Important: **Read and save these instructions. This guide to be left with equipment owner.**

HP Series

Installation and Operation Manual

Includes installation, operation maintenance and troubleshooting information for your HP Series humidifier

1507183-E| 17 JUN 2016

condair

Thank you for choosing Condair.

INSTALLATION DATE (MM/DD/YYYY)

MODEL #

SERIAL #

CYLINDER #

Contents

CAUTION: Servicing

- Disconnect main power before any servicing.
- The plumbing and electrical compartments contain high voltage components and wiring. Access should be limited to authorized personnel only.
- During and following operation of the humidifier, the steam and components in contact with the steam such as the blower pack, steam lines, steam distributors, and condensate lines can become hot and can burn if touched.
- Condair does not accept any liability for installations of humidity equipment installed by unqualified personnel or the use of parts/components/equipment that are not authorized or approved by Condair.

CAUTION: Electrical

- All electrical work should be done according to local and national electrical code.
- Electrical connection to be performed by a licensed electrician.

CAUTION: Plumbing

- Plumbing to be performed by a licensed plumber.
- Drain water from humidifier can be very hot. Do not drain to public sink.
- All plumbing work should be done according to local plumbing code.

CAUTION: Installation

- Do not mount on hot surfaces.
- Do not mount in area where freezing can occur.
- Do not mount on vibrating surface.
- Do not mount on floor.
- Regardless of selecting on/off or modulating control method, Condair humidifiers must have a closed circuit across its on/off security loop control terminal to operate. Condair highly recommends the use of a duct high limit humidistat.

Introduction

HP (Adiabatic Humidification System)

Congratulations on the purchase of your Condair HP humidification system. This system was designed to be efficient and reliable, and is manufactured from high quality materials to provide long trouble free operation. In order for the system to operate as intended it must be installed properly.

This guide details the design, installation, commissioning, operation, and troubleshooting of the HP system. Please take the time to familiarize yourself with this guide before beginning to ensure that the system is installed the way it was designed. This ensures a long and trouble free life of the humidifier.

About HP (Adiabatic Humidification System)

The HP (High Pressure) system is designed to be installed inside an AHU or duct system to humidify air to a desired relative humidity. Proper humidity levels have been shown to be important for health and comfort of occupants. Maintaining proper humidity is also important for many industrial and manufacturing processes.

The HP system uses a series of nozzles to spray a very fine mist of water droplets into an air stream. During this process the air absorbs moisture increasing its relative humidity levels. As the water droplets evaporate, they absorb some energy in the form of heat from the air. This loss of heat causes the air temperature to drop, resulting in a phenomenon known as adiabatic cooling.

The HP adiabatic system has 2 effects:

- The relative humidity of the air increases (humidification)
- The temperature of the air falls (adiabatic cooling)

Humidification of the air is the main goal of the HP system. The cooling of the air is secondary and is frequently beneficial since it is 'free' cooling. In cases where air-cooling is un-desired, preheating of the air is required.

In general a HP system has the following advantages over other humidification technologies:

- Low frequency of maintenance, since there are few moving or expendable parts.
- Replacing components is quick and requires minimal system disassembly.
- A 'free' air-cooling benefit from water extracting latent heat from the air.

Receiving and Unpacking Equipment

- Check packing slip to ensure ALL material has been delivered.
- All material shortages are to be reported to Condair within 48 hours from receipt of goods. Condair assumes no responsibility for any material shortages beyond this period.
- Inspect shipping boxes for damage and note on shipping waybill accordingly.
- After unpacking, inspect equipment for damage and if damage is found, notify the shipper promptly.

All Condair products are shipped on an F.O.B. factory basis. Any and all damage, breakage or loss claims are to be made directly to the shipping company.

Absorption Distances

An important consideration in the planning of a HP system is the absorption distance, or the distance it takes for the droplets to evaporate inside the HVAC system. The absorption distance is relative to the air velocity, temperature, atmospheric pressure, and the amount of water in the incoming air. In applications where space is limited, such as in an air-handler, precautions should be taken to prevent the wetting of sensitive components downstream.

Components

Condair Supplied

Condair will supply the following components:

1 High pressure pump skid

2 Valve block assembly and cables

3 Nozzle manifolds and mounting hardware

4 10 ft. of high pressure hose (optional 6.5 ft., 16.5 ft., or 33 ft. of high pressure hose for piping)

5 10 ft. of anti-chafe spiral hose (optional)

6 Installation manual, installation drawing with mounting dimensions, and tubing diagram.

7 Mist eliminator (optional)

8 Air proving switch (optional)

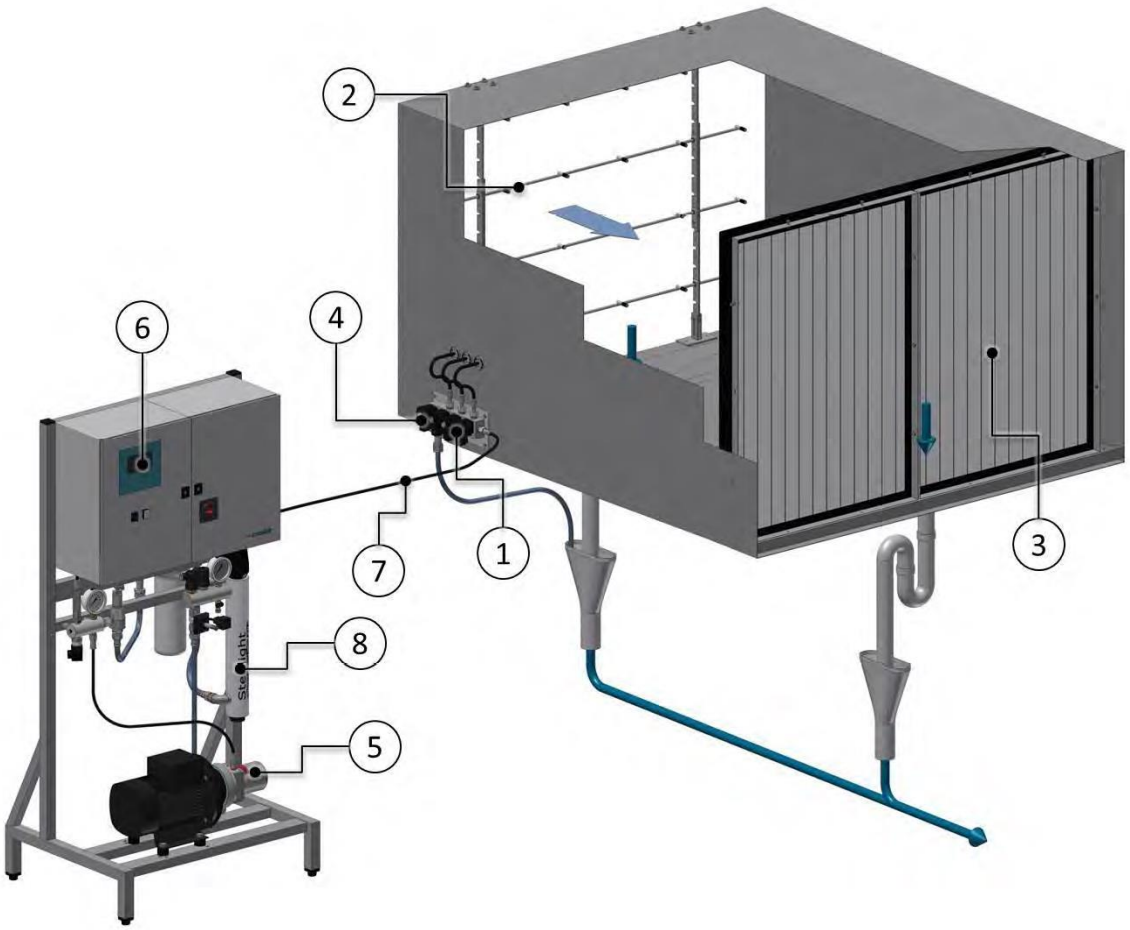
9 High limit humidistat (optional)

10 Humidistat (optional)

Field Supplied

The Installer is responsible for supplying the following:

1. Electrical disconnects
2. All electrical wiring
3. High pressure piping between pump skid and manifolds
4. Flex hose
5. P-traps
6. Drain funnels
7. Wet duct section (drain pans, wall sections, sealants, fasteners)
8. Pump skid vibration dampening
9. Electricity, water, and airflow



2

Figure 1: Typical HP System Installation

Humidifier Components:

1 Step Valves MV REG1, MV REG2, and MV REG3

3 Nozzle Manifold

4 Mist Eliminator

5 Flushing Valve MV REG5

Pump Station Components:

6 High Pressure Pump

7 Control Panel, with Touch Screen

8 High Pressure Flexible Hose

9 UV-light system (Option)

Multiple Zones

Oftentimes a single pump package will be used to serve different ducts or zones. In this case each duct will have its own set of manifolds, valve controller and valve block making it fully

independent of the other zones. The pump should be sized to handle the full flow capacity of all zones combined to ensure reliable operation.

Care must be taken when laying out the piping between the pump and the valve blocks at each zone to prevent vibration transmission or water hammering effects. The piping should be securely supported using appropriate cushion clamps (by others) and long straight runs should be avoided.

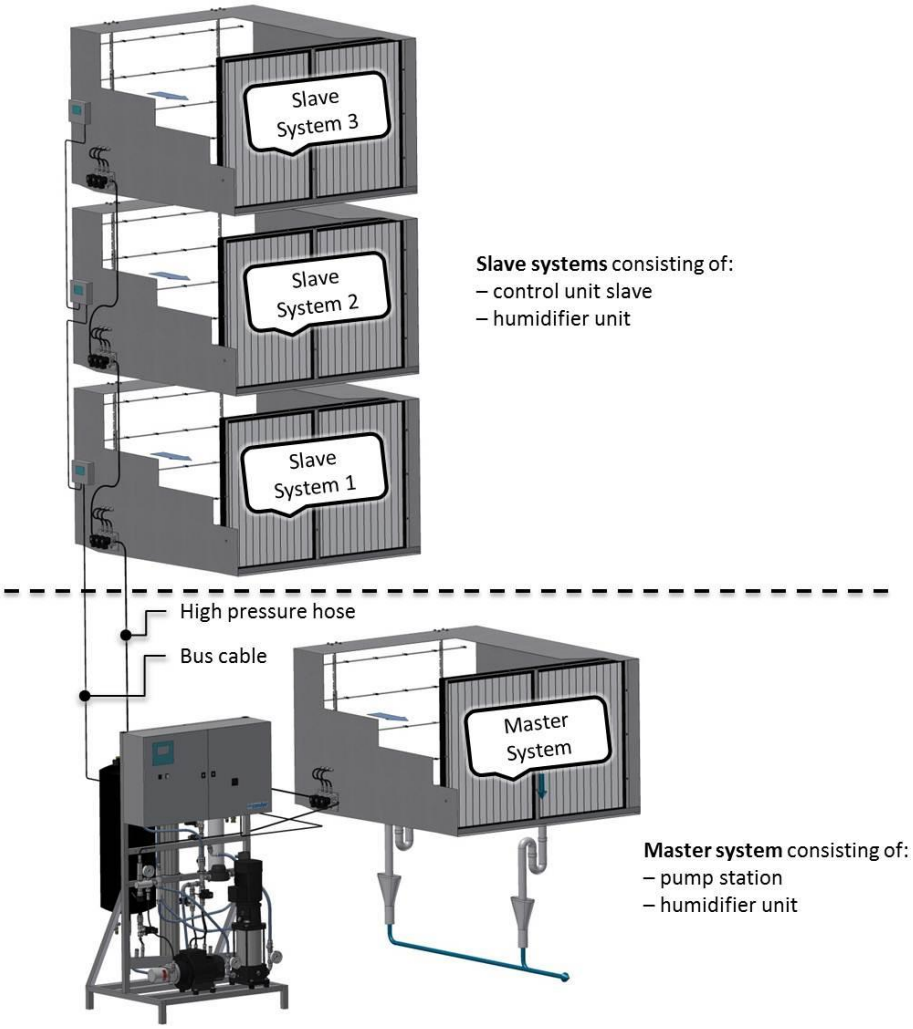


Figure 2: Typical Installation with Master/Slave Configuration

All units must be located at the same elevation.

