame, e.g. conductivity and hardness alarm, BAS integration, ultra-pure water (mixed bed), CIP system, CO₂ adding, damping water outlet, holding tanks (RTN). Options cannot be retrofitted and must therefore be listed when ordering

Water treatment: Stand-alone systems for improving the water quality in order to meet the inlet water quality requirements for the MLP, e.g. booster pump, non-return valve, silt/pre-filter, carbon filter and softener. See separate Water treatment / RO manual for further information.

High-pressure building installation: Added features and optional equipment – e.g. fan speed controller, flow monitor, temperature read-out. Options for the high-pressure building installation will be described in the I/O manual for the high-pressure building installation. See separate High-pressure equipment manual for further information.

5.9 MLP options list

Options cannot be retrofitted and must therefore be listed in connection with order placement.

Table 5: MLP options list

Fan control (Prepare of the control board)	Prepares the control board with terminals I/O for connecting a fan control box.
Fan control box (1-4 zones)	Start/stop fans in each zone between humidification cycles. Only possible if the control board has been prepared for the accessory.
Overheating protection of the high-pressure pump (flow/ temp-dependent)	Dumps excess water via a solenoid valve if the temperature or flow through the pump comes outside the permissible limit.
PLC webserver access	Access to the PLC's homepage from a standard browser. Displays the operating status and humidity for each zone.
Humidity logger	Logs the humidity in each zone every 15 minutes (1 year back). Data is stored in a .csv comma-separated values file, which can be accessed on a SD card or the PLC's webserver.
BAS/BMS integration Modbus TCP/IP	Displays the operating humidity and alarm status of the system via a TPC/IP protocol.
Backup high-pressure pump	The pump station is fitted with an extra high-pressure pump for redundancy, automatic changeover.
Status relay	Potential-free relays for (ready, running, warning, error).
Pulse generator for water meter	The water meter is equipped with a pulse emitter which can be linked to tele-reading systems, the PLC and to M-Bus networks.

5.10 MLP accessories list

Accessories can be retrofitted.

Table 6: MLP accessories list

Pulse generator for water meter, retrofit kit	The water meter is equipped with a pulse emitter which can be linked to tele-reading systems, the PLC and to M-Bus networks.
ML control box for induct system	ML satellite unit for connecting and controlling an induct system from an MLP or an MLP pump station.
Satellite box (4 zones)	Ads 4 additional zones (humidity I/O and zone valve terminals) to an existing ML-System.
Satellite box (8 zones)	Ads 8 additional zones (humidity I/O and zone valve terminals) to an existing ML-System.
Humidity logger retrofit kit	Logs the humidity in each zone every 15th minute one year back. Data is stored in a .csv comma-separated values file.
Alarm lamp	Alarm flash which can be placed up to 328 ft (100 m) from the pump, connects to an alarm output.
Modbus TCP/IP Gateway IP translator	Easy setup op Modbus TCP/IP communication to BAS as IP addresses can be chosen by the costumer on site.
Remote alarm SMS	Sends a SMS via a prepay SIM-card if the system goes in alarm and when the alarm is cancelled.
Remote alarm email	Sends an email if an alarm is triggered in the system and when the alarm is cancelled. Up to 25 recipients.
BAS/BMS integration Modbus TCP/IP, retrofit kit	Displays the operating humidity and alarm status of the system via a TPC/IP protocol.

6 Installation

6.1 General

Strictly observe and perform all installation tasks including the mounting of the unit and connection of the water and power supplies as described in this manual. Observe and comply with all local and national codes dealing with water and electrical installations.

Condair does not accept any liability for installation of humidification equipment by unqualified personnel, or the use of equipment/parts that are not authorized by Condair.

Personnel Qualifications

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, use the materials and hoses supplied with the unit. In case of doubt, please contact your Condair supplier.

Observe the following safety precautions:



WARNING!

Risk of injury and risk of damage to equipment

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



CAUTION!

Risk of breeding ground for bacteria

Do not use oil, grease, glue, Teflon, silicon, O-ring lubrication, etc. when assembling pipes or hose connections.

All of the above products can act as food for bacteria and therefore may pose a health risks.

Prevention: 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. Only approved lubricant is dish soap



CAUTION!

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



CAUTION!

Risk of damage to internal components from electrostatic discharge (ESD)

The electronic components inside the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate and special measures to protect the electronic components inside the unit against damage caused by ESD.

**WARNING!****Heavy object - risk of injury!**

The pump station or pump skid are extremely heavy. Smaller models can weigh 275 lb (125 kg) while the bigger units can weigh in excess of 550 lb (250 kg).

Prevention: Always use appropriate lifting device(s), and proper assistance, safety equipment, harness prior to lifting or moving any Condair ML equipment.

Recommended Tools

Condair recommends the following tools for unpacking, measuring, connecting and tightening all things regarding installation.

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

6.2 Site Requirements and Sizing

Please observe the following regarding positioning and installation:

- The pump station 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.
- Minimum recommended clearance and free space around pump station: 20 inches (0.5 m) side to side, and 32 inches (0.8 m) front and back.
- The pump station is designed for operation in a frost-free and dry environment, never outdoors.
- Do not install the pump station in exposed locations or locations with heavy dust loads.
- The pump station is designed for installation on a load-bearing floor.

6.3 Positioning the pump station

Please observe the following on positioning and installation:

- The pump station 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 19.7" (0.5 m), 31.5" (0.8 m) front / back).
- The pump station is designed for operation in a frost-free and dry environment, never outdoors.
- Do not install the pump station in exposed locations or locations with heavy dust loads.
- The pump station is designed for installation on a load-bearing floor.

Before installing the MLP it is important to consider placement of additional water treatment equipment in the room (e.g. Carbon filter, softener, RO). Please note that the combination/size of water treatment systems will vary from one installation to the next due as a result of water quality and regulatory requirements in the given location.

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.

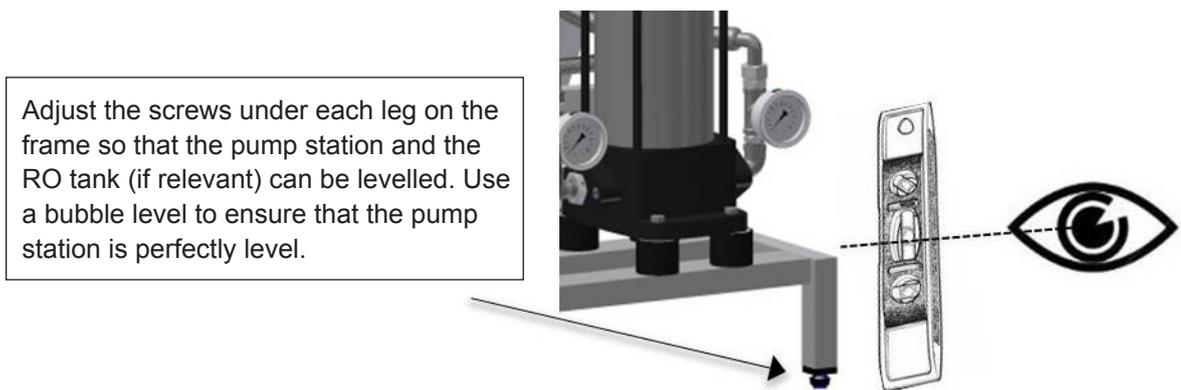


Figure 11: Adjusting the pump station

6.4 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 micro-organisms.

Before connecting the MLP to the water supply 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 to drain for at least ten minutes. Shut off the water again and connect MLP to the water supply with the supplied hose (3/4"/59.1" (3/4"/1.5 m)). Condair recommends that the incoming water is tested for bacterial contamination please contact Condair for further information on the subject.

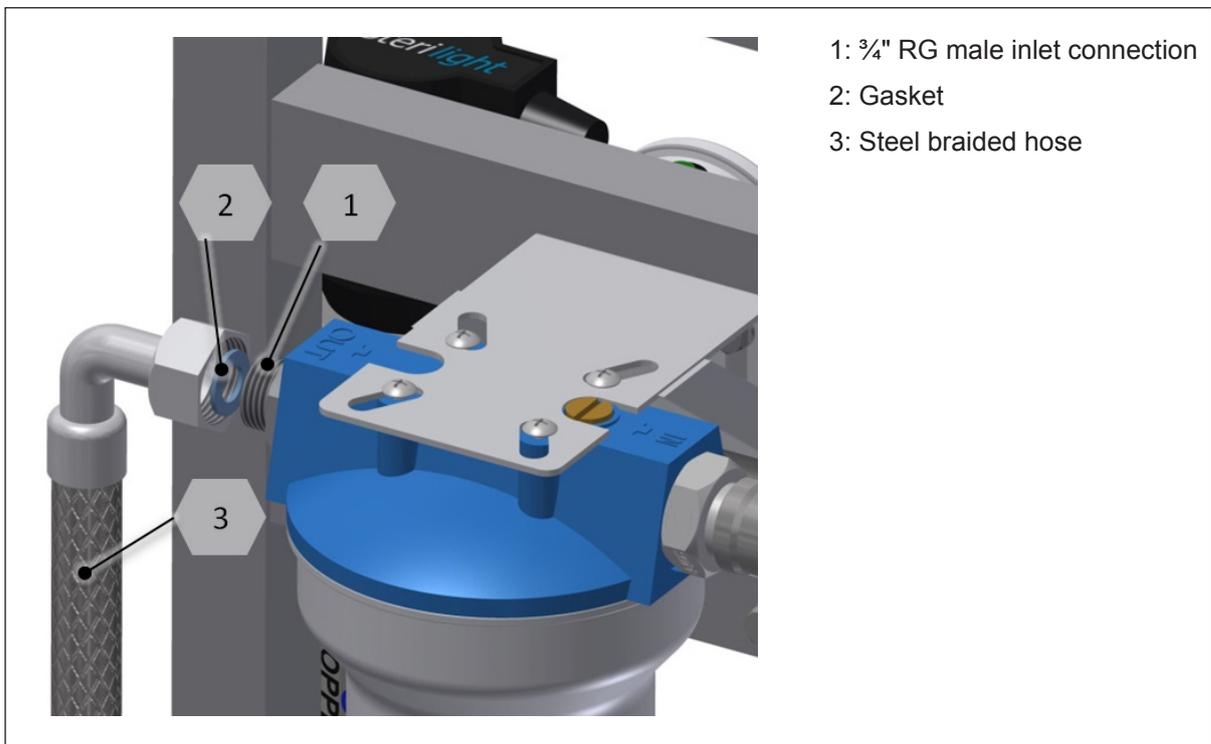


Figure 12: Water connection

6.5 Electrical installation



DANGER!
Danger of electric 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.

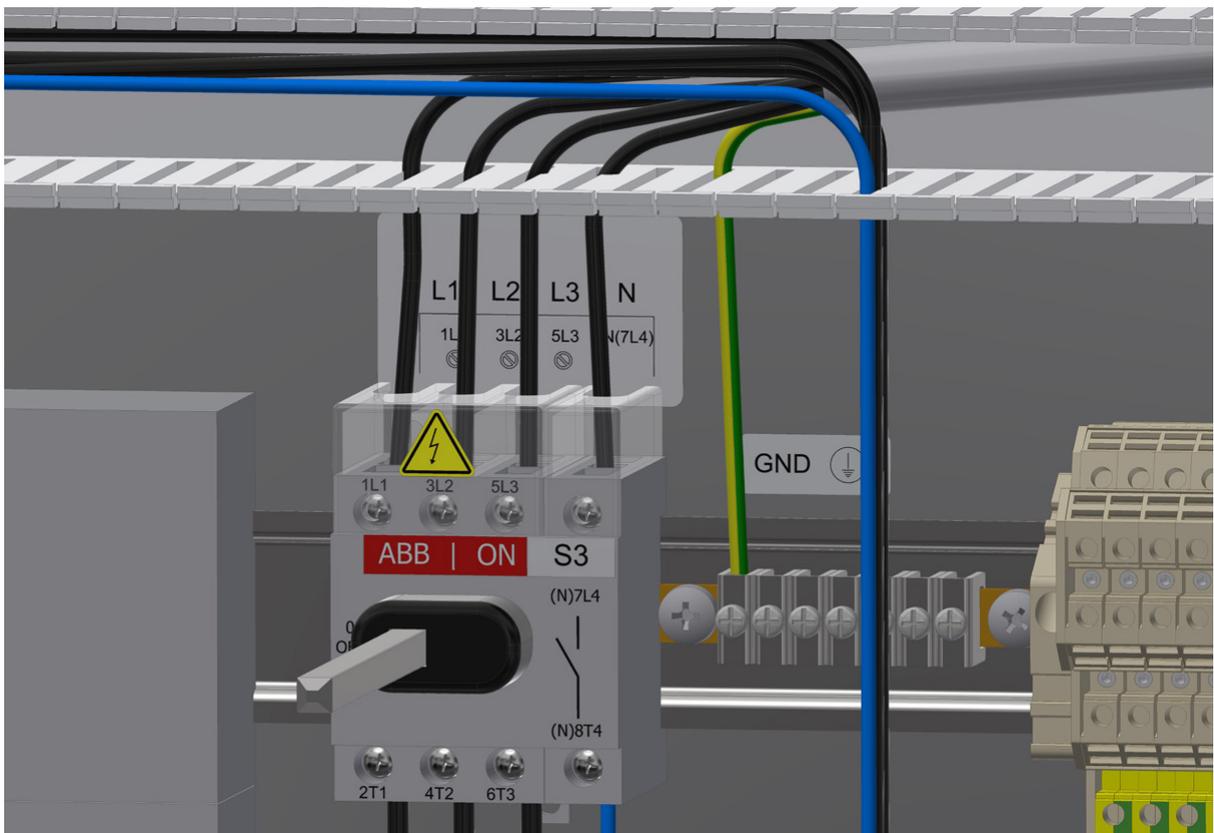
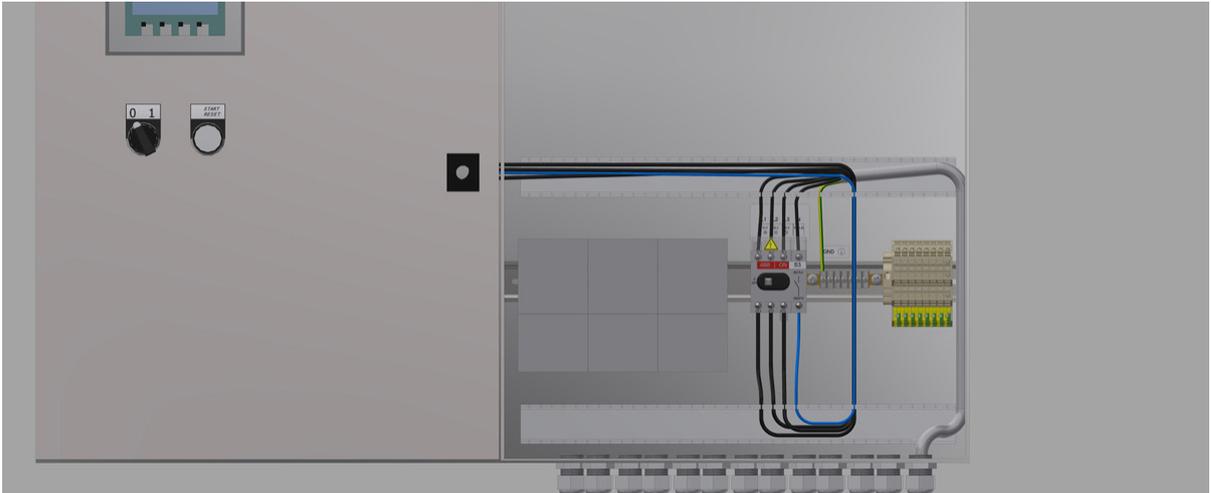
All connections must be made according to the electrical documentation which is found inside the control unit of the electrical cabinet / main box.