The maximum length of high pressure piping from the pump station to the last Slave unit must not exceed 200 ft.

Water Quality

Water used with the Condair HP system must be very pure. Dissolved solids, and impurities contained in the water will precipitate out when the water evaporates, causing dust and minerals to be deposited into ducts, and/or the humidified space. Dusting can have adverse effects on filters, fans, heating and cooling coils, human health, and may promote corrosion and bacteria growth in ducts.

For this reason only Reverse Osmosis (RO) or De-Ionized (DI) water can be used with a Condair HP humidification system. DI water is very aggressive, in applications where DI water is used all components (including wet section of ducting and drains) must be constructed from stainless steel.

If a water treatment system is required, the Condair HP RO pump station is available and includes an integrated RO system built directly onto the HP pump skid.

To ensure that the HP nozzles do not become blocked or damaged over time, the following conditions should also be met:

Table 1 : Water Quality Requirements

Quality	Requirement
Water Supply:	Drinking Water Quality / RO Water
Conductivity:	5-1000 µS/cm
Silt Index:	Max. 3.0
KMn04:	Max. 10 mg/l
NTU:	Max. 1.0
Temperature:	Max. 59°F (15°C)
TDS:	Max. 625 mg/l
Fe:	Max. 0.05 mg/l
Mn:	Max. 0.05 mg/l
Hardness (Max.):	Max. 5 gpg (5° dH)
Free Chlorine (Max.):	Max. 1 mg/l

Component Overview

Pump Station

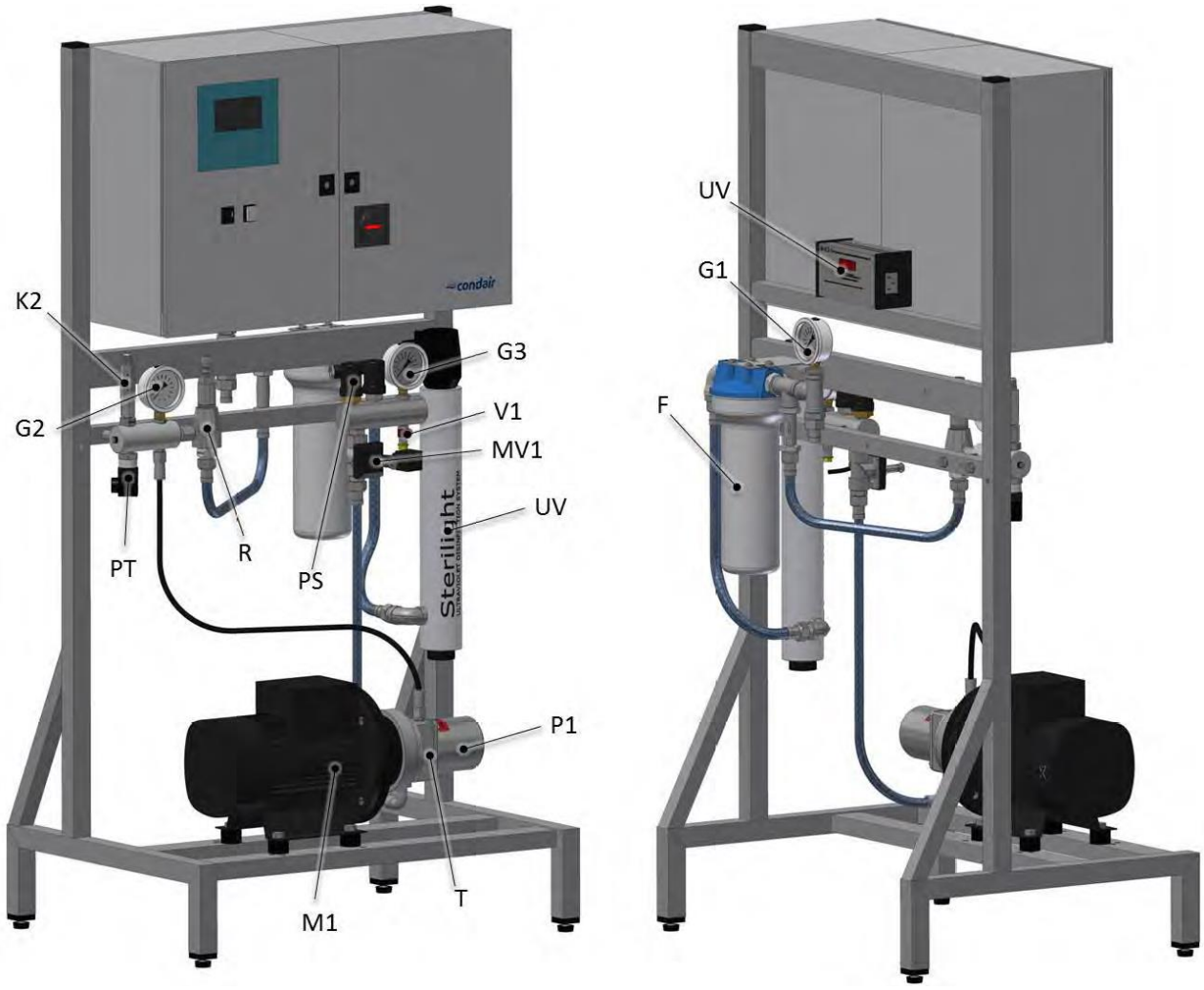


Figure 3: HP Pump Station

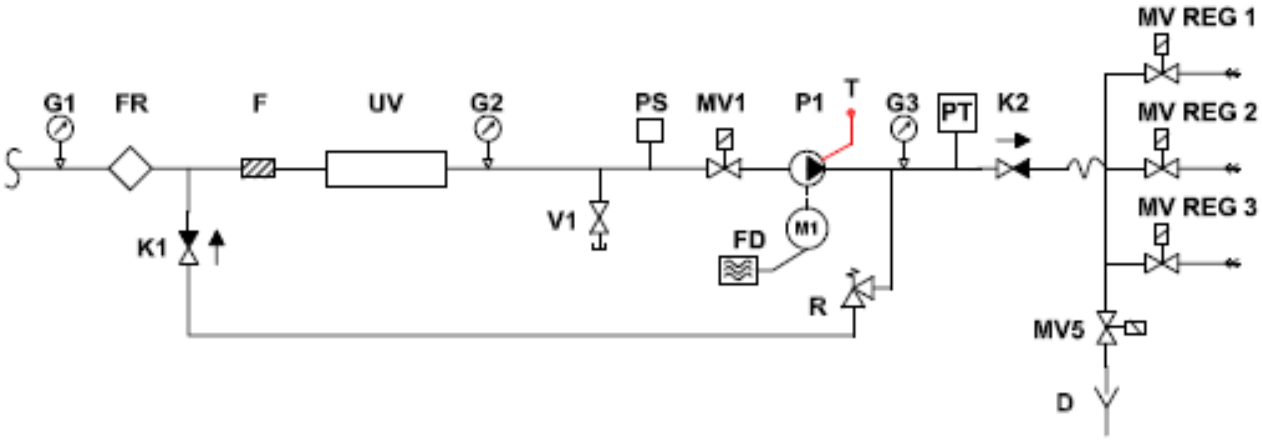


Figure 4: HP Flow Diagram

Part Specification

D	Drain
F	Filter 1µ
FR	Water meter (option)
G1	Pressure gauge 0-145 psi (0-10 bar)
G2	Pressure gauge 0-145 psi (0-10 bar)
G3	Pressure gauge 0-1958 or 0- 2320 psi (0-135 or 0-160 bar)
K1	Check Valve
K2	Check Valve
M1	Motor
MV1	Solenoid Valve
MV5	Valve for flushing
MV REG 1	Valve for nozzle strings
MV REG 2	Valve for nozzle strings
MV REG 3	Valve for nozzle strings
P1	High pressure pump
FD	Frequency converter (option)
PT	Pressure transmitter for frequency converter
PS	Pressure switch
R	Pressure reduction valve
T	Thermostat
UV	UV light tube and transformer (option)
V1	Test water tap 1/8”

Pump Station Details

High-pressure pump station.

All components exposed to water are made of corrosion resistant material. The hoses are drinking water approved high pressure hoses, stainless steel braided or high-pressure hoses in dimension 1/4" or 3/8”.The system is fitted on a frame and all components are assembled, tested, and ready to use.

Pump Station: The water-lubricated high pressure stainless steel pump is directly mounted to the electric motor and operates at a pressure of 435 to 1015 psi (30 - 70 bar).

Table 2 : Technical Specifications

	HP100	HP200 VFD	HP300	HP500	HP500 VFD	HP800	HP800 VFD	HP1300 VFD
Capacity, l/h*	120	200	318	528	500	948	800	1300
Weight, kg (lb)	50-65 (110-143)	50-65 (110-143)	55-70 (121-154)	65-80 (143-176)	55-70 (121-154)	75-90 (165-198)	65-80 (143-176)	75-90 (165-198)
Dimensions l x w x h, in	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1	25.9 x 19.7 x 51.1
Water supply, bar	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4
Sound pressure level, db(A)	<80	<80	<80	<80	<80	<80	<80	<80
Electrical connection	220-240 / 380-415 / 3 / 60Hz							
Installed effect: kW – Pump	0.50	0.80	1.1	1.5	1.2	2.2	2.4	3.5
Pipe diameter – inlet, "RG	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8

The pump is protected against dry running by a pressure switch that stops the system if water pressure drops. The high-pressure pump is protected against overheating by a temperature circuit that measures the current temperature in the pump.

Control unit: the control unit consists of the touch display and PLC. A power board, for control of the high pressure pump and connection terminals for power supply. The power board has an alarm switch (NC).

Optionally the control unit can be equipped with a remote operating and fault indication print, a conductivity monitoring and a BMS gateway for the integration into a building management system (BMS).

The pump station is electrically wired at the factory. At the installation site, the power supply, the humidity controller or humidity sensor, the remote operating and fault indication (option), the external safety chain and the step valves must be electrically connected to the control unit.

Humidifier Unit

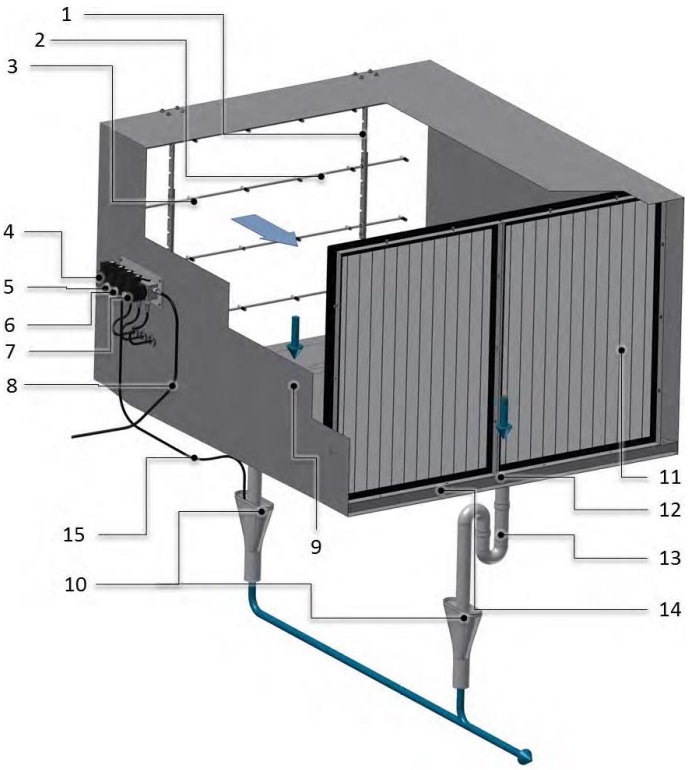


Figure 5: HP Humidifier Unit

1 Nozzle manifold mounting rails

2 Nozzle manifold

3 Spray nozzles

4 Flushing valve MV5 working pressure (option)

5 Step valve MV REG3 (4/7)

6 Step valve MV REG2 (2/7)

7 Step valve MV REG1 (1/7)

8 High-pressure hose from pump station

9 Water drain after nozzles

10 Open drain funnel (by others)

11 Mist Eliminator/Droplet Separator (option or by others)

12 Water drain after humidifier unit

13 P-Trap (by others, height adapted to duct pressure)

14 Separation element humidifier unit

15 (min. height: 3 cm, sealed towards the duct floor and the duct walls)

16 Drain hose from flush valve MV5

Nozzle Unit

The nozzle unit consists of several nozzle pipes, which are equipped with the necessary number of nozzles (system-specific). The individual nozzle pipes are divided into three different spray circuits (1/7, 2/7 and 4/7). The spray circuits are connected via a high pressure hoses to the corresponding step valves (either directly or via a distribution blocks).

Mist Eliminator

The installation of a mist eliminator is the customers responsibility. An optional Condair mist eliminator is available for the Condair HP.

Note regarding the Condair mist eliminator: Due to the special surface finish of the mist eliminator material, the Condair mist eliminator will reach peak performance about 4-8 weeks after the initial installation (time depending on the water quality).

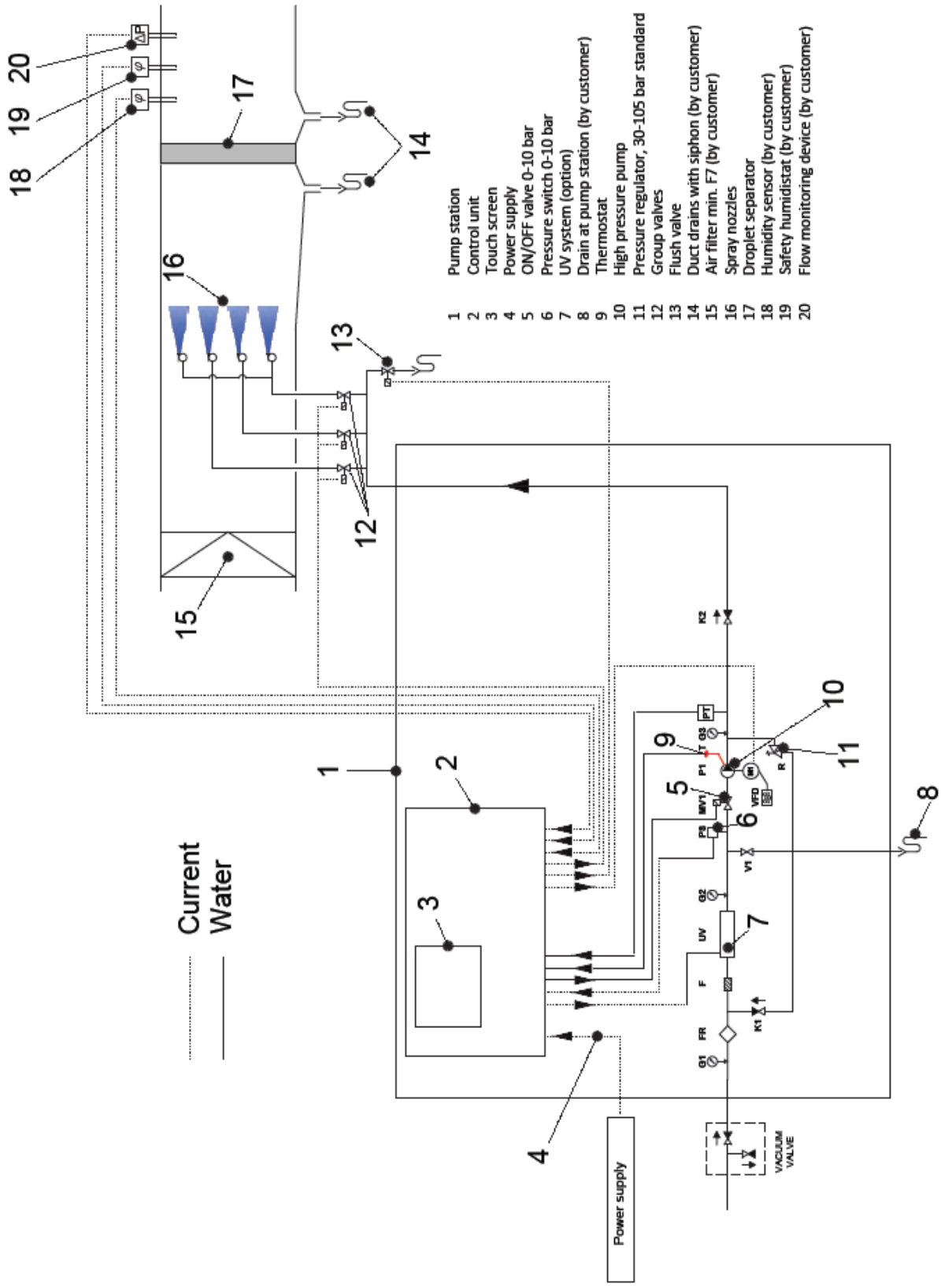


Figure 6: HP System Layout, Stand Alone System

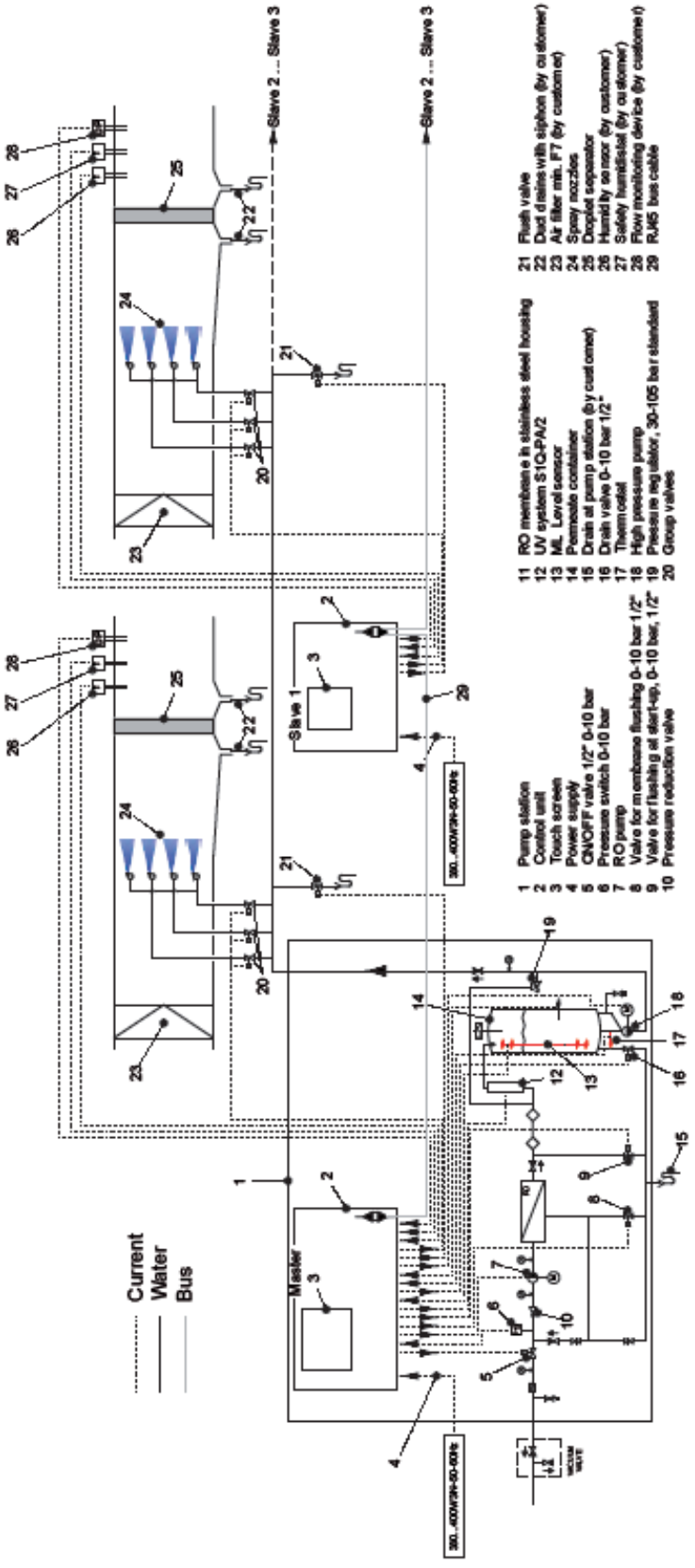


Figure 7: HP System Layout, Master/Slave System

General

The pump is driven by a 3-phase motor. The pump speed is controlled from 1000 rpm to 3500 rpm by a frequency controller VFD.