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.
- The pump station comes with a 3 m rubber coated power cable.
- Power consumption and size of pre-fuse can be found chapter with product data

6.5.1 Power Supply Connection

- Make sure that electrical supply corresponds to the specifications on the humidification system rating plate.
- Unlock the control panel enclosure door with the provided panel key.
- Insert the power supply cable through a suitable free cable gland and lead the cable to the field terminal block, as shown on the picture of the enclosure below.
- Follow the appropriate electrical wiring diagram for the actual humidification system and connect the power supply leads to the field terminal block accordingly.



7 Commissioning



WARNING!

The system start-up must be carried out or monitored by persons approved and trained by Condair. Errors in the start-up phase may ultimately result in illness, injury and death of humans..



CAUTION!

When fitting water filters, RO membranes, 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!



CAUTION!

Commissioning of the pump should be the last thing performed at an installation site. When the pump has run with water and the preservation fluid (windscreen wash) has been flushed out, it should always be kept on (summer and winter) in order to keep the system hygienically clean by allowing it to run its automatic flushing and UV routine.

7.1 Tools and materials for commissioning work

- Screwdriver set (remember small screwdriver for terminals)
- Polygrip pliers
- Spanner set
- Conductivity Meter
- BQ water analyses set ML part: 155600010
- Multi-meter (Volt, Amp)

7.2 Inlet filter

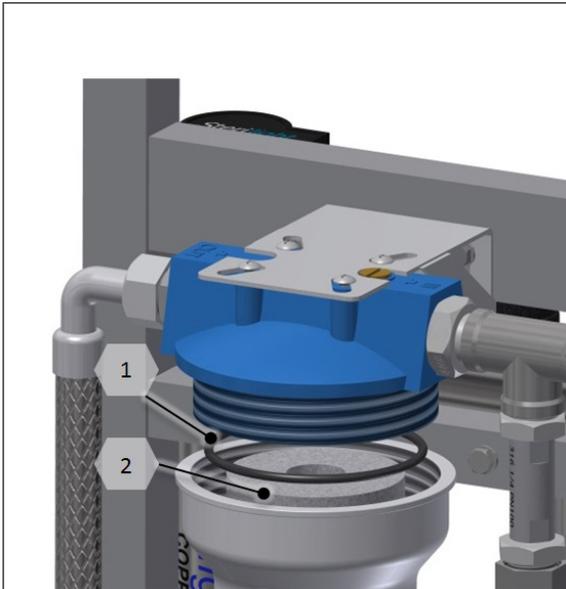


Figure 13: Inlet filter housing and filter

Insert filter:

- Unscrew the filter housing [1] using a filter wrench.
- Insert the filter [2], and make sure that it is centered on the guide knob at the bottom of the filter housing.
- Tighten the filter as much as possible by hand and then use the filter wrench to tighten approx. 1/4 turn.
- Slowly open the water supply
- If the filter housing is hard to tighten or leaks, unscrew it and check that the filter is centered, the O-ring is undamaged and the sealing surface is smooth and free of dirt.

Note: Do not touch the filter with your bare hands (slide it out of the packing directly into the filter housing).

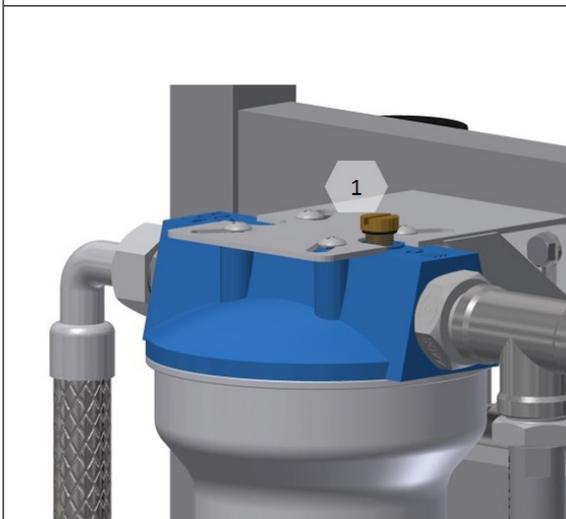


Figure 14: Air-vent screw, inlet filter

Airing filter:

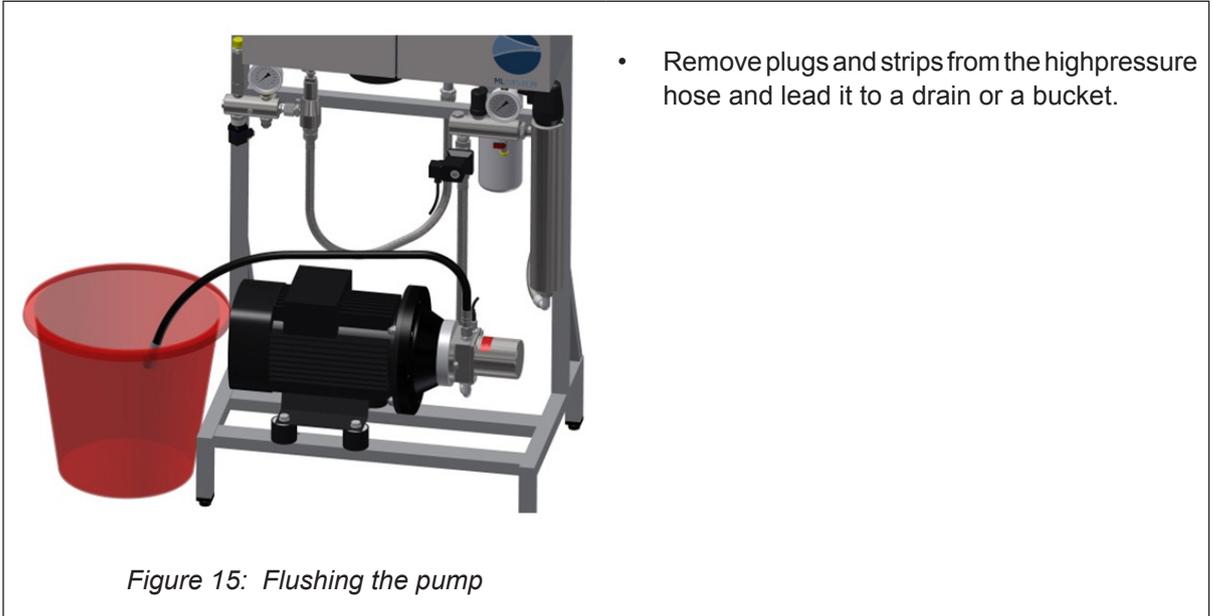
- Slowly open the water supply (tap) to the MLP
- Bleed the filter by loosening the air-vent screw [1] on the filter top until water leaks continuously.
- Retighten the air-vent screw.

7.3 Prepare for pump flush



CAUTION!

The first time a new pump and/or RO membrane is to be used, it is important to flush out any preservation fluids so that they do not end up in the high-pressure system.



- Remove plugs and strips from the highpressure hose and lead it to a drain or a bucket.

Figure 15: Flushing the pump

Before the pump is started for the first time, the controller must be set up.

7.4 Basic set-up of the controller



- 1: Touch Screen (D2)
- 2: Humidification On/Off (S1)
- 3: Reset/Start (S2/P1)
- 4: Keyhole, open cabinet
- 5: Main power switch (S3)

- Put S1 in OFF position
- Start the controller by turning the power switch S3 in ON position
- The display lights up the start center → ► START

Figure 16: Control unit



1.1.1

Every time the system is switched on after a power break, you will see a screen that tells you to control the pump rotation.

Verify that the pump rotation is correct.

A push on the Test rotation starts the high-pressure pump for 5 seconds, so that the rotation can be observed according to the arrows on the pump.

When the rotation control has passed it is possible (by customer's responsibility) to skip this screen in the future (It can be deselected in screen 1.6).

Upon completion of rotation control, press Rotation ok.

A technician pin will be required; 197



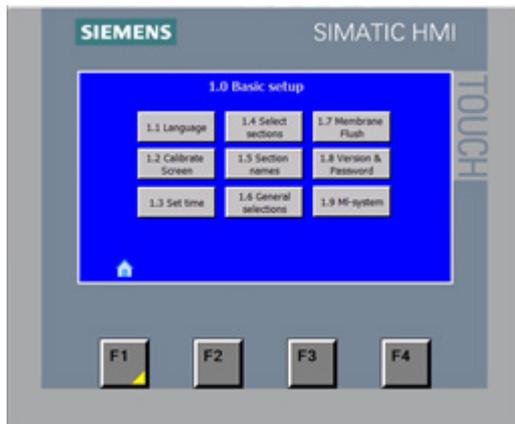
1.1

Select language by pressing the flag.

Select the units to use in the screens.

- Litre/hour
- Lb/hour
- Celsius
- Fahrenheit

Press the right arrow (F4) to continue.



1.0

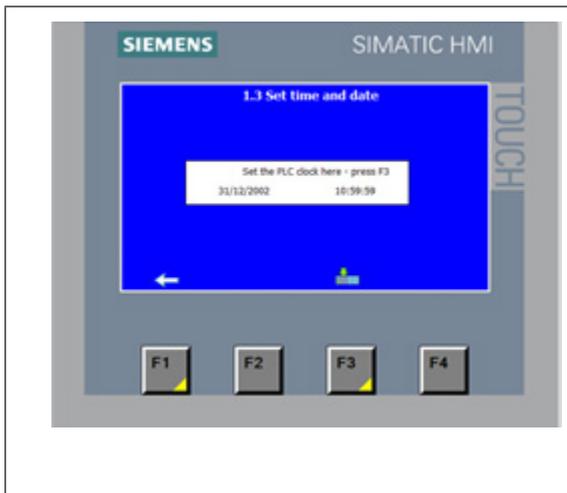
The Basic setup page provides access to pages and selectable functions:

- 1.1-Choice of language
- 1.2-Calibration of screen
- 1.3-Set time and date
- 1.4-Selection of active sections
- 1.5-Selection of names for the sections
- 1.6-General selections (settings)
- 1.7-Membrane flush
- 1.8-Version and change passwords (factory settings)
- 1.9-ML-System (factory settings)

Once you have made your selection(s), press Home (F1) to continue.

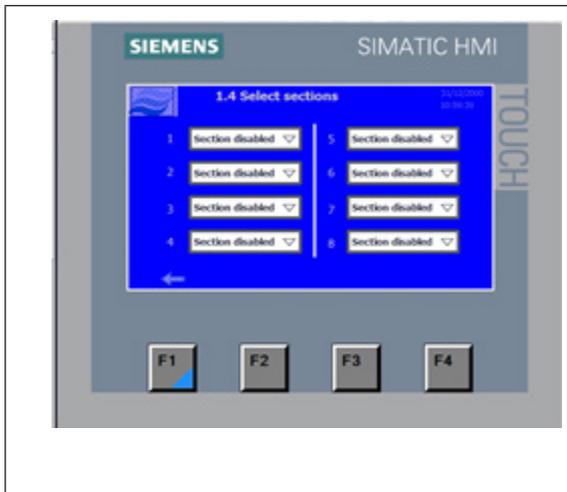
1.2

Calibrate Screen: Adjusts the viewing angle, so you can stand upright and operate the screen. When calibrating, do not lean forward in order to get a better view. You will not get the desired effect.



1.3

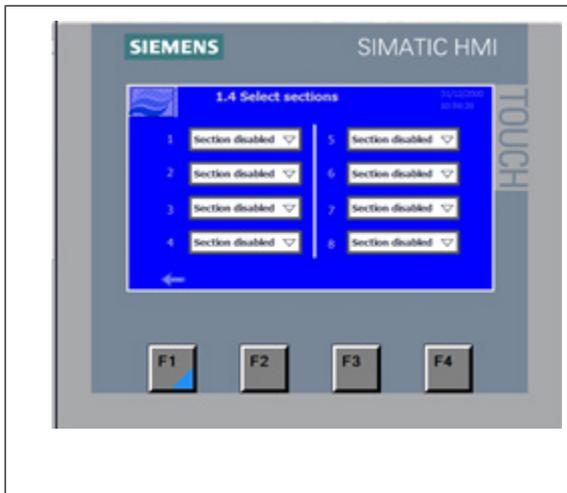
Time/date can be set (stored in the screen only).
 Note: Remember to press F3 to set the PLC clock



1.4

Select which section (zones) is active.
 A section is defined as a humidity sensor and a valve set connected to the controller

- Section disabled
- Section enabled



1.5

Selection of user-defined section names.
 You can use up to 8 characters to define each section.

Default is 1-2-3...11-12



1.6

General selection between options and setups for the general pump station. Please note that some of the options require hardware that has to be ordered together with the pump.

Master pin will be required; 8599

Standard setting is the top choice in the drop-down menus.

Here also shown in bold:

- No CIP function
- CIP function

- No fan control
- Aut fan control
- Constant fan control

- No EC monitoring
- EC monitoring
- EC monitoring +RV/CO2
- EC monitoring +MB+CO2

- No pressostat 3
- Pressostat 3

- Aut reset disabled (inlet water low pressure)
- Aut reset enabled (inlet water low pressure)

- 1 section – valve set
- 1 section – no valve set

- Humidity controlled (20-80% RH)
- Direct controlled (0-10 V)
- % controlled (0-100%)

- No Logging
- Logging selected

- Rotation check enabled (1.1.1)
- Rotation check disabled (1.1.1)



The image shows a SIMATIC HMI login screen. At the top, it says 'SIEMENS' and 'SIMATIC HMI'. The screen title is '1.8 Version & password'. There are four input fields: 'User', 'Password', 'Group', and 'Logoff time'. Below these fields, there are two dropdown menus: 'MLP size' set to '100' and 'Sections' set to '1-4'. At the bottom of the screen, there are four function keys labeled 'F1', 'F2', 'F3', and 'F4'. The screen also displays a serial number '000000000000000000000000' and 'Serie nr. 20 000000'. A 'Log off' button is located at the bottom right of the screen.