The control system consists of a PLC unit, which controls water treatment and adjusts humidity in the duct. Adjustment is carried out by means of a special proportional regulator, which activates the necessary number of steps in relation to the current humidity requirement.

A flushing function is included, which ensures hygienic operation and prevents standing water in the system. If one of the nozzle pipes has been inactive for 30 minutes, the control panel will trigger a rinse pulse lasting two seconds, this ensures continual water movement within the system.

The control signal comes from an analogue 0-10 volt signal. It is possible to choose between two different modes for this signal:

1. Humidity control – The humidity is measured against the relevant input and the control then calculates how many steps to activate in order to achieve the required level of humidity.

2. Direct capacity - The required capacity is transferred directly from a BMS system.

Hour counters are incorporated into the control unit. One hour counter that indicates the pump's running time to be used for setting service intervals, one hour counter for the pump and one hour counter for each of the steps, which summarizes the period of time where each step is active.

Control

With stand-alone systems (master configuration) the control unit is built into the pump station. The control unit features a separate power supply, a control/humidity signal input, connectors for the external safety chain and relay connectors for the remote operation and fault indication (option). In addition, the control unit incorporates the frequency converter for the control of the high pressure pump.
With master/slave systems, each slave is equipped with a separate control unit. Each control unit features a separate power supply, a control/humidity signal input, connectors for the external safety chain and relay connectors for the remote operation and fault indication (option). A bus cable connects each slave control unit to the control unit of the master system which controls the high pressure pump.

Humidification

The control of the humidification system is established via an external P/PI controller, or the PID controller built into the control unit.

As standard, the HP features 7-Stage valve control as outlined in the figure below. An additional step valve is available as an option, and increases the total number of stages to 15.

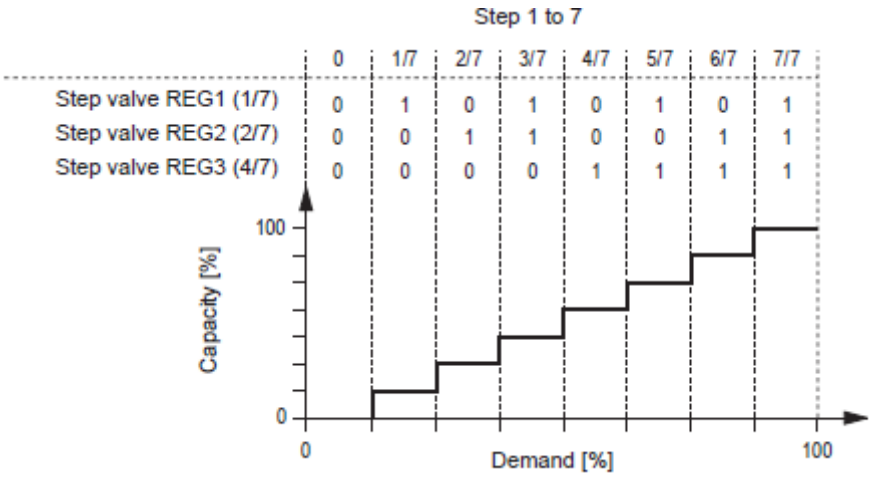


Figure 8: 7-Stage Valve Control

Monitoring of high pressure pump

The supply pressure and pump temperature are continuously monitored. The HP pump automatically stops if one of these values is outside the admissible range. A respective error message appears in the display.

In addition, the control unit of the pump station and the salve control units can be equipped with a remote operating and fault indication board. Thus the following operating conditions can be displayed over the appropriate relays: “Error”, “Humidification”, “Maintenance” and “Unit on”.

Installation

Important Notes on Installation

Qualification of personnel

All installation work must be performed only by persons familiar with the Condair HP Adiabatic High Pressure Humidifier and sufficiently qualified for such work.

All work concerning the electric installation must be performed only by adequately qualified personnel (electrician or workman with equivalent training).

Safety

For all installation work, the ventilation system in which the Condair HP will be installed is to be rendered inoperative and prevented from further inadvertent operation.

The pump station and possible Slave control units may be connected to electric mains only after all installation work has been completed.

General notes

All statements relating to the correct positioning and installation of the particular components of the Condair HP must be followed and complied with.

When installing components of the Condair HP, use the mounting hardware supplied with the unit. If the mounting hardware cannot be used in your particular case, select a method of fixing that provides equivalent support. For questions on concerns, please contact your Condair supplier.

Scope of Delivery

Included Components

- Pump station complete with control unit and built-in PID controller and optional items as ordered
- Nozzle unit including hoses, 3xstep valves / 1xflush valve and mounting accessories
- High-pressure hose (9.8ft. / 3 m) for high-pressure piping between pump station and step valves
- Hose feed through, 3 pc. for single walled duct's
- Special cable to step valves REG1, REG2, REG3
- Alarm switch (NC)
- Installation and operating instructions (the document you are currently reading)
- Installation drawing with mounting dimensions
- Tubing diagram

Pre-Installation

Prior to beginning installation of the HP system, the required tools should be obtained, and all contractor-supplied parts (indicated as parts "By Others" throughout this manual) should be gathered.

Required Tools

In order to assemble an HP system the following tools and supplies are required:

1 Hammer
2 Socket Set, common imperial and sizes
3 Box-end wrenches – various sizes
4 Pipe Bender
5 Screwdriver Set, including standard flathead and Phillips
6 Caulking
7 Caulking Gun
8 Metal Snips
9 Hacksaw
10 Plumbing Tape

Required Components

The following components must also be supplied to complete the installation:

1 Electrical Disconnect Switches

- Disconnect switches must be supplied to isolate the humidifier for maintenance and in the case of emergency. If the control panel and disconnect is to be located outdoors, NEMA rated disconnect switches should be used per national and local codes.

2 Sizing High Pressure Stainless Steel Tubing

- Stainless steel piping must be supplied for distances between the HP pump module and the HP manifolds. These distances should be kept to a minimum to minimize pressure losses and maximize system performance, however it is important to avoid over-sizing the lines. For most installations a 1/2" line is appropriate. Stainless Steel Pipe Fittings

- Stainless steel compression fittings are required for all high-pressure line connections. When using swage type fittings to connect feed lines together, use fittings of the same material as the feel lines. Never use a brass compression fitting on a stainless steel tube, as the brass will not properly hold the harder stainless steel pipe.

- Follow manufacturer's instructions when installing fittings.

- Recommended tube material: 304L stainless steel tube, ½" Outside Diameter, 0.049" Wall thickness

- Recommended fittings: 316 stainless steel, ½", double ferrule compression connections.

3 Reinforced Flexible Hose

- The HP pump module features a modern high precision pump. Despite this some degree of vibration is unavoidable when the system is operating. Vibration effects can be further amplified by long lengths of solid piping and can be transmitted over distances. To avoid this, reinforced flexible hose is recommended between the pump outlet and the feed piping, as well as between the feed piping and the valve block. The lengths of reinforce flexible hose used at these points should be at least 2ft (61 cm). This will dampen vibrations transmitted from the pump and air-handler / ducting.

- A length (9.8 ft. / 3m) of high pressure hose is supplied with each unit for piping between the pump station and step valves.

- Additional hose can be purchased from Condair. Hoses provided by others are not recommended.

- Care must be taken when using reinforced flexible hose. It must not be allowed to sag unduly, vibrate excessively, be bent around a radius of less than 2" (50 mm), or come into contact with sharp edges. Always leave some extra line when going around corners and making bends. Avoid twisting and kinking the lines while un-spooling and installing. When supporting the hose, keep in mind that thermoplastic hose has a tendency to return to position it was supplied in.

4 Pipe Supports and Fasteners

- The installer must also supply support for feed piping. When selecting brackets, pipe strapping, and various other supports, ensure that local and national plumbing codes are followed. The use of heavy-duty vibration control clamps is strongly recommended. For long runs, ensure that there is no more than 5 feet between supports.

- Various fasteners may be required to complete the installation of the HP system. These should be sized to adequately support any anticipated loads. Follow local codes for installing pipe hangers and bolts.

- Recommended supports: Stauff® Cushion Clamps or equivalent

5 Primary Wiring for Pump Module

- Appropriate primary wiring is required for connection to the pumps. Refer to the specification labels on the pump and valve controllers for voltages and currents. Follow local and national codes for wiring.

6 Vibration Isolation

- The pump skid will generate some degree of vibrations by its nature. It is recommended that the pump skid be installed on a vibration-damping mat or vibration isolators to reduce vibrations and noise.

Construction of a Wet Duct Section

General

The section of ductwork that the HP manifolds are installed to be in needs to be capable of handling excess water that is not absorbed by the air. Condair requires that a wet section be installed in the duct. The wet section should be as long as expected wetting distance. In most cases Condair recommends the wet section extend 1.5 feet upstream and 6 feet downstream of the HP manifolds.

A wet duct section consists of; a double walled plenum, drain pan, and drains. All material used in the wet section should be made of stainless steel. All seams should be sealed properly with caulking to prevent leaks.

Double Walled Plenum

A stainless steel liner should be secured to the existing wall. The objective of this is to cover any exposed insulation, seams, and any existing ducting materials that may not be corrosion resistant or suited for constant exposure to water. The liner should cover both sides and ceiling of the plenum. All seams should be caulked and sealed to prevent leakage.

Drain Pan

A stainless steel drain pan should be installed on the floor of the duct. This pan should slope downwards in the direction of airflow from the HP manifolds to end of the wet section. The drain pan should terminate with a drain connected to a “P” trap. The “P” trap should be at least 2 inches taller (center to center) that the duct static pressure, and should drain to an open funnel drain.

For systems up to 750 lb/s per hour a 1” diameter drain should be used. For larger systems a 2” diameter drain, or multiple 1” diameter drains should be used.

HP systems must NOT drain onto a roof. Building damage could result. Any drain lines routed outdoors must be insulated and heat traced to protect from freezing.

Ensure that all traps are primed by filling them with water.

Mist Elimination

In some cases, the HP system will need to be installed in tight spaces or where water sensitive equipment is present a short distance downstream. In these cases a mist eliminator is required. The mist eliminator will be located immediately after the drain in the wet section. A second drain will be then installed immediately after the mist eliminator.

Air Handler Installations

In many cases the HP system is installed in an air handler upstream of the cooling coil. Many air handlers include a wet section around the cooling coil as a standard offering. These cooling coils also function as natural mist eliminators and thus an additional mist eliminator may not be required. Consult the air handler manufacturer for further information.

The above is not true for a heating coil; most heating coils are not designed to be wetted. If installing upstream of a heating coil a mist eliminator must be used.