1.7

Select MLP size and select 1-4 or 1-8 sections. This selection is pre-set from factory according to the controller hardware.

Changing password is only possible with the master password.

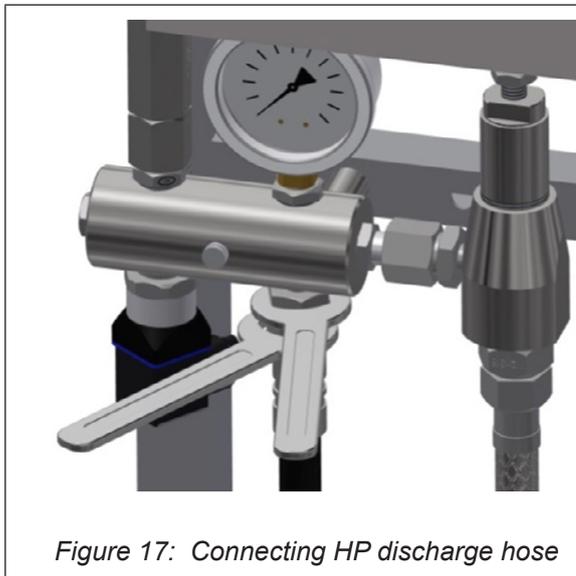
7.5 Pump flush procedure

Venting and flushing the high-pressure pump:



Force the HP pump to run by adjusting the set point in a section to 75%.

Let the HP pump flush for 10 minutes.



Turn S1 (on/off switch) to off position, and connect the HP discharge hose to the high-pressure manifold.

Note: It is important to use two wrenches, otherwise there is a danger of the glue breaks and high-pressure manifold leaks.

Leave the main switch turned on and the S1 (on/off switch) in off position. This way the system will perform a flush routine that together with the UV lamp will help keeping the system clean.

8 Operation

Every person operating the MLP's controller must have read and understood this manual.

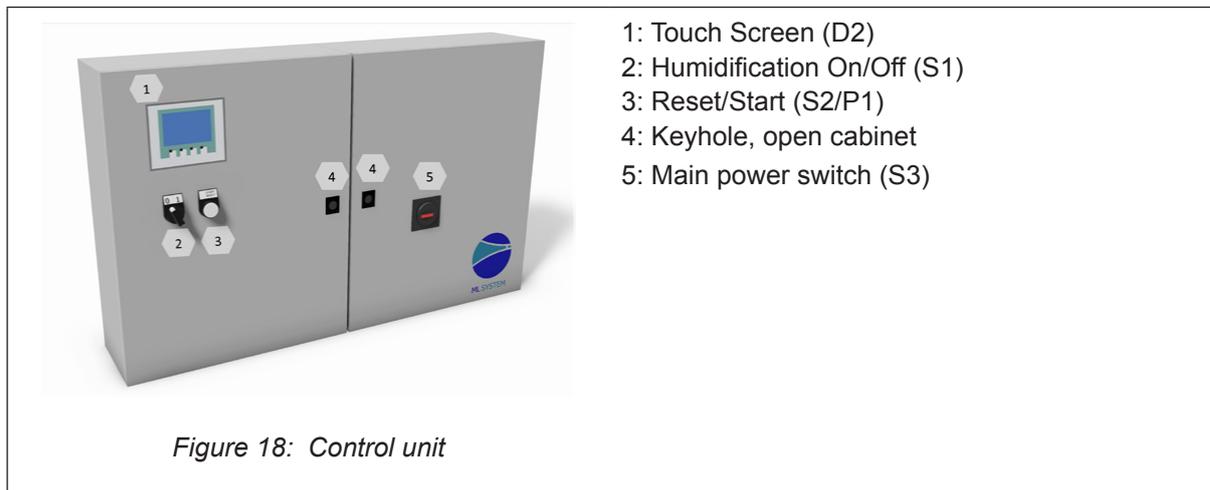
Knowing and understanding the contents of the manuals is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation and to operate the unit safely and correctly.

All safety notes in the installation and operation manual for the MLP must be observed and adhered to.

All work described in this controller manual may only be carried out by properly trained personnel which is authorised by the customer.

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

8.1 Overview control unit



8.2 Equipment protection

Pressure switch (inlet water)

The MLP has a pressure switch which monitors the inlet water pressure.

If the inlet water pressure drops, the controller will stop the pump, thus protecting it against dry running. If the water pressure drops, the screen will display 'PM Water pressure too low'.

Max. hygrostat to protect against excessive humidification

A max. hygrostat can be connected to the control unit. If humidity levels rise to a value that exceeds the value set on the max. hygrostat, the system stops and the alarm lamp flashes. The system will not restart until the alarm is acknowledged by pressing 'Alarm reset'.

Temperature switch

The high-pressure pump is protected against overheating by a temperature circuit that measures the current temperature in the pump. The temperature limits can be set individually.

If the temperature exceeds 122°F (50°C), the pump will stop immediately and must be reactivated via the reset button once the temperature has dropped again.

Description of touch screen

The screen has four F keys. 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. Once a new value has been entered, press Enter at the bottom right of the image using the numerical keyboard.

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.

User (no password) can read operational information and alarms.

User 1 (password 1234) as above + changes of set points.

Technician (password 197) as above + changes of operational parameters and choice of membrane rinse.

Master (password 8599) as above + selectable options, reset to factory settings.

Technician xxxx, as above + factory / service menu.

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

When a password is required in order to change parameters, a screen will appear where the password can be entered. Once the password has been entered, the system is unlocked for five minutes.

8.3 Alarm messages

This page shows alarms and operational messages. The alarm display contains information about when an alarm was triggered and when it was reset. The page shows active alarms and previous alarms. Please note that the system does not have a backup memory, which means that previous alarms will be lost in case of power failure.

Max.Hygrostat Sect. 1...12

Max. hygrostat in the current section has dropped out due to excessive humidity. The system has stopped and must be restarted once the humidity level has dropped.

Water pressure too low

The water pressure on the water inlet to the pump station is too low.

Sensor error Section 1...12

The signal from one of the humidity sensors is outside the expected interval of 20 to 80% RH. In order to ensure that it will be possible to start up the system in very dry conditions, the 20% limit is reduced to 5% RH for the first 10 minutes after the system is switched on. If an alarm is triggered, only the affected sections will be stopped.

Pump too hot

The water is too hot – above 122°F (50°C). The system has stopped and must be restarted once the temperature has dropped.

Thermal relay error

The protective motor switch for the high-pressure pump is disengaged. Engage the relay and try restarting.

UV lamp error

There is an error on the UV lamp

CIP dosing time alarm (option)

The CIP weight has not given a signal within the expected time

CIP weight error (option)

The CIP weight gives an incorrect signal

CIP overdosing last day (option)

The CIP self-monitoring system is defect due to possible overdosing. Please call for service

Operational message display**The pump will start automatically after delay.**

The pump has been paused, e.g. after disinfection. The pump will start automatically after the expiry of the set time.

Service

The pre-set service interval has been reached. The system must be serviced!

UV lamp error

The UV bulb or ballast is broken.

UV lamp soon to be changed

Warning 3 weeks prior to UV lamp change / service.

UV lamp error too old

Replace UV lamp and reset service interval.

8.4 Controller menu



The screenshot shows the '2.0 Home' screen of a SIMATIC HMI. It features a blue background with white text. At the top, there are four progress bars representing humidity levels. Below these, a table displays 'Humidit', 'Setpkt', and 'Load' for four sections. A yellow message bar at the bottom of the table area reads 'Humid stopped'. At the bottom of the screen, there are four function keys labeled F1, F2, F3, and F4.

2.0
Normal operation page

Shows up to four sections at a time. The names of the section changes colour according to the current status.

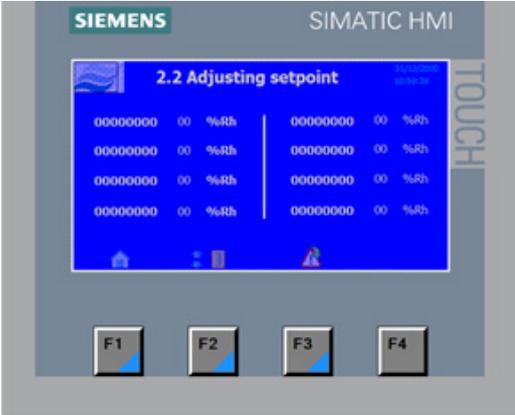
- White – normal inactive
- Green – active section – humidification is on
- Yellow flash – humidity out of range
- Red flashing – alarm on the section

Humidity, set point and load for each section.

Just tap the set point to go to the set point adjust screen.

If an alarm or message is triggered, a bar will appear across the screen, showing the message.

Access to the menu page – the alarm page – the page for other displays and to the page for section 5-8.



The screenshot shows the '2.2 Adjusting setpoint' screen of a SIMATIC HMI. It features a blue background with white text. The screen is divided into two columns, each with four rows of input fields for setpoint adjustment. Each row includes a numerical value and a '%RH' label. At the bottom of the screen, there are four function keys labeled F1, F2, F3, and F4.

2.2
Changes of set points for the individual section.



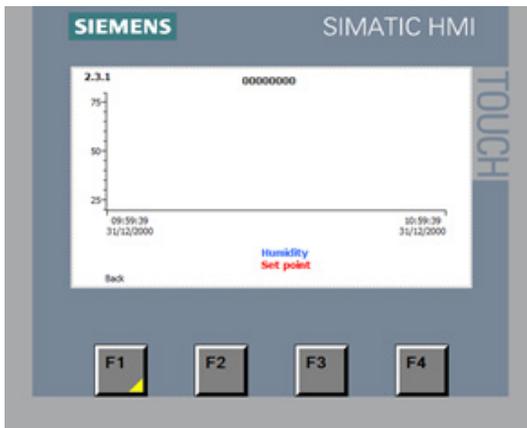
2.3

Shows the pump temperature and the actual flow – calculated after the setting for each section.

If the EC option is selected, lines for the actual EC monitoring will also be displayed.

Hour counter – select between pumps and each section.

Access to the Trend curve for each section.

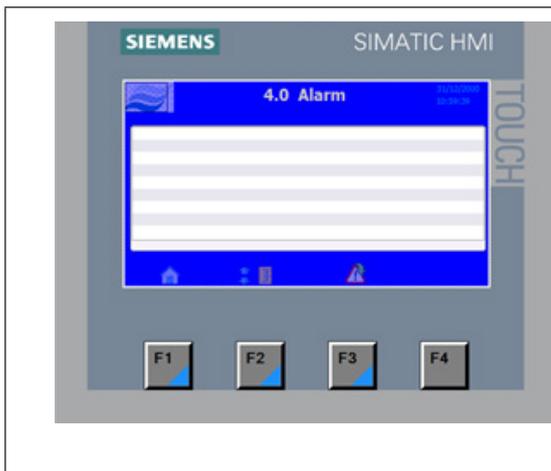


2.3.1

Graphic display of humidity development in the relevant section for the last hour.

Please note that this function will be reset when the power to the screen is cut.

8.4.1 Alarms and user messages

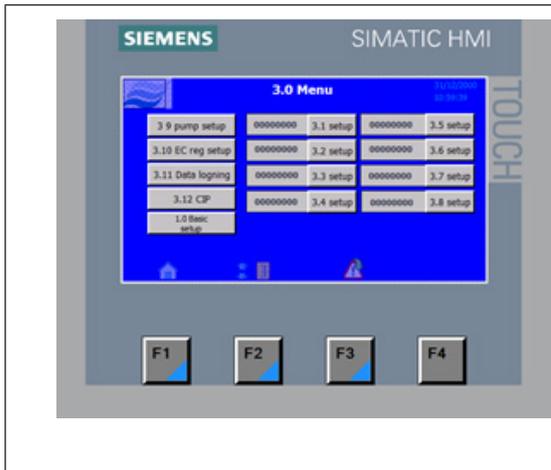


4.0

All alarms and operational messages are shown, showing the time at which they occurred and the time when the alarm stopped.

Please note that the alarm log will be reset after a power cut.

8.4.2 Parameter change menu



3.0

Menu for the pages where the different parameters can be changed.

8.4.3 Settings for section parameters



3.1

Section parameters for sensor scaling and regulator settings

These values should be changed by Condair's technicians only.

Hum.Alarm

Set the HI and LO. The alarm appears if the humidity becomes lower than the pre-set value in HI or lower than the pre-set value in LO.

8.4.4 Pump

The screenshot shows the '3.9 Pump setup' screen on a SIMATIC HMI. The screen is divided into several sections:

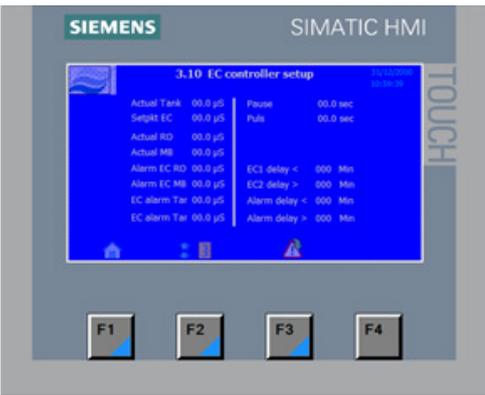
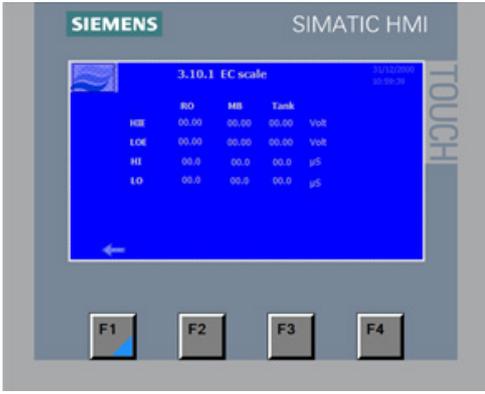
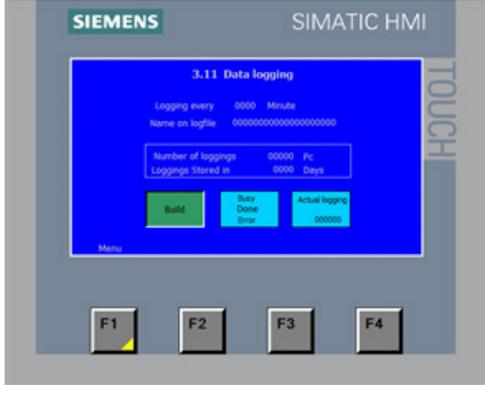
- Pressure:** 'Pressostat del' is set to 000.0 bar, and 'Flex.SP' is set to 00 %.
- Start after disinfection:** 'Cilind' is set to 00.
- Pump temperature:** 'Actual Temp' is 000.0000.
- Temp limit 1:** 28 °C - 82 °F.
- Temp limit 2:** 38 °C - 100 °F.
- Temp limit 3:** (blank).
- UV monitoring:** 'UV set' is 0000 / 0000, and 'UV temp' is 000.0000.

At the bottom of the screen, there are four function keys labeled F1, F2, F3, and F4. The text 'TOUCH' is visible on the right side of the screen.

3.9 Pump alarm settings

These values should be changed by Condair's technicians only.

8.4.5 Conductivity monitoring, humidity logging and CIP (options)

	<p>3.10 EC controller set point</p> <p>These values should be changed by Condair's technicians only.</p>
	<p>3.10.1 Scaling EC sensors</p> <p>These values should be changed by Condair's technicians only.</p>
	<p>3.11 For detailed description in the logging option, read Condair document TI086.</p>

	<p>3.11.1 Build a log file</p>
	<p>3.12 Select the days you want to run a CIP function – CIP on days (one or two days each week) Select the CIP start time. Select the dosing amount (can only be selected in intervals of 5 ml per 50 litres of water)</p>

8.5 Weekly inspection

During operation, the MLP and the humidification system have to be inspected weekly. On this occasion, check the following:

- Entire humidification system for leakage
- Electric installation for damage
- Operating display for warning or error messages
- UV filters
- Pressure drop over filters
- Water treatment systems such as carbon filter, softener, RO

If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components take the MLP 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

9 Maintenance

9.1 Important notes on maintenance

Qualification of personnel

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

Maintenance and repair of the electrical installation of the Condair MLP must be carried out only 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 and upheld.

Only the maintenance work described in this documentation may be carried out.

Only use original ML-System spare parts to maintain the warranty on the system.

Safety

Before maintenance is initiated, the MLP must be taken out of operation in accordance with instructions in section "Taking the MLP out of operation" and protect against unintentional switching on.

The MLP must be cleaned and disinfected at the intervals described in this manual and the cleaning work has to be carried out correctly 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 work in strict accordance with the instructions.

9.2 Maintenance work

To ensure safe, hygienic and economic operation of the MLP, 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 possible maintenance indications. The relevant personnel are fully liable for any maintenance work not carried out.

Service, to be carried out	Half year	Each year	Every 2 years	Every 4 years
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	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
Change gasket kit in high pressure relive		X	X	X
Functional testing of max hygrostat circuit	X	X	X	X
Functional testing of high pressure gauge	X	X	X	X
Functional testing of pressure switch (pressostat)	X	X	X	X
Service inspection of PAHT pump (age 2 years or 8000 running hours)			X	X
Testing of ON/OFF valve and replacement if necessary	X	X	X	X
UV system				
Functional testing of UV systems	X	X	X	X
Cleaning of quartz glass on UV systems	X	X	X	
Replacement of UV-lamp		X	X	X
Replacement of quartz glass				X
Humidity sensors				
Testing and adjusting of humidity sensors. Replaced if +/- 10% deviation	X	X	X	X
Checking of max humidity controller (max hygrostat)	X	X	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 (Bacterie test)	X	X	X	X
Disinfection of the system	X	X	X	X

9.3 Preventive spare parts chart

Part Description	P/N	100		300		2x300		500		2x500		800		2x800		1000		2x1000		Service Cycle
		208V	480V	208V	480V	208V	480V	208V	480V	208V	480V	208V	480V	208V	480V	208V	480V	208V	480V	
Water Filters																				
20" 1-Micron sediment filter	2300218	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3 mo.
10" 1-Micron sediment filter	2300213	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3 mo.
O-ring for filterhouse	430020050	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12 mo.
UV Lamps																				
8400900 UV lamp for .5 GPM Unit - SQ-PA	2300239	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12 mo.
8400902 UV lamp for 2GPM Unit - S2Q-PA	2300241	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	12 mo.
8400903 UV lamp for 5GPM - S5Q-PA	2300243	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	12 mo.
Quartz Sleeves																				
Quartz sleeve (QS-212) for SQ-PA	2300235	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24 mo.
Quartz Sleeve (QS-330) for S2Q-PA	2300236	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	24 mo.
Quartz Sleeve (QS-463) for S5Q-PA UV	2300237	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	24 mo.
Electrical Control System																				
Thermal relay 2.8-4.8 A	349010202	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	36 mo.
Thermal relay 4.5-6.3 A	349010203	0	0	1	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	36 mo.
Thermal relay 1.1-1.6 A	349010208	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36 mo.
Thermal relay 2.2-3.2 A	349010209	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	36 mo.
Thermal relay 5.5-8.0 A	349010212	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	1	0	2	36 mo.
Thermal relay 11.0-16.0 A	349010067	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	2	0	0	36 mo.
Siemens Contactor 24VDC 9A	349010218	1	1	1	1	2	2	1	1	2	2	0	1	0	2	0	1	0	2	36 mo.
Siemens Contactor 24VDC 12A	2585530	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	2	0	0	36 mo.
Relay, Print frame relay	680010177	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	12 mo.
High Pressure Pumps																				
Service kit PAHT 2	104466001	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24 mo./8K hr.
Service kit PAHT 4/6.3	104466002	0	1	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	24 mo./8K hr.
Service kit PAHT 10/12.5	104466003	0	0	0	0	0	0	0	1	2	1	2	1	2	1	2	1	2	1	24 mo./8K hr.
Pressure Regulator																				
Service kit pressure regulator	104481000	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	12 mo.
Gasket 1/2" connection hose	705020042	2	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	12 mo.
Gasket 3/4" connection hose	705020043	2	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	12 mo.
Check Valves																				
Check valve 1/4" high pressure	510020000	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24 mo.
Nipple 3/8" hose x 1/4"	730020279	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24 mo.
1/4" or 1/8" hose extension fitting	108301000	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24 mo.
Check valve 3/8" high pressure	510020005	0	0	0	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	24 mo.
3/8" x M20 nipple w/cone	730020278	0	0	0	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	24 mo.
Brystnippel 3/8", 100 bar	721000002	0	0	0	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	24 mo.
Nozzles																				
Nozzle Complete stainless 2,5 l/h.	103160000	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	12 mo.
Nozzle Complete stainless 4,5 l/h.	103150000	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	12 mo.
Disinfection																				
Disinfection, Sanosil HM10 Ag 5% - quart	2300001	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	12 mo.
Disinfection, Sanosil HM10 Ag 5% - Gallon	2587665	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	12 mo.
Test Strips																				
HACH Test Strips 5-in-1 50 strips	2300144	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12 mo.
Bacteria Testing																				
BAQ Water Testing Kit	155605000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	12 mo.

9.5 Troubleshooting

Qualification of personnel

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

Repair work on the high-pressure pump may only be carried out by your Condair representative's service technician.

Safety

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

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

9.5.1 Malfunction with error indication

Error message	Cause	Remedy
Max. humidistat	Max. humidistat has been tripped, due to high humidity	Check that ventilation is on Set point is correct Incoming set point signal OK
	Max. humidistat defect or incorrectly set	Change max. humidistat Set correct rel. humidity, e.g. 85% RH
	Max. humidistat circuit damaged or not installed correctly	Check circuit for faults Check settings for max. humidistat in controller are correct If no max. humidistat, a jumper must be installed over terminals (4 & 4+)
Inlet water pressure too low	The inlet water pressure is too low	Check the inlet pressure at maximum flow for pump station according to product data
	The Inlet water pressure is too low for short periods (if inlet pressure and flow seems ok when measured)	Check the water installation for periodically high consumption e.g. cleaning, tank filling and maintenance work
	Defect Inlet pressure switch [PS]	Replace pressure switch
Sensor error	Humidity sensor missing or defect	Install humidity sensor
	Wiring to humidity sensor damaged or incorrectly installed	Replace wiring according to electrical diagram
	Humidity outside range (below 20% RH or above 80% RH)	Check the humidity at sensor and reset if below 20% RH
	Sensor scaling is wrong	Scale the sensor correctly in the controller

Error message	Cause	Remedy
Stop - Pump too hot	Water flow through high-pressure pump too low	Check flush valve MV5 at step valve block opens and nozzle are not clogged
	Ambient temperature too high at pump location (max. 77°F (25°C))	Lower ambient temperature in pump room (max. 77°F (25°C))
	Incoming water too warm	Lower inlet water temperature (max. 59°F (15°C))
	Inlet pressure / flow missing	Defect inlet valve [MV1] Water supply blocked / closed
	Damaged thermostat or cable [T]	Change thermostat and cable
	High-pressure pump defect	Locate cause of failure, e.g. running hours exceeded 8,000, particles / dirt in system, missing water pressure, defect inlet valve. Change pump when cause of failure has been established and corrected

9.5.2 Resetting the error indication

Press the reset button underneath the touch screen.

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

9.5.3 Malfunction without error indication

The following table provides malfunctions that do not issue messages, notes on the cause of malfunction and information on how to eliminate the source of trouble.

Malfunction	Cause	Remedy
Water's dripping from modules/flex/nozzles	Defect / clogged nozzles	Replace nozzles
	Zone valves defect / leaking	Repair valves
	Air in system	Air the entire system
	Pressure too low	Check / repair PAHT pump
	Water below 5 µS/cm	Adjust RO
Condair MLP humidifies permanently.	Nominal humidity value too high.	Reduce nominal humidity value.
	Ambient humidity very low.	No measures to be taken, just wait.
	The internal controller is activated, although an external controller is connected	Deactivate internal controller.
Maximum humidification capacity not reached.	Air change to high	Contact your Condair supplier.
	Defective zone valves	Check the function of valves
	Hygrostat defect	Check calibration and function
	Spray nozzles clogged.	Remove nozzles and replace them
	Hoses to nozzle pipes are leaking or disconnected, or nozzle pipes are leaking.	Check hoses/nozzle pipes and seal, as required
Control unit is switched on but the display of the control unit does not show anything.	Service switch in power supply line is off.	Set service switch in power supply line to On position.
	Fuses of the power supply line blown	Have an electrician replace fuses of the power supply line.
	Fuse of control unit blown	Have an electrician replace fuse of the control unit.
	Display or control board defective	Have a Condair service technician replace the display or the control board.

10 Product data

	MLP100	MLP300	MLP500	MLP800	MLP1000	MLP 2X800	MLP 2X1000	MLP 3X800	MLP 3X1000
Capacity = water consumpt. [lb/h (kg/h)], 60 Hz (12-120)	26.5-264.6 (12-120)	79.4-701.1 (36-318)	92.6- (42-528)	1164.0-2090.0 (72-948)	238.1-2645.5 (108-1200)	158.7-4180.0 (72-1896)	238.1-5291.1 (108-2400)	158.7-6289.9 (72-2844)	238.1-7936.6 (108-3600)
Weight [lb (kg)]	110.2-143.3 (50-65)	121.3-154.3 (55-70)	143.3-176.4 (65-80)	165.3-209.4 (75-95)	187.4-220.5 (85-100)	341.7-374.8 (155-170)	352.7-385.8 (160-175)	385.8-418.9 (175-190)	396.8-440.9 (180-200)
Dimension w x d x h [inches (mm)]	26.0x19.7x51.2 (660x500x1300)	26.0x19.7x51.2 (660x500x1300)	26.0x19.7x51.2 (660x500x1300)	26.0x19.7x51.2 (660x500x1300)	26.0x19.7x51.2 (660x500x1300)	32.3x27.6x63.0 (820x700x1600)	32.3x27.6x63.0 (820x700x1600)	55.1x27.6x63.0 (1400x700x1600)	55.1x27.6x63.0 (1400x700x1600)
Water supply dynamic pressure [psi (bar)]	14.5...58.0 (1...4)	14.5...58.0 (1...4)							
Pipe inlet "RG"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	2x3/4"	2x3/4"
Pipe outlet "RG"	1/4"	1/4"	3/8"	3/8"	3/8"	2x3/8"	2x3/8"	4x3/8"	4x3/8"
Sound level [dB(A)]	<75	<80	<80	<80	<80	<80	<80	<80	<80
60Hz									
Electrical conn. 3-phased	Un = 208-277 V								
Absorbed Power [kW]	1.1	1.8	2.3	4.0	4.0	7.4	7.4	11.2	11.2
Pre fuse	16 A	16 A	16 A	16 A	20 A	32 A	32 A	50 A	50 A
Electrical conn. 3-phased	Un = 400-480 V								
Absorbed Power [kW]	1.4	2.1	2.6	3.6	4.4	6.8	8.4	9.7	12.5
Pre fuse	16 A	20 A	20 A	25 A	25 A				

11 Declaration of conformity



EC - Declaration of Compliance

Manufacturer:

Condair A/S
Parallelvej 2
8680 Ry

We hereby declare, that the following pump systems for humidification purposes:

ML RO 100; ML RO 300; ML RO 500; ML RO 800; ML RO 1000; ML RO 1500;
HP 100; HP 200 VFD; HP 300; HP 500; HP 500 VFD; HP 800; HP 800 VFD; HP 1300 VFD
HP RO 100; HP RO 200 VFD; HP RO 300; HP RO 500; HP RO 500 VFD; HP RO 800; HP RO 800 VFD
MLP 100; MLP 300; MLP 500; MLP 800; MLP 1000; MLP 2x800; MLP 2x1000; MLP 3x800; MLP 3x1000
MLP RO 100; MLP RO 300; MLP RO 500; MLP RO 800
MLP HRO 100; MLP HRO 300
MLPD 300; MLPD 500; MLPD 1000;
MLPG 100; MLPG 300; MLPG 500; MLPG 800; MLPG 1000;

are manufactured in accordance with the following EC directives:

- 2006/42/EC, Directive on machinery
- 2014/30/EC, EMC (ElectroMagnetic Compatibility) Directive
- 2014/35/EC, The low voltage directive
- 2011/65/EC, ROHS Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

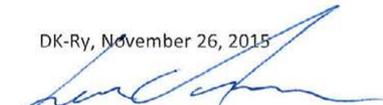
The following harmonized standards have been applied:

- EN ISO 12100:2011, Safety of machinery – General principles for design – Risk assessment and risk reduction
- EN ISO 13849-1:2008, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design.
- EN 55022:2011+AC, Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
- EN 60204-1:2006 + amendments, Safety of machinery – Electrical equipment of machines – Part 1: General requirements

The following international standards and technical specifications are used:

- IEC 60034-1 ed. 12.0, Rotating electrical machines - Part 1: Rating and performance
- IEC 60034-5 ed. 4.1, Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification
- IEC 60034-6 ed. 2.0, Rotating electrical machines - Part 6: Methods of cooling (IC Code)
- IEC 60034-8 ed. 3.1, Rotating electrical machines - Part 8: Terminal markings and direction of rotation
- IEC 60320 ed. 2.1, Appliance couplers for household and similar general purposes - Part 1: General requirements

DK-Ry, November 26, 2015



Lasse Andresen, Technical Manager

Condair A/S
Parallelvej 2, DK-8680 Ry
Tel. +45 8788 2100
www.condairsystems.dk

A Appendix

A.1 Siemens Scalence Router (option)



2589380
Gateway IP Translator, Separate box, Y17 incl. PIN code

2589381
Gateway IP Translator, Built-in, Y17 incl. PIN code

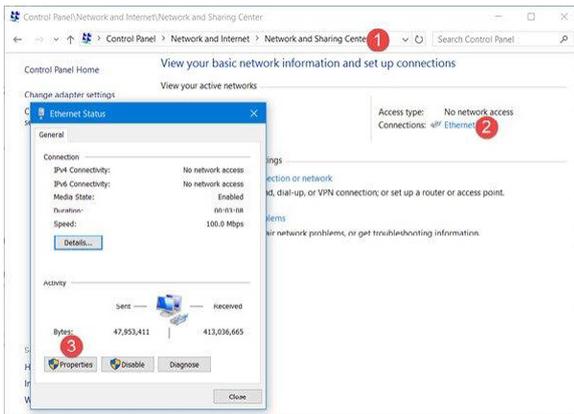
This describes how to set up the Siemens Scalence S615, in order to create a connection between PLC and external communication (e.g. BMS system).