Pump Module

Please follow these guidelines for positioning and mounting of the pump module:

Place the pump station in a way that:

- The distance to the humidifier unit is as short as possible.

Note: High-pressure hoses in lengths of 9.8 ft. (3m), 16.4 ft. (5m) or 32.8 ft. (10m) length are available.

- It is freely accessible and there is enough space for convenient operation and maintenance (min. clearance around pump station: Side clearance 1.6 ft. (0.5 m), front side/back side clearance 2.6 ft. (0.8 m)).

- The pump station is designed for the operation in protected and dry rooms, and must therefore not be installed outside.

- Do not install the pump station in exposed locations or locations with heavy dust load.

- The pump station must be installed only in a location having a water drain on the floor. If this is not possible, it is mandatory to provide water sensors to safely interrupt water supply in case of leakage. Furthermore, choose a suitable location that prevents damage to material assets in case of leakage.

- The pump station is designed for installation on a load-carrying floor.

- Do not install the pump station on vibrating surfaces or components.

Running the pump on any voltage other than what is listed on the spec label can cause serious equipment damage and may ignite a fire.

Dimensions and Weights of Pump Station

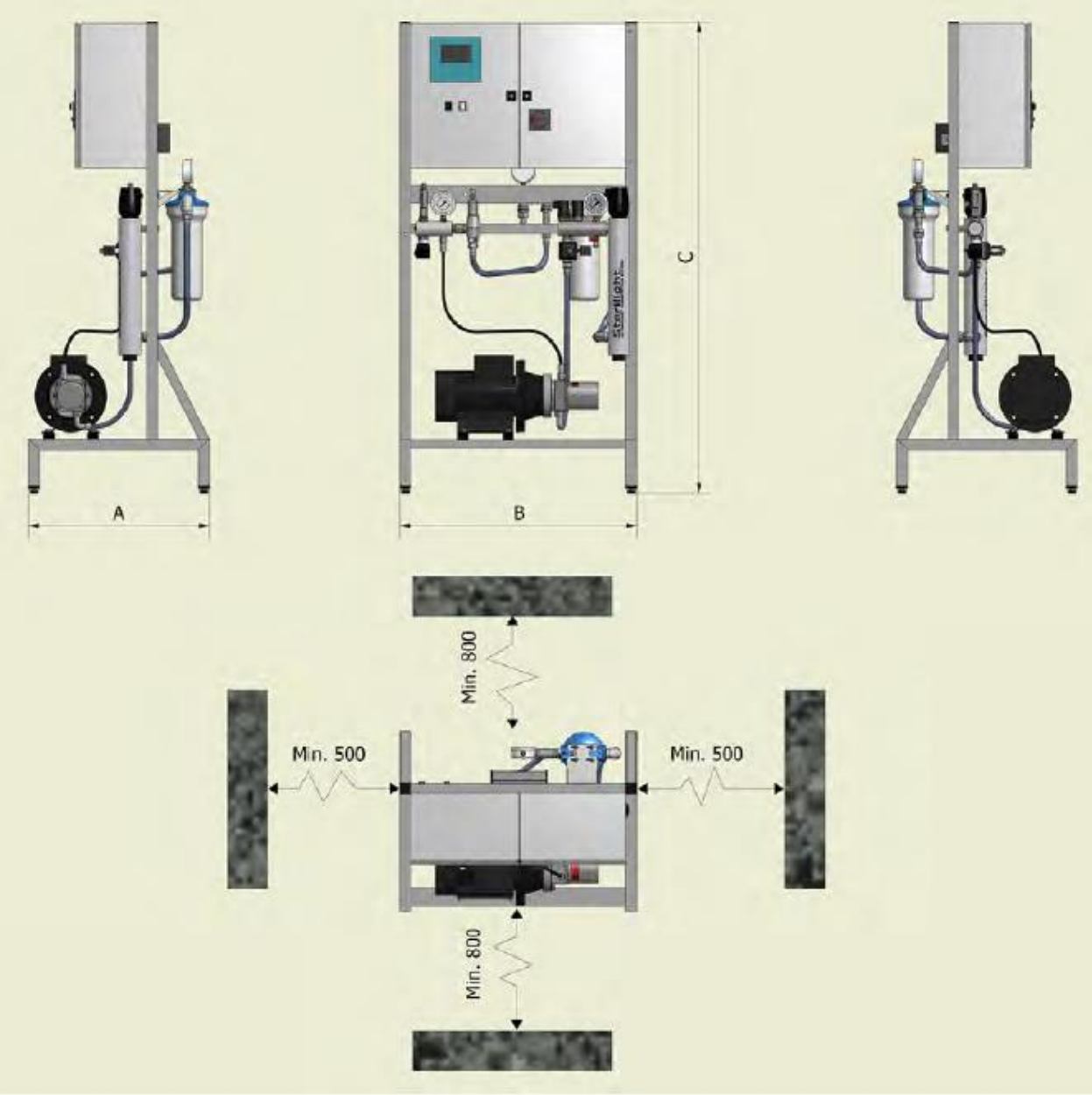


Figure 9: Pump Station Dimensions and Required Clearances

Table 3 : Pump Station Dimensions and Weights

Pump Station	Dimensions [in]			Weight [lb]
	A	B	C	
HP 100 (200 VFD)	19.7	26.0	51.2	110 – 143
HP 300 (500 VFD)	19.7	26.0	51.2	121 – 154
HP 500 (800VFD)	19.7	26.0	51.2	143
HP 800 (1300VFD)	19.7	26.0	51.2	165

Mounting the Pump Station

Install the HP pumps station in the desired location, directly on the floor or in a tray.

The pump station must be placed in a location with an accessible floor drain to prevent flooding in case of a leak.

Ensure that the pump station is mounted level using the four adjustable supports (see figure below)

Figure 10: Front View – HP 100-300 Pump Station

Water Installation

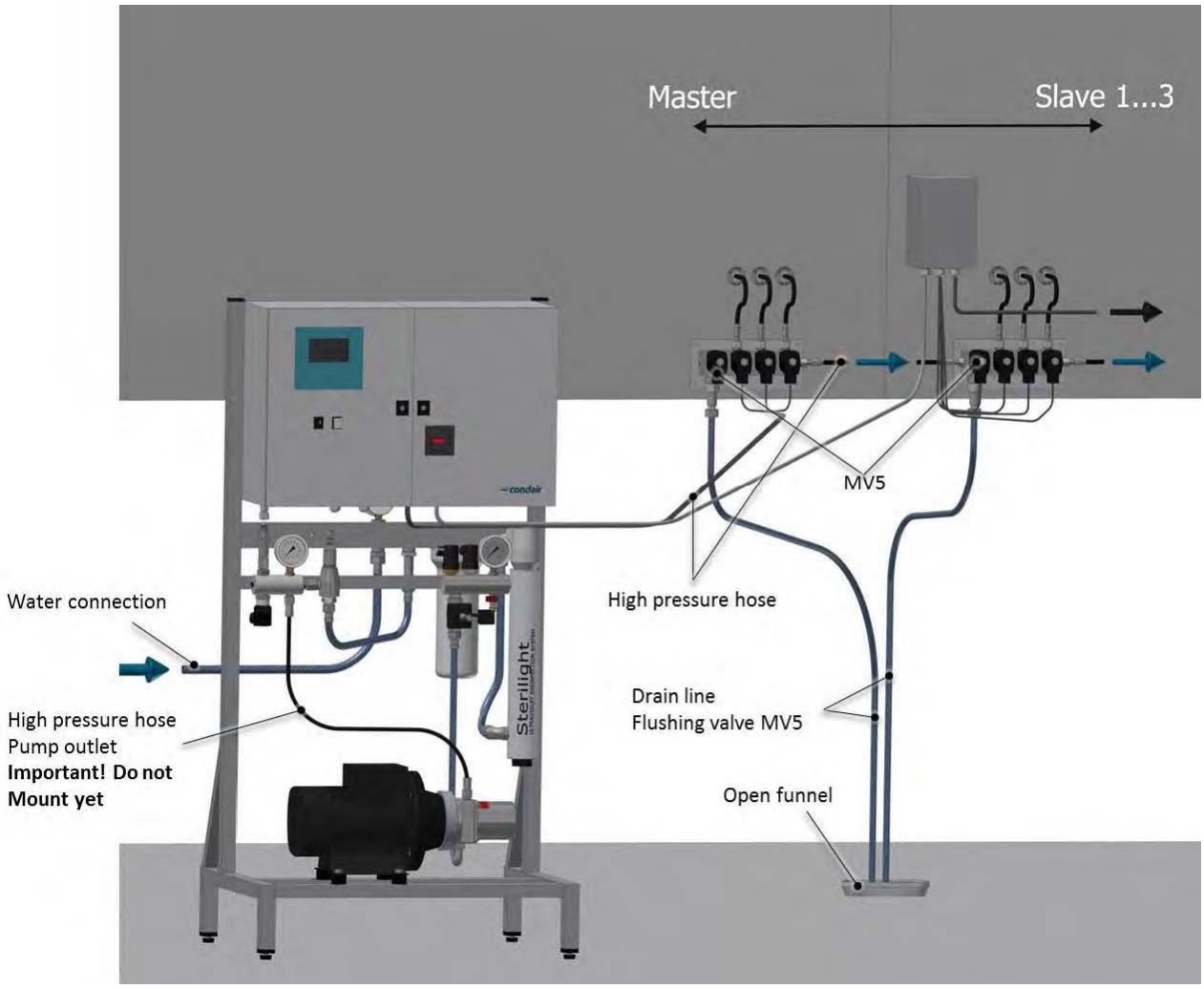


Figure 11: Water Connections

Before connecting water lines, all water lines must be flushed with fully demineralized water for at least 10 min. Remove the sealing caps from the connections just before installing the hoses.

Connecting Water Supply Hose

Water Supply Requirements: 14.5 – 58.0 PSI (1 – 5 bar)

Water Volume: Min. humidification capacity x 2 l/hr.

Water Quality: See Water Quality on page 7.