It is assumed, that the Siemens Scalence S615 is properly connected to the mains supply and the patch cables are connected to the PLC and to the HMI (if applicable).

The PLC should be connected in port P2-P4.

Connect a PC with a patch cable to port P1 on the Siemens Scalence S615. (Not the BMS PC)

Change your PC's IP address to:
IP address: 192.168.1.20
Subnet mask: 255.255.255.0

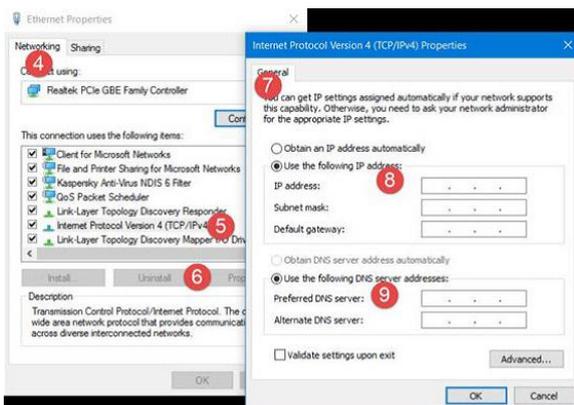


The image shows the procedure in Windows 10.

If you are using another version of windows or a MAC, you will find a lot of instructions on the internet. Search for: *Change IP address windows xx or MAC...*

Open the "Network and Sharing Center" (1) in the control panel and click the "Connections" link (2).

A new window will open, showing the details about your internet connection. Click the "Properties" button (3).



The default settings of a PC is to "Obtain the IP address automatically". However, you can change it, if required.

Select "Use the following IP address" and fill in (8):

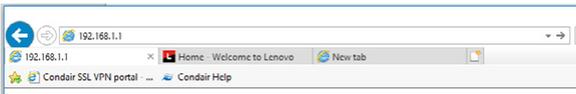
IP address: 192.168.1.20
Subnet mask: 255.255.255.0
Click "OK" and it's done.

Don't forget to check the box "Validate settings upon exit". Your PC will automatically run the network diagnostic and verify the connection.

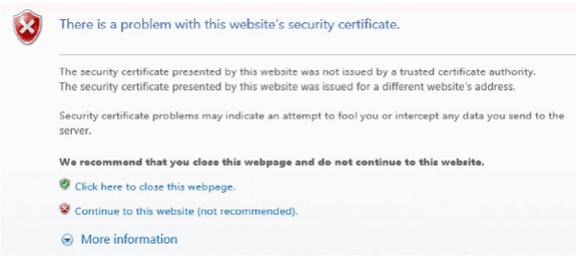
If your computer is used on more than one network (most likely not), enter the details like subnet mask, default gateway, preferred DNS server, alternate DNS server, etc (9).

The IP setting is finished now and the communication with the Siemens Scalence S615 should work.

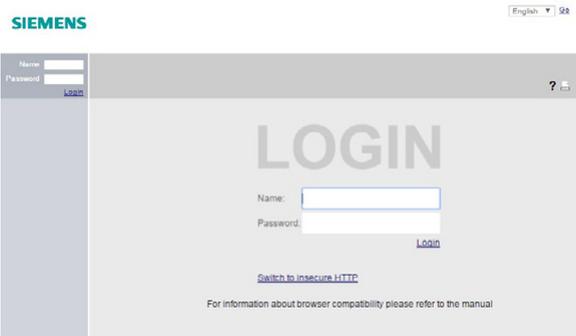
Switch back to "Obtain an IP address automatically", after the settings of the Siemens Scalence S615 are done.



Open a browser, enter the IP address 192.168.1.1 in the address bar and press "Enter".

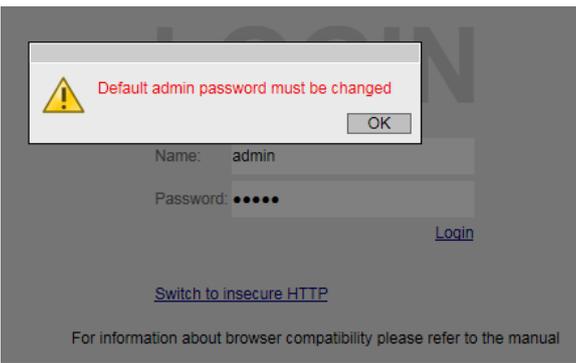


This warning (or similar) will appear. To proceed click: "Continue to this website (not recommended)".



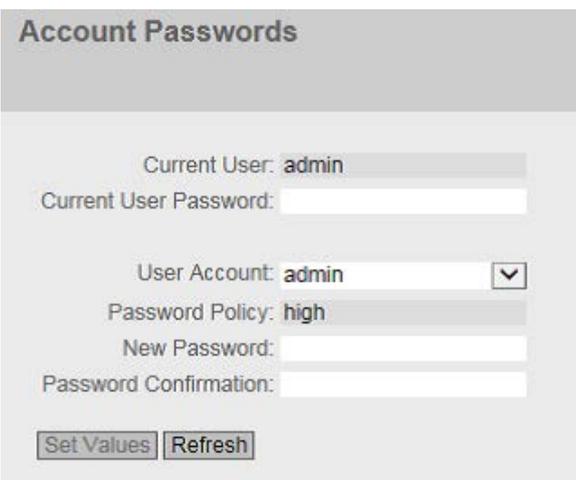
The login screen for the configuration of the router appears.

At the first login:
Enter "admin" for both Name and Password.



If the Router is accessed the first time you are prompted to change the password.

Select "OK". The "Account Passwords" window appears.

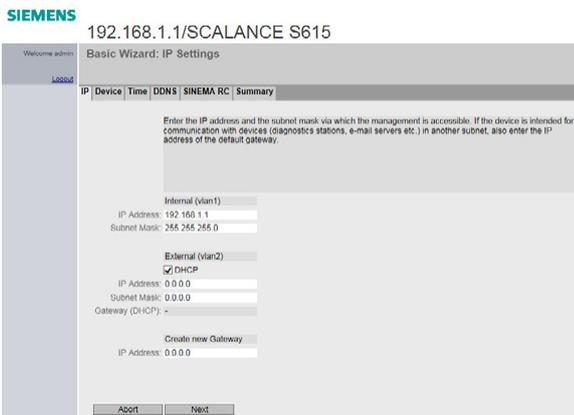


To ensure that Condair technicians have access in case of a fault, set the password as follows:

Enter the current User Password:
"admin"

Please enter the new password as below:
"Condair#1234"
"Condair#1234"

Select "Set Values" and the password is changed.



Enter under "Internal (vlan1)":
 IP Address: 192.168.100.200
 Subnet Mask: 255.255.255.0

Under "External (vlan2)":
 Remove checkmark in "DHCP"

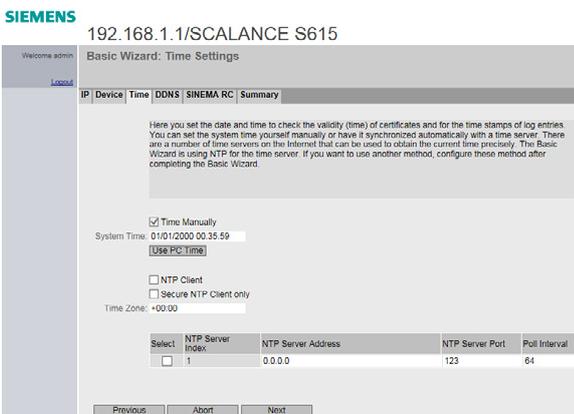
Enter IP address and Subnet Mask:

Example *:
 IP Address: 10.20.30.1
 Subnet Mask: 255.255.255.0

Under "Create new Gateway" nothing should be changed.

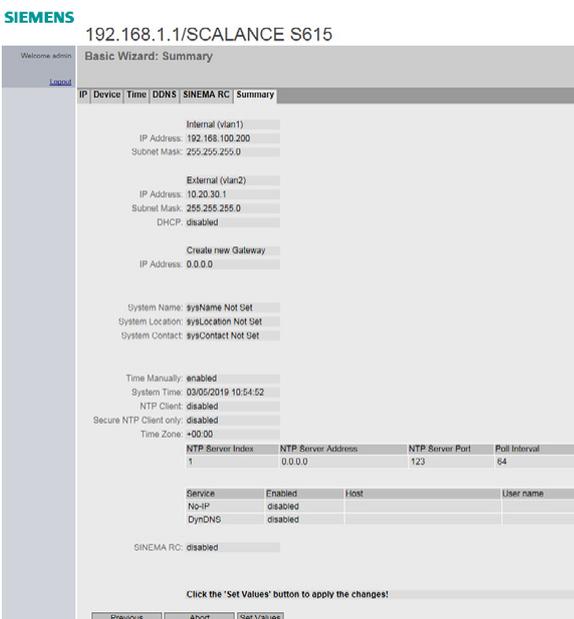
* The IP address to be entered under "External (vlan2)" must fit to the network, to which the BMS is connected.

Choose "Next" and "Next" again until the tab "Time" appears.



Select "Use PC Time"

Select "Next" and "Next" again until the tab "Summary" appears.

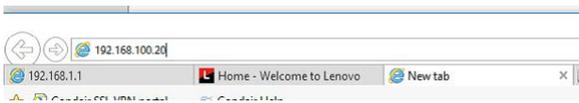


On the last tab "Summary", select "Set Values" and the IP address of the router is configured.

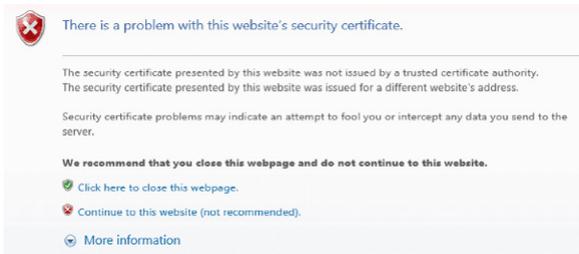
The NAT and Firewall must also be modified.
 To do that, the IP address on the PC has to match the newly changed one on the router.
 It can be done the same way as shown before on the pages 1 and 2.

IP Address: 192.168.100.20
 Subnet Mask: 255.255.255.0

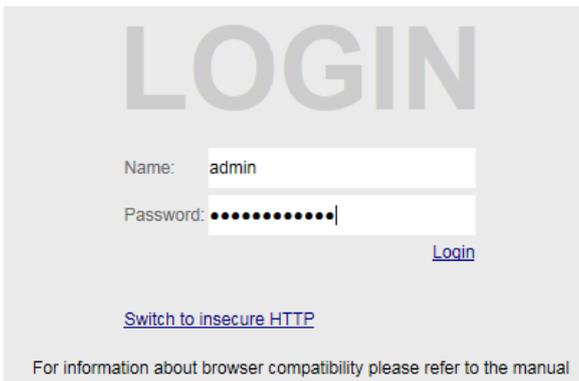
The IP address of the PC is now changed and it's possible to connect to the router.



Open a browser, enter the IP address 192.168.100.20 in the address bar and press "Enter".



This warning (or a similar one) will appear. In order to proceed, it is necessary to choose: "Continue to this site (Not recommended)".



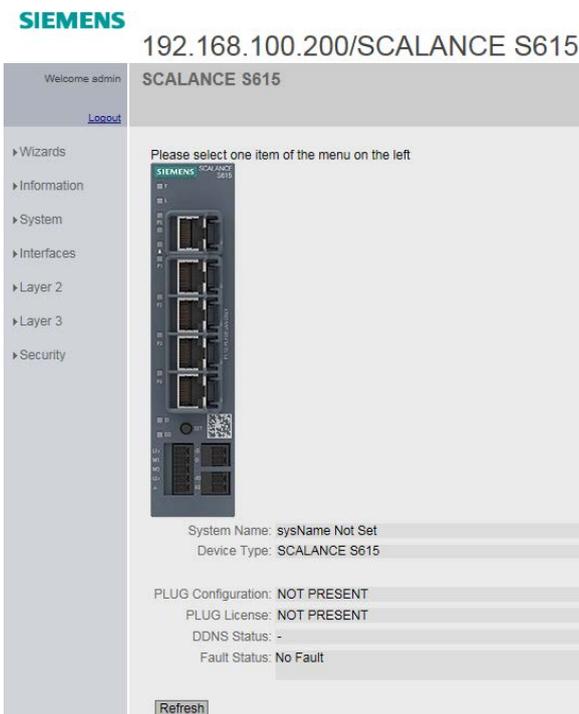
The login screen appears.

As the password is changed now, please enter:

Name: "admin"

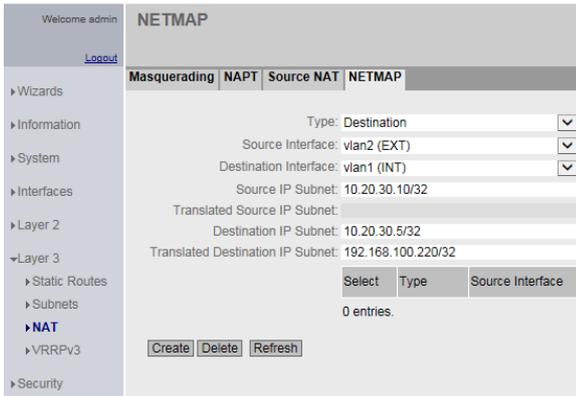
Password: "Condair#1234"

Select "Login".



The setup screen for changing the NAT and Firewall settings appears.

Select "Layer 3" and then "NAT".



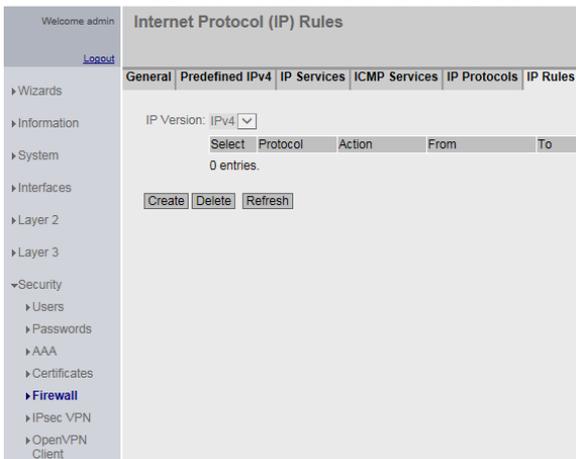
Select the tab "NETMAP".

Enter the different setup as shown on the picture or below.

Remember that the IP addresses have to fit to the network, to which the BMS is connected.

Type:	Destination
Source Interface:	vlan2 (EXT)
Destination Interface:	vlan1 (INT)
Source IP Subnet:	IP address has to fit to the BMS system (e.g. 10.20.30.10/32).
Translated Source IP Subnet:	-
Destination IP Subnet:	IP address has to fit to the BMS system (e.g. 10.20.30.5/32).
Translated Destination IP Subnet:	192.168.100.220/32

When all the settings have been entered, select "Create".



Select "Security" then "Firewall" on this screen.

Select the tab "IP Rules".

Select "Create".

The line shown below appears with further settings. Please enter the following settings:

General Predefined IPv4 IP Services ICMP Services IP Protocols IP Rules									
IP Version: IPv4									
Select	Protocol	Action	From	To	Source (Range)	Destination (Range)	Service	Log	Precedence
<input checked="" type="checkbox"/>	IPv4	Accept	vlan2 (EXT)	vlan1 (INT)	10.20.30.10/32	192.168.100.220/32	all	none	0
1 entry.									
<input type="button" value="Create"/> <input type="button" value="Delete"/> <input type="button" value="Set Values"/> <input type="button" value="Refresh"/>									

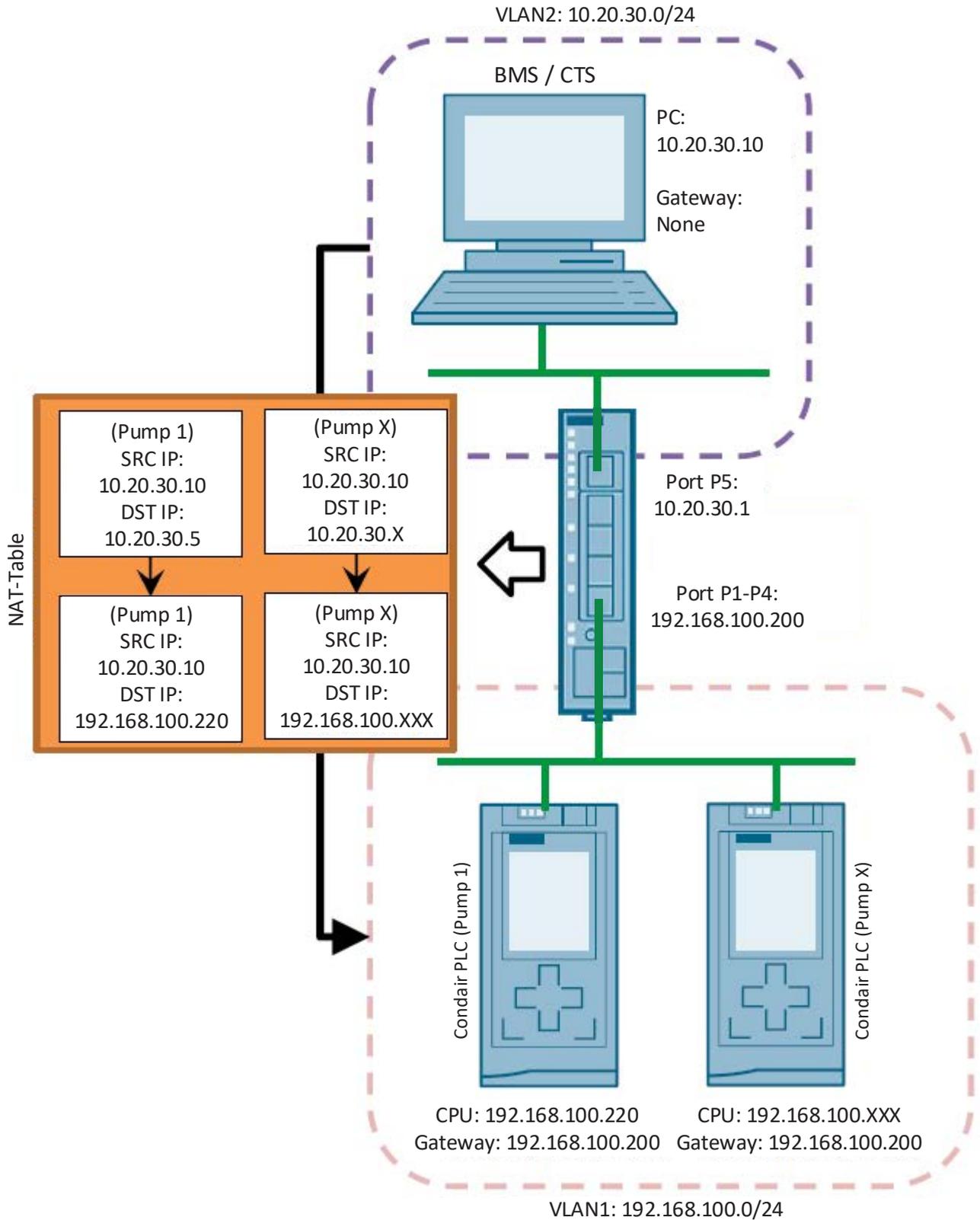
Select:	<input checked="" type="checkbox"/>
Protocol:	IPv4 (Cannot be changed)
Action:	"Accept"
From:	"vlan2 (EXT)"
To:	"vlan1 (INT)"
Source (Range):	IP address has to fit to the BMS system. (e.g. 10.20.30.10/32)
Destination (Range):	192.168.100.220/32
Service:	"all"
Log:	"none"
Precedence:	"0"

When all the data have been entered, select "Set Values".

The setup of the router / IP Translator is now finished.

The patch cable from the network where the BMS system is connected must now be connected to port P5 on the router. The patch cable from the pump station's PLC / switch must be connected to one of the ports P1-P4. The router one is now configured and connected as shown in the drawing below.

Schematic drawing of the Router setup as it will look in most cases:



A.2 Optional Modbus TCP/IP

MODBUS communication TCP/IP

ML-System humidification controls with PLC control is available with an option that allows connection to CTS / BMS systems via Modbus TCP / IP.

The physical connection is made with a standard Ethernet cable that connects the PLC controller with a standard RJ45 connector.

The option includes changes in the software, and a list of setup and the addresses of parameters to be transferred between the PLC system and CTS / BMS.

The connection gives actual humidity for each section and general information on the system status. And it is possible to change setpoint from the BMS system. In addition, there is also a current "status" integer that describes the plant's operational status so alarms can be transferred to the BMS.

The Modbus TCP / IP connection is set up with ML-System's PLC as Server/(slave) – and the BMS as a client/(master).

IP PLC:	192.168.135.220	Subnet mask 255.255.255.0
Connect ID	1	
Port	502	
MB Data addresses	40001 – 40033	
Data format	Integer (int)	

Setpoint 1	R	Integer	40001	%RH
Setpoint 2	R	Integer	40002	%RH
Setpoint 3	R	Integer	40003	%RH
Setpoint 4	R	Integer	40004	%RH
Setpoint 5	R	Integer	40005	%RH
Setpoint 6	R	Integer	40006	%RH
Setpoint 7	R	Integer	40007	%RH
Setpoint 8	R	Integer	40008	%RH
Setpoint 9	R	Integer	40009	%RH
Setpoint 10	R	Integer	40010	%RH
Setpoint 11	R	Integer	40011	%RH
Setpoint 12	R	Integer	40012	%RH
Humidity 1	W	Integer	40013	%RH
Humidity 2	W	Integer	40014	%RH
Humidity 3	W	Integer	40015	%RH
Humidity 4	W	Integer	40016	%RH
Humidity 5	W	Integer	40017	%RH
Humidity 6	W	Integer	40018	%RH

Humidity 7	W	Integer	40019	%RH
Humidity 8	W	Integer	40020	%RH
Humidity 9	W	Integer	40021	%RH
Humidity 10	W	Integer	40022	%RH
Humidity 11	W	Integer	40023	%RH
Humidity 12	W	Integer	40024	%RH
Tank level	W	Integer	40025	%
Actual flow	W	Integer	40026	l/h (lb/hr)
EC Ro	W	Integer	40027	µS
EC MB1	W	Integer	40028	µS
EC MB2	W	Integer	40029	µS
EC tank	W	Integer	40030	µS
Status mode	W	Integer	40031	
On/Off	W	Boolean	40032.1	
alarm generel	W	Boolean	40032.2	
Level in tank ok	W	Boolean	40032.3	
Water pressure low	W	Boolean	40032.4	
Pump overheated	W	Boolean	40032.5	
Pump2 overheated	W	Boolean	40032.6	
tank overfull	W	Boolean	40032.7	
UV error	W	Boolean	40032.8	
UV age warning	W	Boolean	40032.9	
UV age alarm	W	Boolean	40032.10	
Sensor error	W	Boolean	40032.11	
MaxHyg error	W	Boolean	40032.12	
Cip Alarm	W	Boolean	40032.13	
EC RO alarm	W	Boolean	40032.14	
EC MB1 alarm	W	Boolean	40032.15	
EC MB2 alarm	W	Boolean	40032.16	
EC tank high alarm	W	Boolean	40033.1	
EC tank low alarm	W	Boolean	40033.2	
Too many pump stopped	W	Boolean	40033.3	
Internal setpoint	W	Boolean	40033.4	
Not used	W	Boolean	40033.5	
Not used	W	Boolean	40033.6	
Not used	W	Boolean	40033.7	
Not used	W	Boolean	40033.8	
Not used	W	Boolean	40033.9	

Not used	W	Boolean	40033.10	
Not used	W	Boolean	40033.11	
Not used	W	Boolean	40033.12	
Not used	W	Boolean	40033.13	
Not used	W	Boolean	40033.14	
Not used	W	Boolean	40033.15	
Not used	W	Boolean	40033.16	

A.3 Setpoint

The ON-time for the pump, when the humidity is between setpoint and (setpoint - proportional band), can be calculated after the formula:

$$T(\text{on}) = \text{Period time} \times (1 - (\text{humidity level} - \text{Setpoint} + \text{Pro.band})/\text{Pro.band})$$

Example: Period time: 3 min., Setpoint: 80% RH, Pro.band: 30%, Minimum ON-time 0,2 min.

With the values from the example above the ON-time for 78, 70 og 60% RH is calculated:

If the humidity level in the room is 78% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (78 - 80 + 30)/30) = 3 \times (1 - 0,933) = 0,20 \text{ min.} = 12 \text{ sec.}$$

If the humidity level in the room is 70% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (70 - 80 + 30)/30) = 3 \times (1 - 0,667) = 1,00 \text{ min.}$$

If the humidity level in the room drops to 60% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (60 - 80 + 30)/30) = 3 \times (1 - 0,333) = 2,00 \text{ min.}$$

New Proportional band: If the proportional band in the above example is reduced to 20% instead, the ON-time for the pump will change quicker when the humidity drops in the room.

Period time: 3 min., Setpoint: 80% RH, **Pro.band:** 20%, Minimum ON-time 0,2 min.

If the humidity level in the room is 78% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (78 - 80 + 20)/20) = 3 \times (1 - 0,90) = 0,30 \text{ min.} = 18 \text{ sec.}$$

If the humidity level in the room is 70% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (70 - 80 + 20)/20) = 3 \times (1 - 0,50) = 1,50 \text{ min.}$$

If the humidity level in the room drops to 60% RH, the ON-time for the pump is:

$$T(\text{on}) = 3 \times (1 - (60 - 80 + 20)/20) = 3 \times (1 - 0,0) = 3,00 \text{ min. (100%).}$$

If the humidity level in the room drops below 60% RH, (setpoint - pro. band) the pump will run all the time - Minimum OFF-time (PAU).

Note that the running time of the pump changes quicker when the proportional band is lower.

New Period time: If the period time is changed, the ON- and OFF-times will change accordingly.

Example: Period time in the example changes from 3 to 5 min.

Period time: 5 min., Setpoint: 80% RH, Pro. band: 20%, Minimum ON-time 0,2 min.

If the humidity level is 70% RH, the ON-time for the pump will be:

$$T(\text{on}) = 5 \times (1 - (70 - 80 + 20)/20) = 5 \times (1 - 0,50) = 2,50 \text{ min.}$$

A.4 Temperature Sensor

- TS-PT1000 is a PT1000 temperature sensor mounted in stainless steel AISI304 housing
- M12 sensor connector.
- Accuracy: $\pm 0.5\text{ }^{\circ}\text{F}$ at $32\text{ }^{\circ}\text{F}$ ($\pm 0.3\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$)
 $\pm 1.3\text{ }^{\circ}\text{F}$ at $176\text{ }^{\circ}\text{F}$ ($\pm 0.7\text{ }^{\circ}\text{C}$ at $80\text{ }^{\circ}\text{C}$)
- 3 types of thread available:
 - M6
 - 1/8" pipe thread
 - 1/4" pipe thread

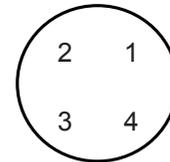
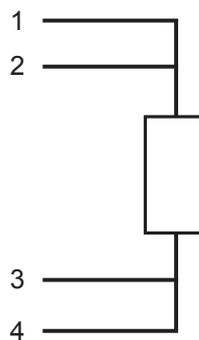


Connection:

PT1000 sensor element:

pin:

pin numbering, M12 socket



Environment:

Degree of protection:	IP65 (IEC 60529) installed with correct M12 connector
Temperature, operation:	-22 °F to 176 °F (-30 °C to 80 °C)
Temperature, stock:	-22 °F to 185 °F (-30 °C to 85 °C)

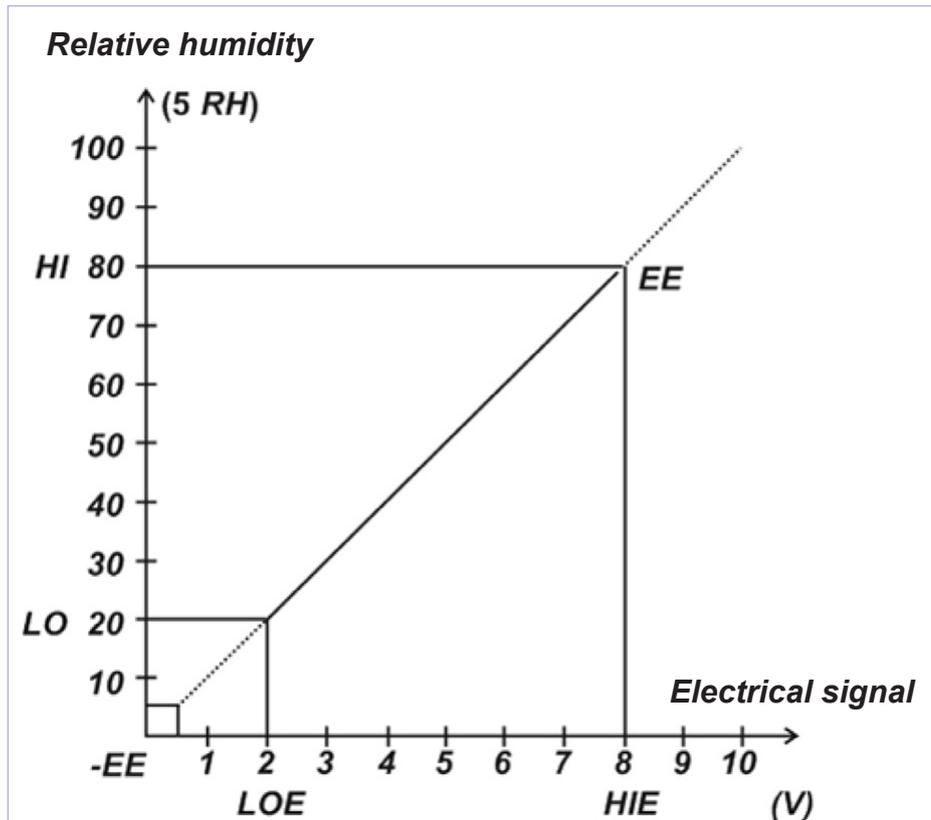
Mechanical specifications:

Length:	1.64" (41.7 mm)
Hex width, M6 & 1/8":	0.55" (14 mm)
Hex width, 1/4":	0.75" (19 mm)
Material, housing:	Stainless steel, AISI 304
Material, M12 socket:	Noryl, black
Weight:	M6 & 1/8": 12 g. 1/4": 21 g.