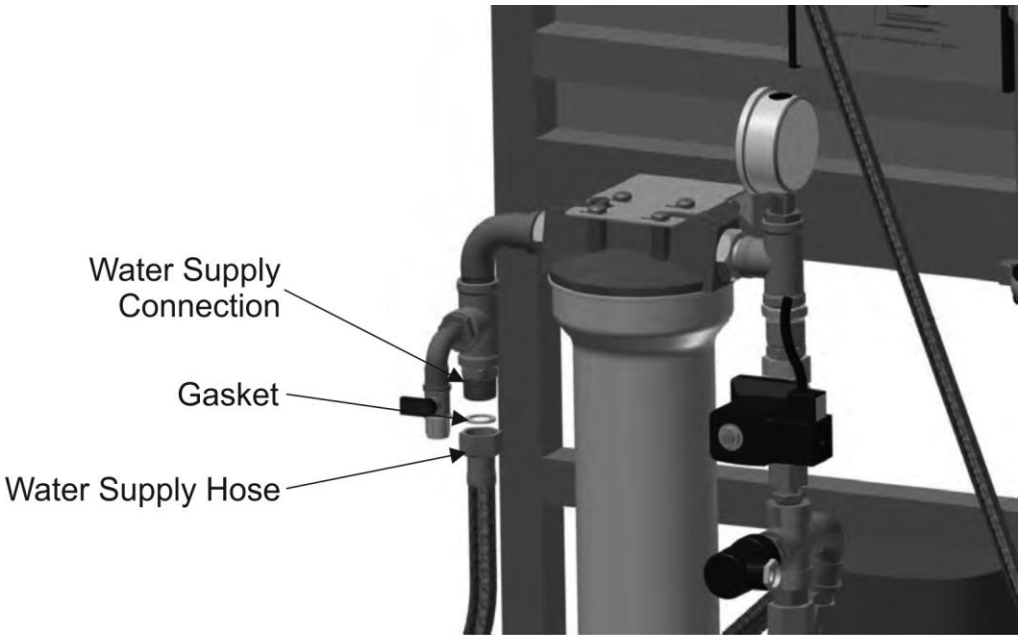


Figure 13: Water Supply Connection

1 Connect water supply hose to the supply connection (RG ¾" inside thread) using the gasket provided.

Connecting High Pressure Hoses

1 Connect the high pressure hoses between the pump station and the valve block(s) using the high pressure hoses supplied.

2 Use only the high pressure hoses provided to connect the pump station, high pressure manifold and step valve block (or between step valve blocks of the Salve units). Hoses by others may fail or become damaged during operation and prevent the system from operating.

3 Install the high pressure hoses ensuring that they do not touch each other or other system components. Where this is not possible, use anti-chafe spiral hose or similar to protect the hoses from damage.

The high pressure hose between the high pressure pump and high pressure manifold must not be installed before bleeding of the high pressure pump has been done. See page 42: Initial Commissioning and Start-Up

Connecting Drain Line to the Working Pressure Flushing Valve (MV5)

The working pressure flushing valve MV5 is mounted directly to the step valve block of the Master unit (stand-alone system) or the last Slave unit (master/slave configuration).

1 Connect the drain hose to the flushing valve connection using the drain hose supplied.

2 Lead the drain hose down to an open funnel with a constant down-slope.

3 Fix drain hose in its position to prevent movement during operation.

Electrical Installation

- The wiring diagram can be found inside the control unit of electrical cabinet.
  Note: The Condair HP is equipped with a 3-Phase monitoring relay for detection of incorrect phase sequence, total and partial phase loss. Instructions can be found on a sticker inside the electrical cabinet.
- The electrical installation (power supply, humidity control) must be installed according to the wiring diagram supplied with the unit and the local/national electrical code. All information given in the wiring diagrams must be followed.
- All cables must be lead into the control unit via the cable openings using the cable glands.
- Make sure the cables do not come touch any other components.
- The supply voltage must match the voltage indicated in the wiring diagram.

Electrical installation should be carried out by a licensed electrician. Touching live parts may cause severe injury or even death.

The electronic components inside the control unit are very sensitive to electrostatic discharge. When carrying out work on the open unit, appropriate measures must be taken to protect these components against damage caused by electrostatic discharge (ESD Protection.

HP Manifolds

Installation of the HP Manifolds

The system specific dimensions for the positioning of the manifold can be found in the installation documents which are provided with your system.

In addition to the installation instructions, please ensure the following when installing the HP manifolds:

- In order to allow for proper maintenance of the manifold, the ventilation duct must be equipped with a viewing window and a maintenance access door.

- The manifold must be installed in a full wet section with two drains: one before and one after the mist eliminator. See page 23 for wet section requirements.

- If the ambient air is cold, the ventilation duct must be isolated to prevent the humidified air from condensing on the walls.

- An air filter with min. MERV 13 (F7) or better must be installed upstream of the manifold.

- A stainless steel drain pan should be installed on the floor of the duct. This pan should slope downwards in the direction of airflow from the HP manifolds to end of the wet section. The drain pan should terminate with a drain connected to a “P” trap. The “P” trap should be at least 2 inches taller (center to center) that the duct static pressure, and should drain to an open funnel drain.

- The minimum distance between the nozzle manifold and a heating element must not be less than 16 inches.

- The duct velocity before the humidifier must be within 100 – 787 fpm.

Mounting the Nozzle Supports

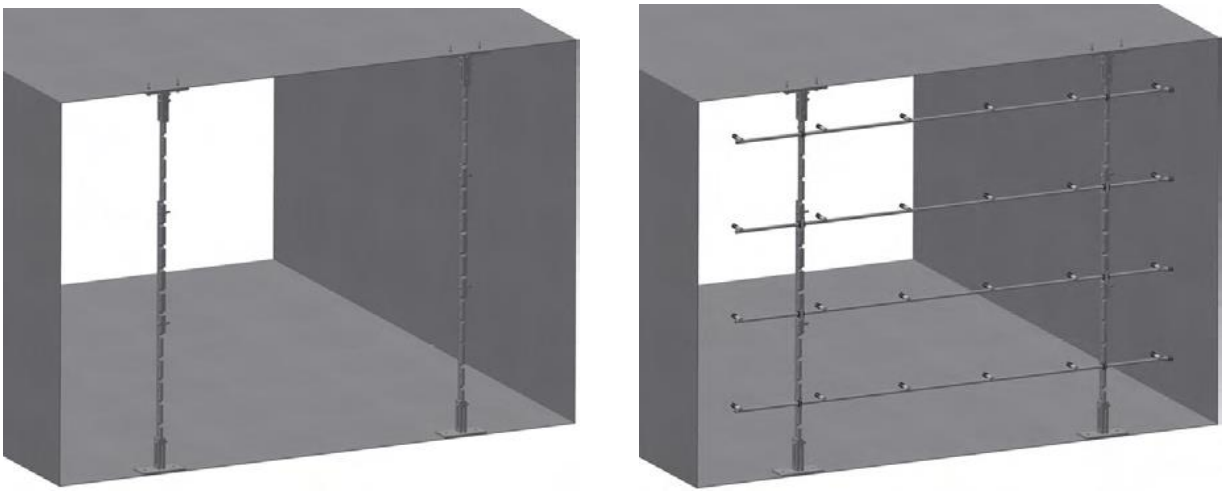


Figure 14: Vertical Mounting Fixture Location

1 Install the vertical mounting fixtures by marking the position of the top brackets on the ceiling of the duct (1/5 of the duct width from each side). Drill 1/8" (ø3.3) fixing holes (self-tapping screws) or 15/64" (ø6 mm) (nuts and bolts).

Make sure that the fixing holes on the left and right of the duct ceiling are aligned.