Accessories:

79" (2 m) cable with M12 connector	Note: cable colours: 1 = brown; 2 = white; 3 = blue; 4 = black
Gasket	

A.5 Electrical Settings in the Humidity Regulator

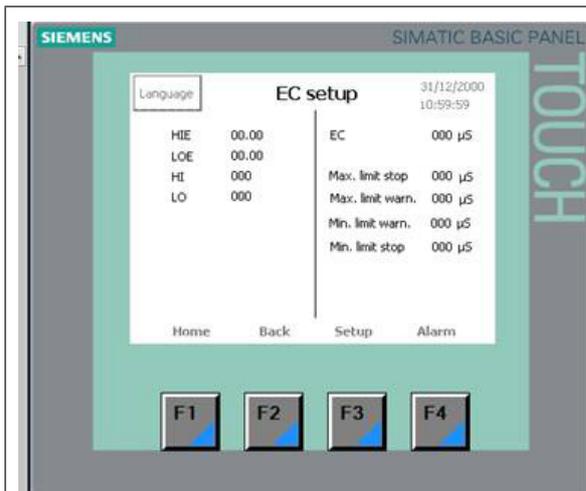


- HIE: Highest electrical input
- LOE: Lowest electrical input
- HI: Highest reading in display
- LO: Lowest reading in display

0-10 minutes after switch on LOE is 0.5 V and LO is 5 % RH
After 10 minutes LOE changes to 2 V and LO to 20 % RH

A.6 Overview of calibration for conductivity sensors and converters (amplifiers)

Converter	Sensor	 Item.: CS-100 Conductivity sensor std. sensitivity ML nr.: 655.050.023	 Item.: CS-101 Conductivity sensor high sensitivity ML nr.: 655.050.026	 Item.: CS-110 Conductivity sensor, std. sens. long ML nr.: 655.050.024	 Item.: CS-111 Conductivity sensor, high sens. long ML nr.: 655.050.027	 Item: CS-120 Conductivity sensor std. sens. 3/4" ML nr.: 655.050.029	 Item: CS-121 Conductivity sensor high sens. 3/4" ML nr.: 655.050.028
ML – CMR ML nr. 655.010.050		Range: 0-60 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 60 μ S LO - 0 μ S	Range: 0-20 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 20 μ S LO - 0 μ S	Range: 0-60 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 60 μ S LO - 0 μ S	Range: 0-20 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 20 μ S LO - 0 μ S	Range: 0-45 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 45 μ S LO - 0 μ S	Range: 0-20 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 20 μ S LO - 0 μ S
ML – CMR ML nr. 655.010.052		Range: 0-600 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 600 μ S LO - 0 μ S	Range: 0-200 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 200 μ S LO - 0 μ S	Range: 0-600 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 600 μ S LO - 0 μ S	Range: 0-200 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 200 μ S LO - 0 μ S	Range: 0-450 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 450 μ S LO - 0 μ S	Range: 0-200 μ S HIE - 10.00 Volt LOE - 0.00 Volt HI - 200 μ S LO - 0 μ S



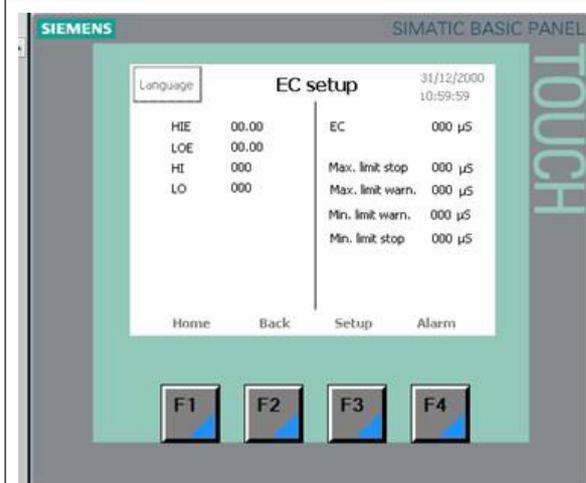
HIE, Input standard values, from chart, Overview of calibration for conductivity sensors and converters (amplifiers)

LOE, Input standard values, from chart, Overview of calibration for conductivity sensors and converters (amplifiers)

HI, Input standard values, from chart, Overview of calibration for conductivity sensors and converters (amplifiers)

LO, Input standard values, from chart, Overview of calibration for conductivity sensors and converters (amplifiers)

If the sensor needs calibration, adjust HI up or down until EC value is correct



Setting the Alarm's and Warnings example, this sensor is chosen :

HIE	-	10.00 Volt
LOE	-	0.00 Volt
HI	-	60 µS
LO	-	0 µS

Max limit stop 50 µS
 Max limit warn 40 µS
 Min. Limit warn 10 µS
 Min. Limit stop 5 µS

This setting will give a warning if µS value goes to 40 or 10 µS and stop the pump if µS value goes to 50 or 5 µS

Max limit stop 100 µS
 Max limit warn 40 µS
 Min. Limit warn 10 µS
 Min. Limit stop 0 µS

This setting will give a warning if µS value goes to 40 or 10 µS and never stop the pump

A.7 ML-system - Condair Ltd.

Monitoring of humidity and status signals:

As an option the PLC system can through an integrated website be connected to the customer's computer over TCP/IP so that the client can access a page, that shows the status of the system with monitoring of the current humidity in each section.

This page can be opened with most standard browsers - We have tested.

The website in the PLC:

The screenshot displays the 'MLPRO 100-800 Webserver Applikation' interface. On the left, there is a sidebar with contact information for Condair A/S. The main content area is titled 'Overview System - ** Update by pressing F5 **'. It features two data sections: 'Pump system value' and 'Humidity section'. The pump system value section shows 'Current flow: 650 l/h' and 'Tank Level: 20 liter', with an 'Operation warning!' indicator. The humidity section lists eight sections with their respective relative humidity percentages: Section 1: 31 %RH, Section 2: 32 %RH, Section 3: 33 %RH, Section 4: 34 %RH, Section 5: 35 %RH, Section 6: 36 %RH, Section 7: 37 %RH, and Section 8: 38 %RH.

MLPRO 100-800 Webserver Applikation	
Condair A/S Parallelvej 2 8680 Ry - DK Tlf: +45 87882100 mail: condair.dk@condair.com www: condairsystems.com	Overview System - ** Update by pressing F5 **
	Pump system value
	Current flow: 650 l/h
	Tank Level: 20 liter
	Operation warning!
	Humidity section
	Section 1: 31 %RH
	Section 2: 32 %RH
	Section 3: 33 %RH
	Section 4: 34 %RH
	Section 5: 35 %RH
	Section 6: 36 %RH
	Section 7: 37 %RH
	Section 8: 38 %RH

The system displays the current humidity as the page opens - most browsers will then update every 10 seconds. - But you can also manually refresh at any movement by pressing F5.

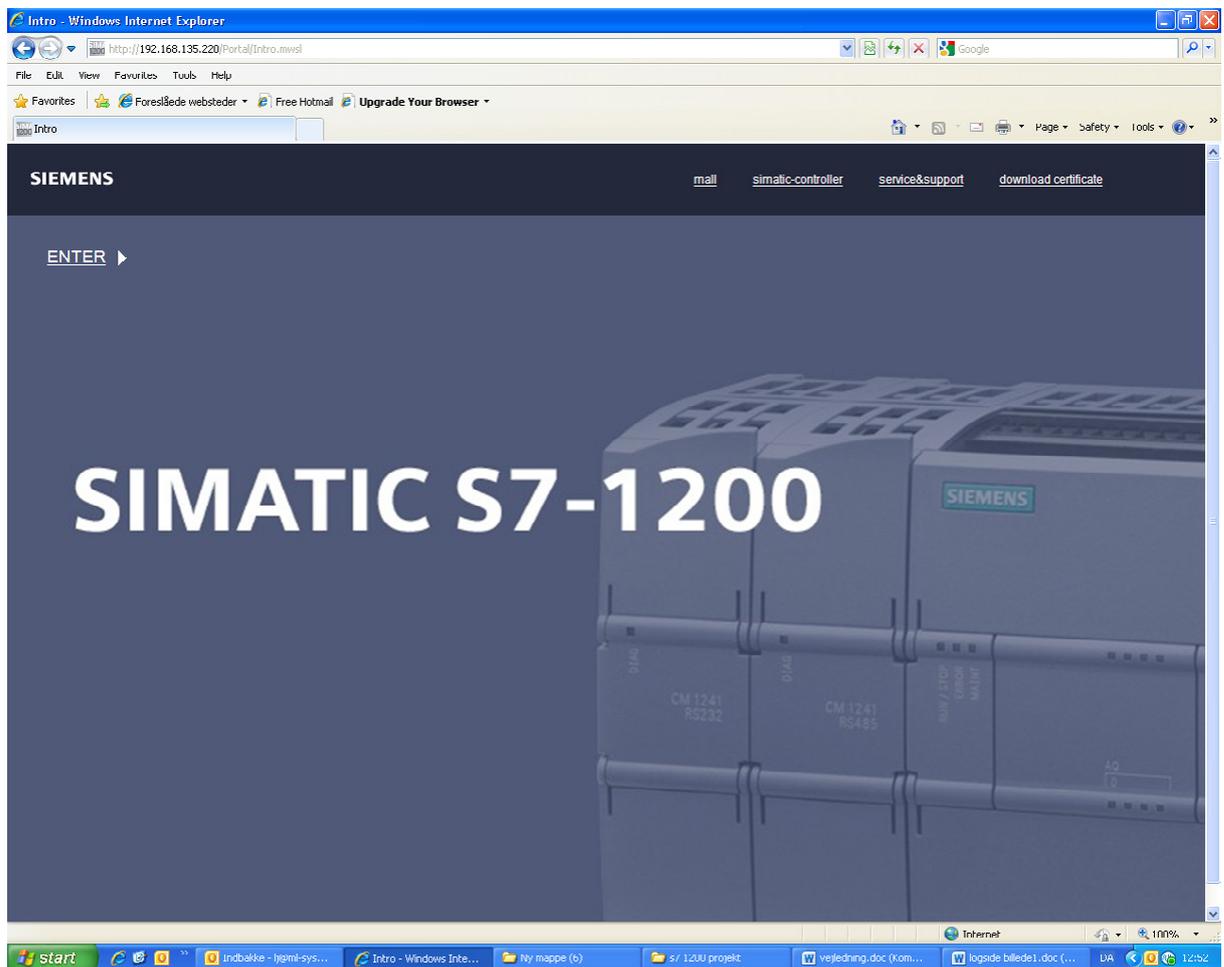
Also shown is a pump station operating status:

- Humidification stopped
- Humidification active
- One or more operating warnings – System still running
- One or more operating alarms – System stopped

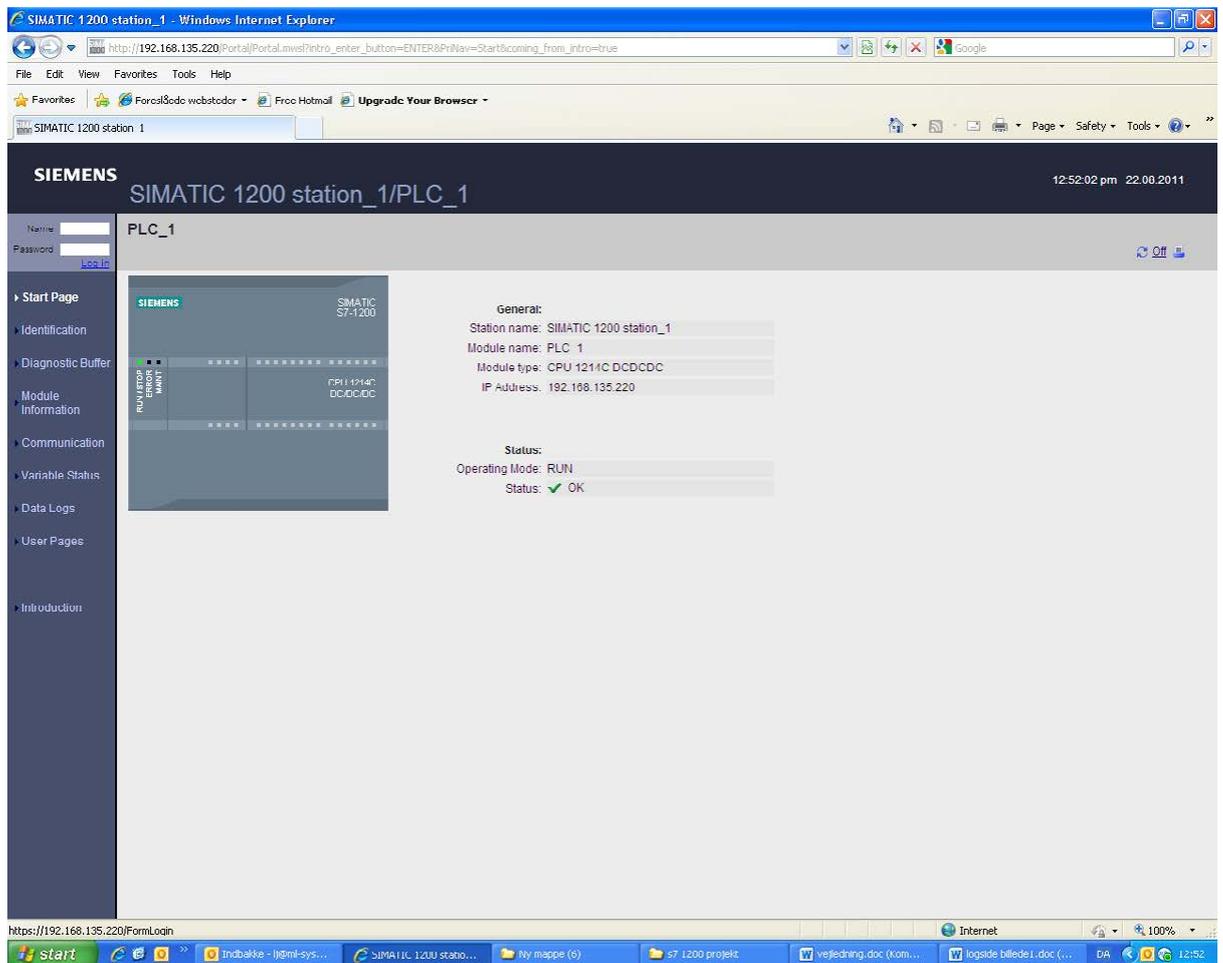
In order to obtain access to the data, use an Ethernet connection directly to the PLC system data switch located in the control unit to the left of the PLC system.