2 Fix the top brackets to the ceiling of the duct with self-tapping screws or bolts provided.

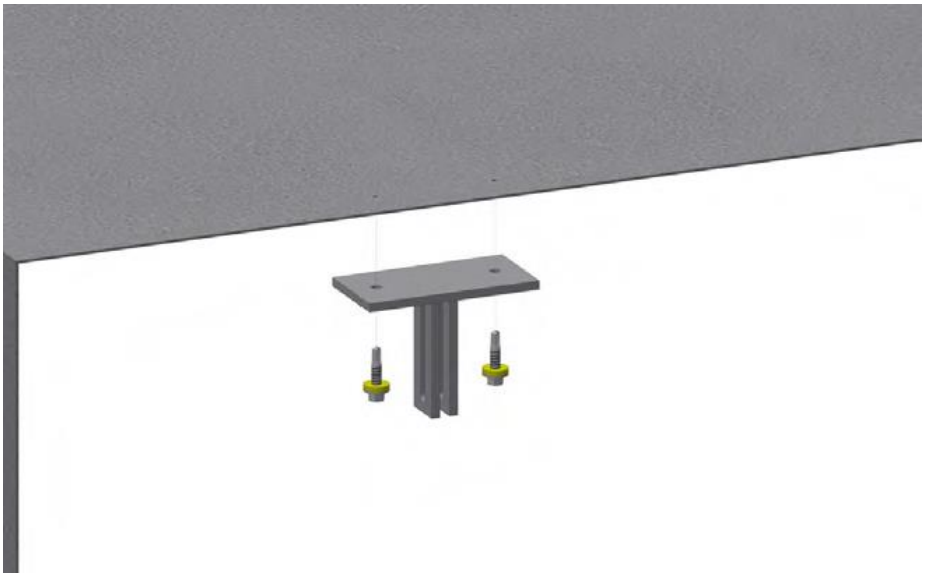


Figure 15: Top Bracket Installation

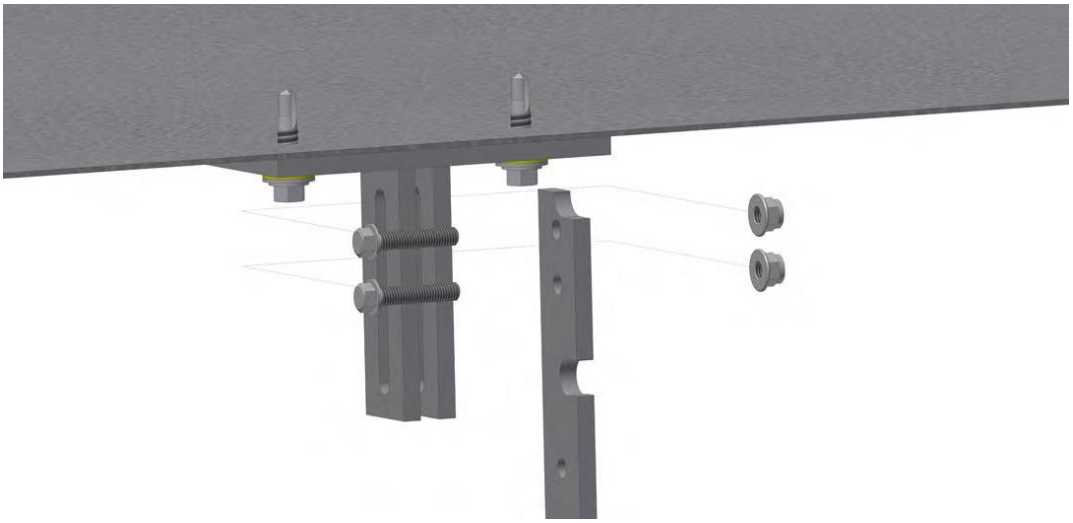


Figure 16: Installation of Pipe Supports

3 Install one of the pipe supports to each of the top brackets using the nuts and bolts provided. Hand tighten.

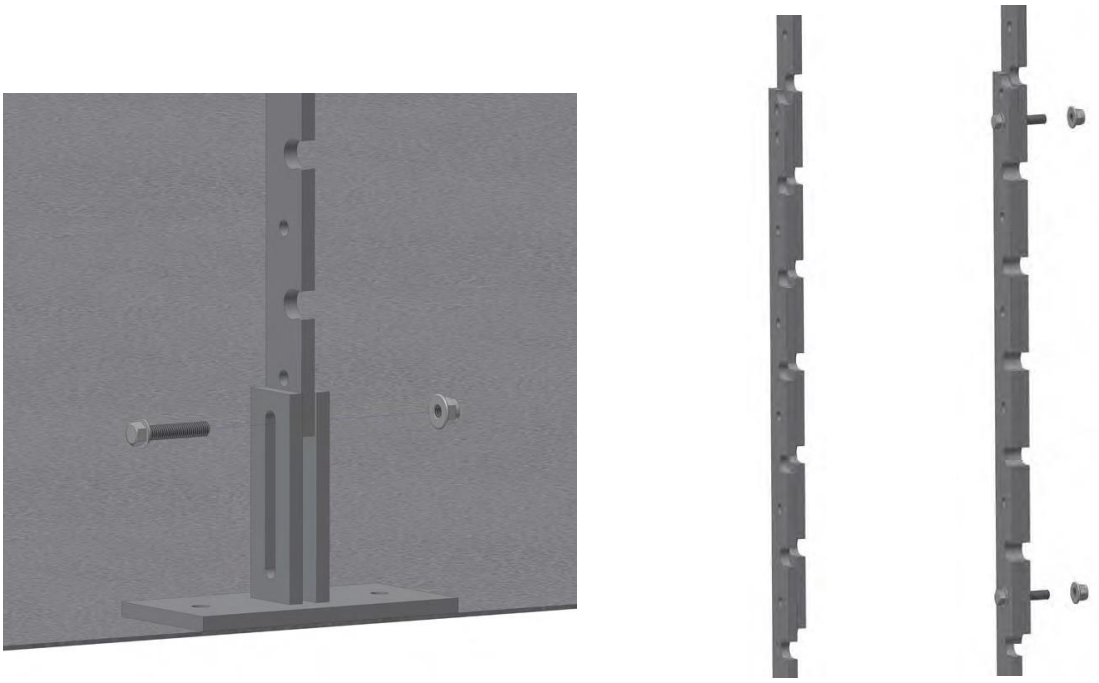


Figure 17: Installation of Pipe Supports

4 Install one of the pipe supports to each of the bottom brackets using the nuts and bolts provided. Hand tighten.

Do not remove the film from the adhesive pad underneath the bottom bracket.

5 Bolt the two pipe fixtures together as shown in Fig. 17. Adjust the length such that the bottom bracket can slide up and down. Hand tighten.

6 Use a level to adjust the fixture both sideways and back/forth so that the pipe fixture is exactly vertical in all directions.

7 Now mark the position of the bottom bracket using a scratch pin or similar, to draw around it. Clean the bottom of the duct thoroughly underneath the bottom bracket using a degreaser.

8 Remove the film from the adhesive pad, and press the bottom bracket in place.

9 Check that the fixture is still vertical in all directions.

10 Tighten all bolts. The pipe fixture is now in place.

Mounting the Nozzle Pipes

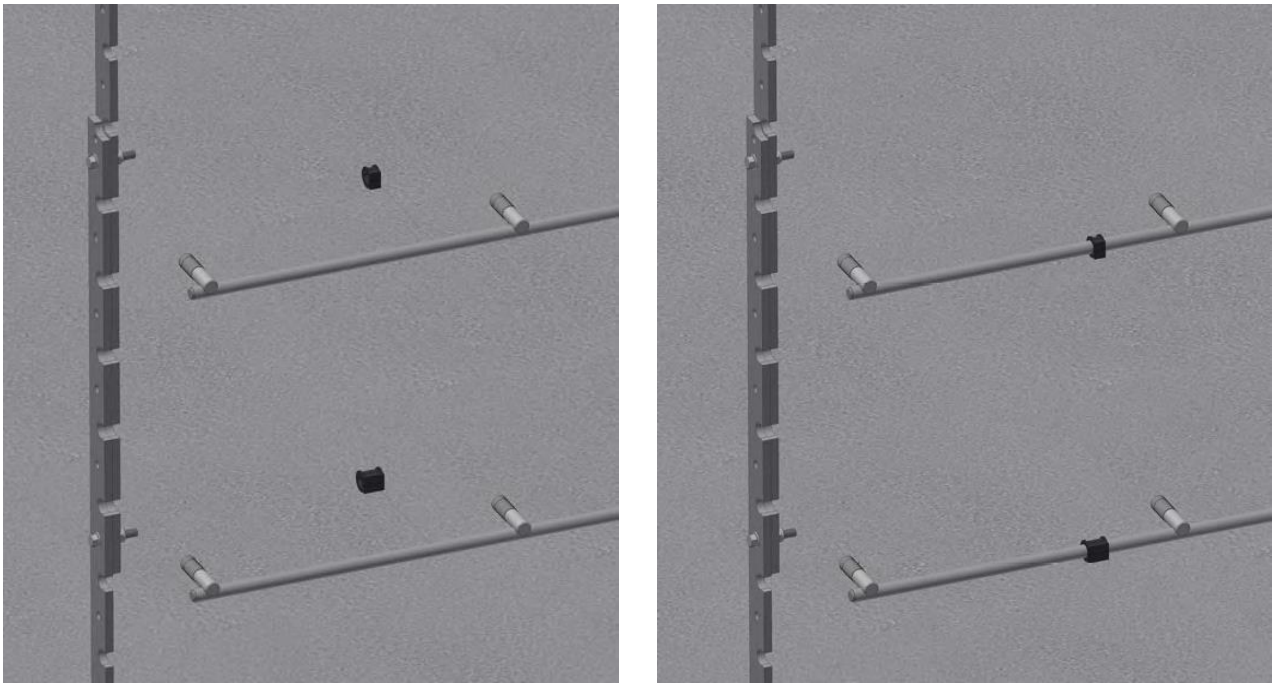


Figure 18: Installation of Rubber Ferrules

1 Refer to the supplied drawing for the position of each of the nozzle pipes.

2 Install the nozzle pipes first by fixing the pipes to the vertical pipe fixtures using the clamps and rubber ferrules provided as shown in figure 18.

3 The rubber ferrules are first pushed on to the nozzle pipes, the flat side/opening facing away from the nozzles.

Ensure that the pipe outlets are aligned horizontally in the direction of flow.

Note: The clamps and rubber ferrules both comes in two different widths, the broad ones are used where two pipe fixture rods overlap (on taller units).

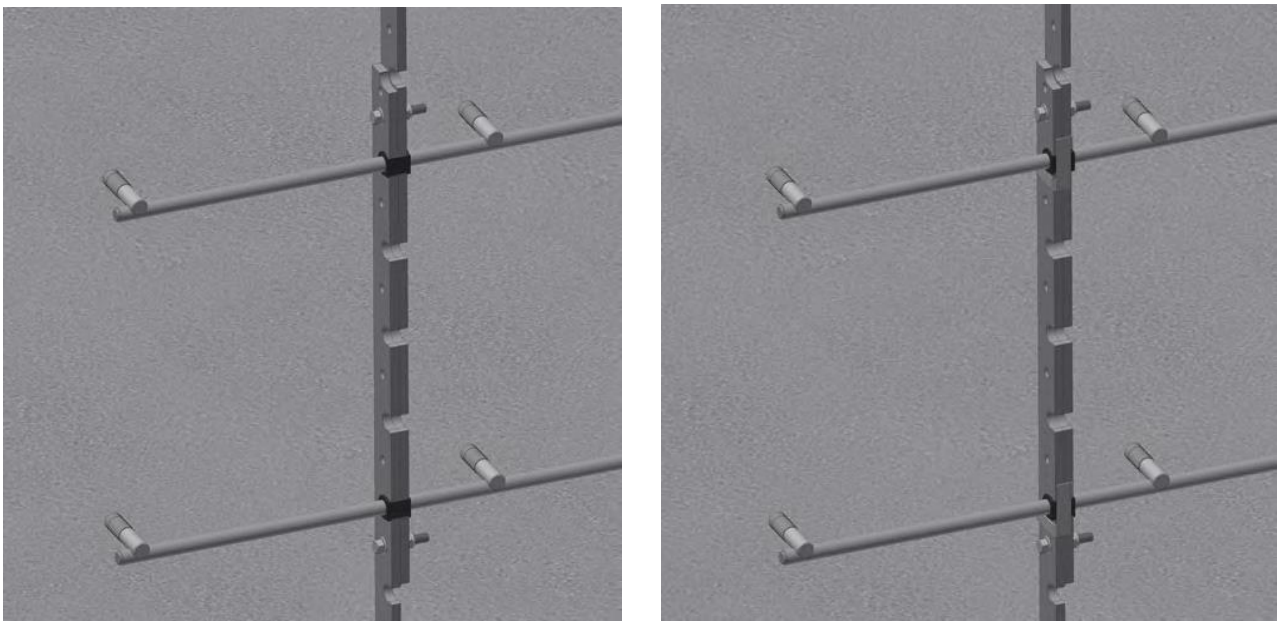


Figure 19: Installation of Nozzle Pipes and Clamps

4 Once the ferrules are installed, push the nozzle pipes firmly into the grooves of the pipe fixtures and install the clamps as shown in Fig. 19.

Mounting the Step Valve Block

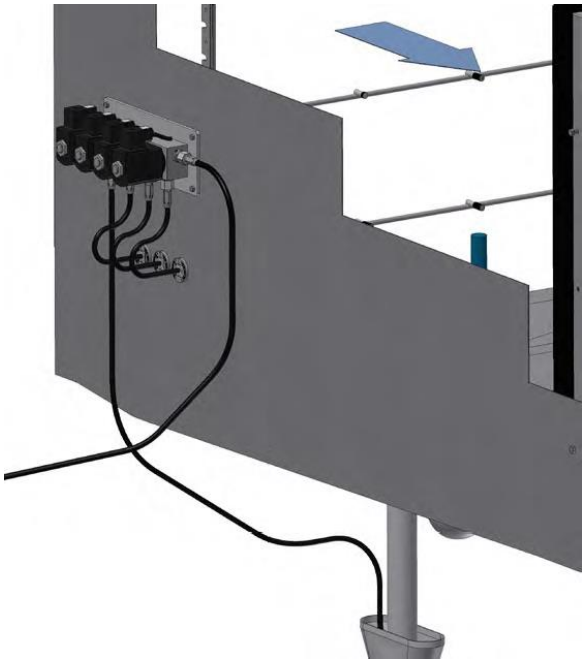


Figure 20: Installation of Step Valve Block

1 Mount the step valve block outside of the duct near the nozzle manifolds using the self-tapping screws or bolts provided.

2 Drill 3 x ø1-1/4” (3xø32 mm) duct penetrations and seal the holes on the inside and outside with the rubber sleeves provided.