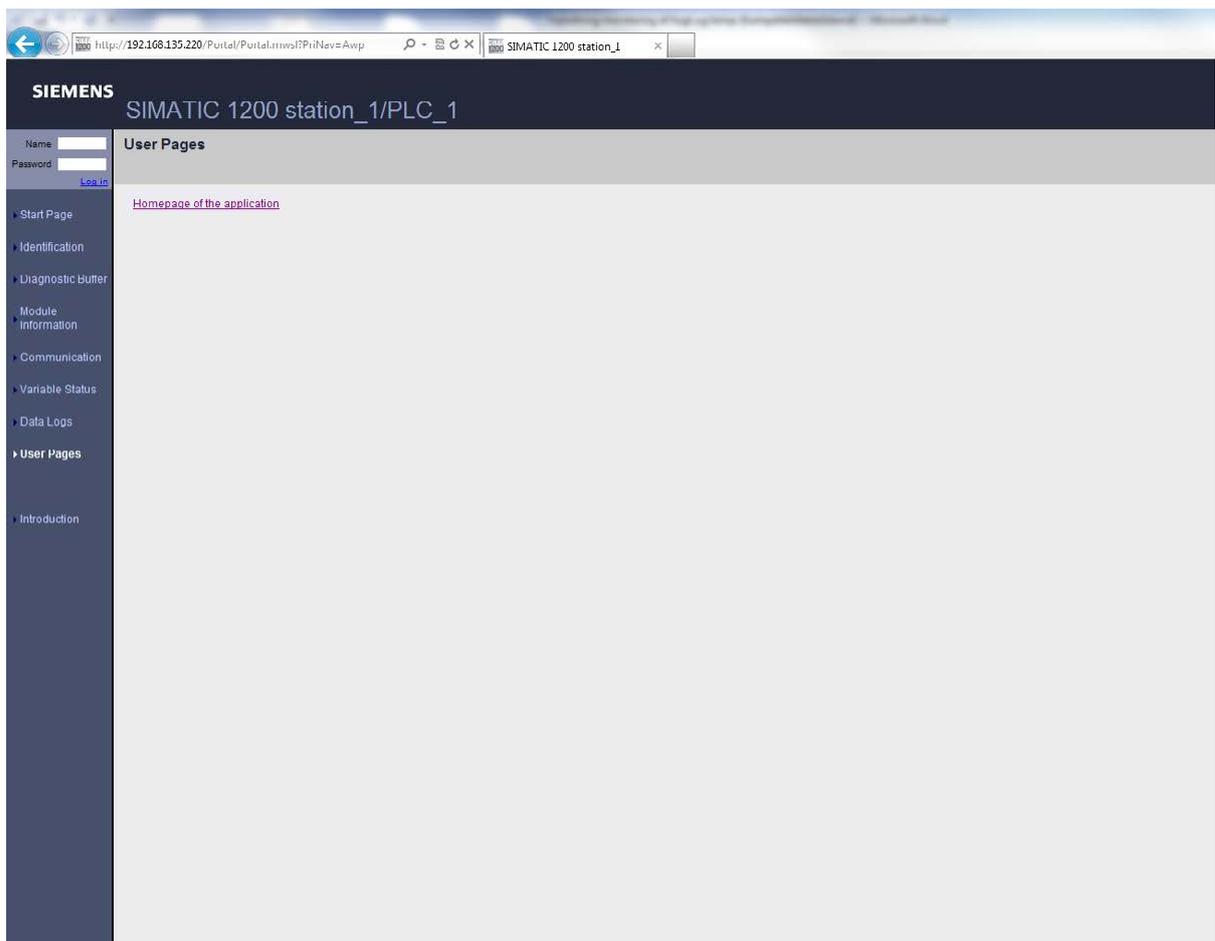
Use a standard web browser and enter the PLC fixed IP address xxx.xxx.xxx.xxx in the address field. This can be done through the company's internal Ethernet network – with separate cable or with a laptop directly into the switch. Perhaps, use a router to get going at this address.

(It is important here to remember that the PC must be located in the same virtual network as the PLC does).



After entering the correct IP address - the following picture appears. Start by downloading and installing Siemens security certificate (download and follow the onscreen instructions). Then press Enter





Press on the Home Page of the application

The website now opens and update.

To make future connections easier, make a shortcut for example to your desktop.

B Appendix

B.1 Installation Checklist

The following is a consolidated installation checklist that can be used in the commissioning of the unit:

Mounting

- Unit installed in the correct location (according to [4.2 – General Notes on Positioning](#) and [6.2 – Site Requirements and Sizing](#))?
- Adequate clearance for servicing unit?
- Mounting surface stable, and capable of supporting the full operating weight of the humidifier?
- Unit level?
- Mount humidification heads as per "ML Heads Installation Guide" manual?

Electrical Connections

- Power supply meet the voltage and current requirements shown on the specification label ([Figure 1 on page 14](#))?
- Power supply have an external dedicated fused disconnect?
- All wiring done according to the wiring diagram and instructions in this manual?
- All cables fastened securely?
- All cables free of tension and pass through cable glands or grommets?
- Electrical installation meet the applicable national and local codes?
- All door panels closed and fastened securely?
- Wire humidification heads according to "ML Heads Installation Guide" manual?

B.2 Commissioning Checklist

The Condair ML humidifier must always be commissioned for the first time by a service technician from your local Condair representative, by a Condair employee, or by personnel who are well trained and authorized by the customer. It is the customer's responsibility to verify the qualifications of personnel. The intent of the commissioning checklist is to verify that the humidification system has been installed according to the installation manual.

Commissioning of the Condair ML humidifier consists of two steps – an inspection of the site services and the installation prior to start-up, and performance tests of the unit. Complete the [„Pre-Start-Up Checklist“](#) below. Retain this copy in the installation manual, and submit a copy of the completed forms to your local Condair representative.

B.2.1 Pre-Start-Up Checklist

Inspect the site services and the installation, and fill out the form below.

Note: When filling out the form leave the checkbox un-checked if the item does not apply, or if the requirement is not satisfied.

General data

Serial Number:	
Tag:	
Model:	
Capacity:	
Voltage and Phase:	
Customer/Job:	
Condair representative:	
Customer Address:	
Pump Location:	

Site Ambient Conditions

Ambient temperature: (Permissible range: 41-95 °F (5-35 °C))	
Ambient humidity level: (Permissible range: 5-95% RH, non-condensing)	

Site Water Supply

Well water	<input type="checkbox"/>
City water	<input type="checkbox"/>
Softened water	<input type="checkbox"/>
Reverse osmosis (RO)	<input type="checkbox"/>
De-ionized water (DI)	<input type="checkbox"/>

Refer to [Table 4 "Inlet water quality requirements"](#) for water quality requirements. Note: Run the water for approximately five minutes before performing the tests:

Site Water Quality	Measurement ¹⁾
Conductivity (µS/cm):	
Hardness (gpg):	
Silica (ppm):	
Chlorides (ppm):	
pH level:	

¹⁾ Test sample must be collected as close as possible to in the humidifier, so that the sample reflects the characteristics of the supply water entering the unit.

Site Water Supply, continued...

Water supply pressure meets requirement: (Permissible range: 50-100 psig (345-690 kPa),, select checkbox, or enter measurement, as appropriate)	<input type="checkbox"/>	
Water supply temperature meets requirement: (Permissible range: 34-68 °F (1-20 °C), select checkbox, or enter measurement, as appropriate)	<input type="checkbox"/>	
Shutoff valve and union fitting installed upstream (by site):	<input type="checkbox"/>	
No pressure surges: (Surge protection device must be installed, if necessary)	<input type="checkbox"/>	
All debris flushed from supply line:	<input type="checkbox"/>	
No leakages in supply line:	<input type="checkbox"/>	

Pump Station Mounting

Unit level?	<input type="checkbox"/>
Front clearance:	
Left side clearance:	
Right side clearance:	
Ground clearance:	
Overhead clearance:	

Electrical Power Connections

Power supply meets voltage and current requirements shown on specification label:	<input type="checkbox"/>
Dedicated external fused disconnect switch installed to local code: (Fusing must not exceed the maximum current rating shown on specification label)	<input type="checkbox"/>
Dedicated external non-fused disconnect switch (if installed) located in vicinity of MLP:	<input type="checkbox"/>
Phase-to-phase voltage measurements:	
Proper grounding: (Green wire must be connected to GND in the supply)	<input type="checkbox"/>
All wiring and connectors fastened securely:	<input type="checkbox"/>

B.2.2 Performance Checklist

Complete the table below. If you would like to break up the number of heads per their respective zones. Indicate the appropriate zone and use more space in the Notes section below, as needed.

Enter all notes and exceptions in the space provided below.

ML Distribution Heads

Note: For commissioning the distribution system itself, refer to the individual commissioning checklist for the distribution system. Please indicate number of Direct Room Humidification Heads per project:

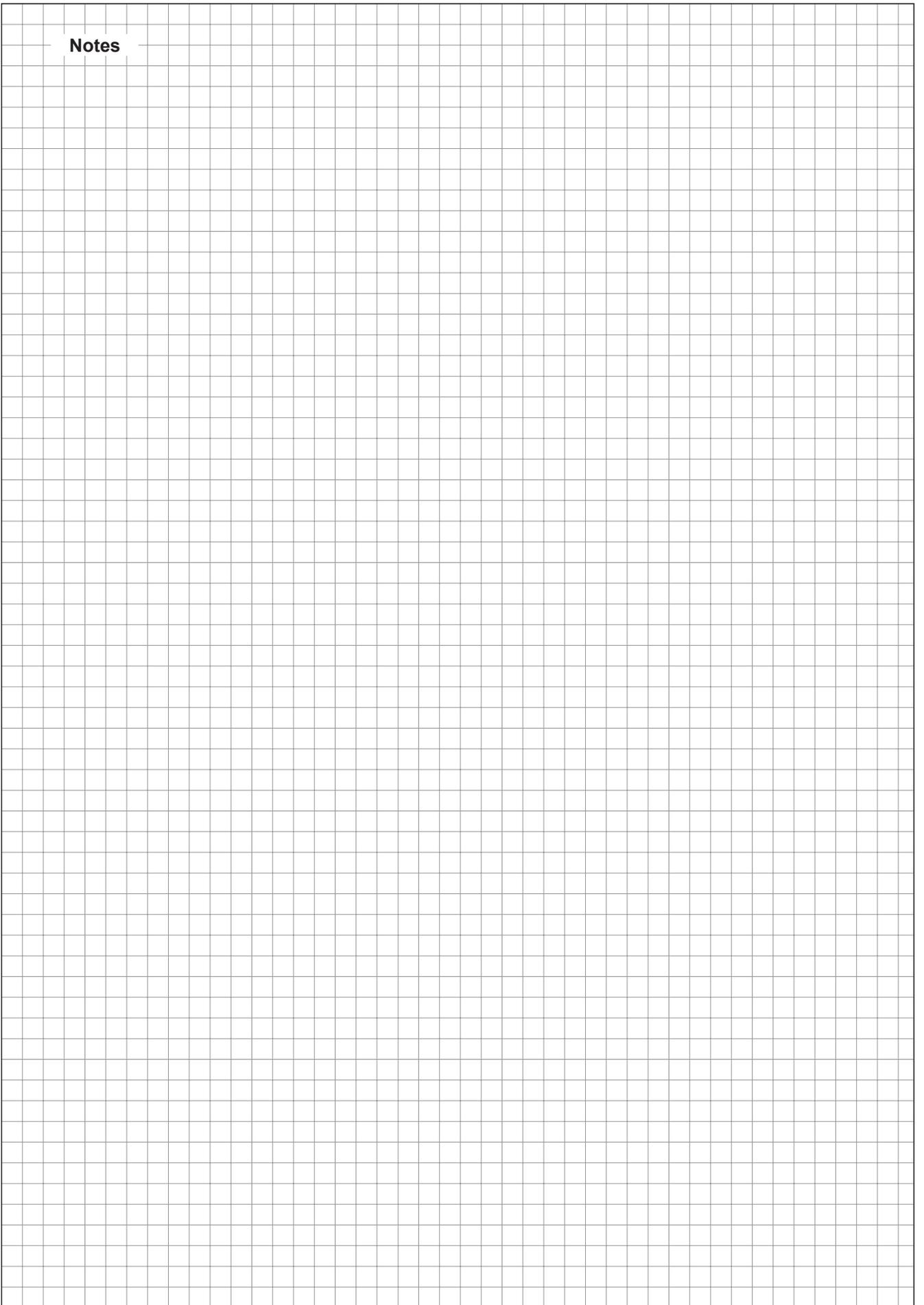
ML Solo	
ML Princess	
ML Flex System	

Notes

Enter notes and exceptions in the space below.

Notes:			
Commissioned by:		Commissioning Date:	
Company:			

Notes



Notes

Warranty

Condair Inc. and/or Condair Ltd. (hereinafter collectively referred to as THE COMPANY), warrant for a period of two years after installation or 30 months from manufacturer's ship date, whichever date is earlier, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted, are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.

The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

THE COMPANY's parts or materials that are considered consumables, including but not limited to: cylinders, filters, nozzles, membranes, media, gaskets, O-rings, etc. are NOT covered by the warranty.

THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper maintenance of the equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for damage resulting from freezing of the humidifier, supply lines, drain lines, or quality of the water used.

THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.

THE COMPANY's limited warranty on accessories, not of the companies manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

Extended Warranty

Extended warranties are available to purchase under the conditions listed above.



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