3 Connect the high-pressure hoses to the step valve block, then lead the hoses through the rubber sleeves into the duct.

4 Connect the high-pressure hoses to the appropriate distribution blocks and nozzle pipes as indicated in the supplied drawing.

Hand tighten the hose screw connections, then tighten the screw connections 1-1/4 turns further using an open-end wrench. Check screw connections for leaks during operation. If the screw connections are leaking, retighten them. Do not over tighten the screw connections.

Make sure the hoses are not kinked (if necessary, lead hoses in a bow to the connector). Maintain the following minimum bend radius:

– for hoses DN6 = 4 in. (100 mm)

– for hoses DN8 = 5 in. (130 mm)

– for hoses DN10 = 7 in. (180 mm)

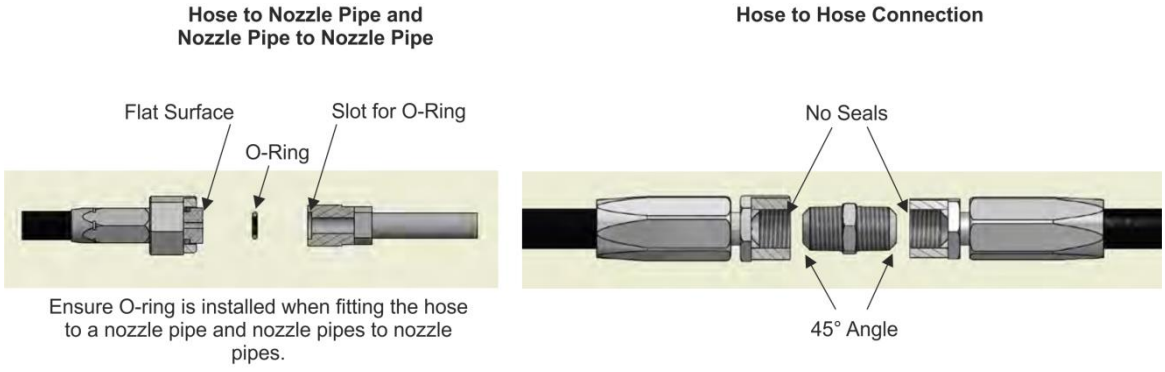


Figure 21: Hose Connections

Mist Eliminator

Mounting the Condair HP Mist Eliminator

General

The Condair Mist Eliminator is a single bank water droplet removal system installed at a pre-defined distance from the water entry point. The highly humidified air is to come into contact with the Mist Eliminator and any un-absorbed droplets of water are removed from the air stream. The collected water accumulates on the media then descends downward towards the bottom of the Mist Eliminator. During this process much of the collected water is absorbed into passing air while any remaining water is funneled to one of two drains via a pre-installed drain pan. See Figure 22: Mist Eliminator Overview.

The Mist Eliminator is available in standard sizes ranging from 4ft high x 4ft wide to 12ft high x 20ft wide with 4ft increments between. If a duct size does not fall under one of our standard sizes simply order the next larger size then cut to fit.

The drain pan is to be installed at the bottom of the plenum to remove the water collected by the Mist Eliminator. The height of the drain pan should be not be any less than 3 inches (7.5cm) and should extend past the filter bank 8 inches (20.3cm). A drain with trap before and after the Mist Eliminator is required, shown in
Figure : For this the duct's static pressure must be known. The drain traps must be 2 inches larger than the duct's static pressure. Ensure that the drain trap is filled with water prior commissioning a high-pressure system.

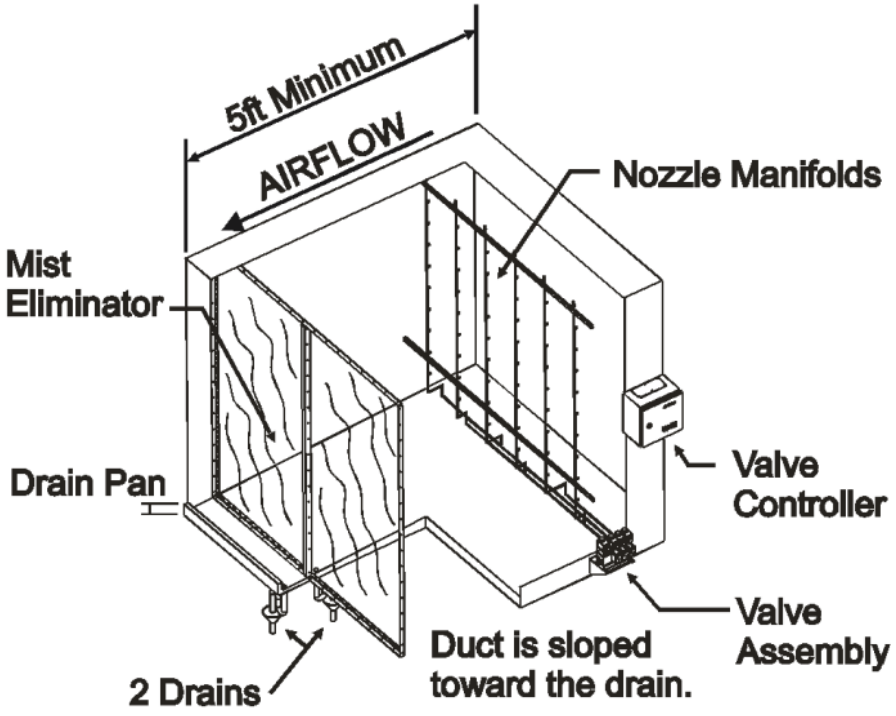


Figure 22: Mist Eliminator Overview

Installation of Mounting Angles

Measure the duct height and width.

Height = _____

Width = _____

The mounting angles are to completely surround the duct. Mark the duct floor with a line a minimum of 8" from the end of the drain pan and perpendicular to the ducts airflow. Now continue the lineup vertically up the walls and finally across the ducts ceiling.

Each angle measures 95.5 inches. Enough length of angle is supplied to cover the perimeter of the duct but they must be cut to fit. Over-lapping joints slightly is recommended for the floor angles only as they should be sealed along the entire length of angle with appropriate caulking to prevent free air flow through the drain pan. Angles may have to be cut in half to make-up two 4ft lengths. When securing the mounting angles to the duct place the side with circular holes against the duct and the bent edge along the marked line.

Orient the mounting angle as shown in Detail A in
Figure 24: Mounting Angles. Using field supplied self-taping screws attach the mounting angle to the duct via the round mounting holes. A screw every 18 inches is recommended.

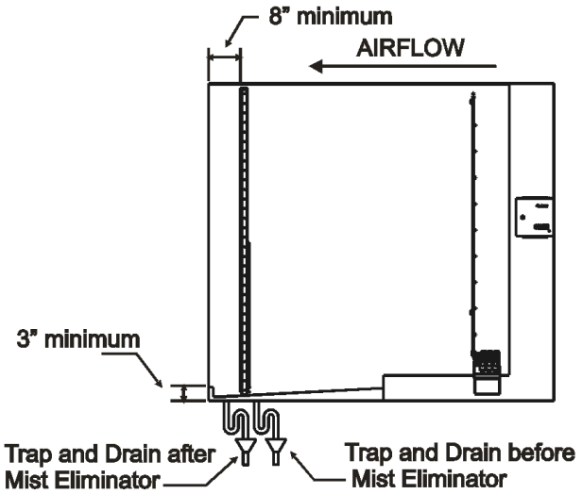


Figure 23: Drainage and Drains

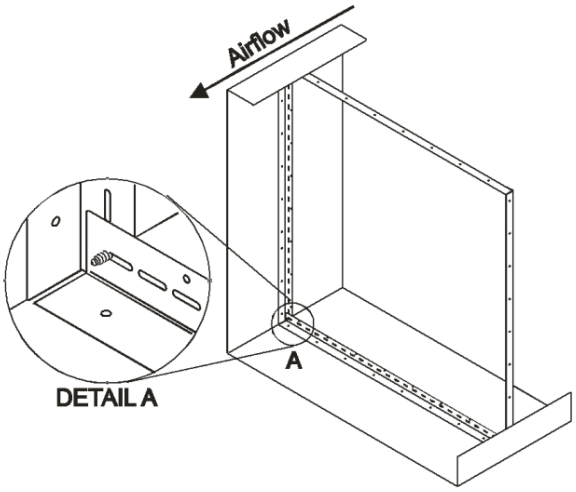


Figure 24: Mounting Angles

Installation of Mounting Channels

Before installing the mounting channel or channels the starting mounting point needs to be determined using the duct width. If the duct width is 4ft or less then there is no need for a mounting channel, continue to the next step.

Table 4. Mounting Channel Locations

Duct Width	Mounting Position	Number of Channels
4ft - 8ft	Middle	1
8ft - 12ft	Offset 2ft from middle	2
12ft - 16ft	Middle	3
16ft - 20ft	Offset 2ft from middle	4

Once the mounting location is determined the mounting channel(s) are ready to be cut to fit, keeping in mind that drain pans are not level and lengths may vary. From the starting point, each additional mounting channel is placed at 4ft centers. In the figure below a typical 4ft x 8ft installation is shown with the mounting angle surrounding the perimeter and a mounting channel installed vertically at the center point of the duct.

In Figure 26: Large Duct Mounting Channel Locations, a 6ft high x 10ft wide mist eliminator frame is shown. Notice how the mounting channel placement is offset from the center.

Installations between 8ft x 12ft to 16ft x 20ft may involve the removal of excess material. Excess material is removed equally from both sides of the frame not from the middle.

To secure the mounting channel in place use the factory supplied ½ inch self-threading screws. Use the center row of slotted holes to attach the mounting channel to the mounting angle. Place one screw at the top and one at the bottom making sure that the mounting channel is level or square to the ceiling, this will help for mounting the wire mesh. See Figure 27: Mounting Channel Installation.

If the duct height greater than 8 feet a channel extension is needed in order to link 2 mounting channels together. The extension slides inside the mounting channel. Use 4 ½ inch factory supplied screws for each mounting channel as shown in Figure 28: Mounting Channel Extension Kit.

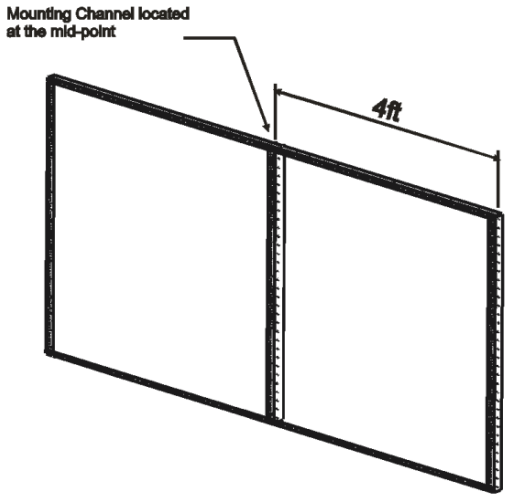


Figure 25: Mounting Channel Location

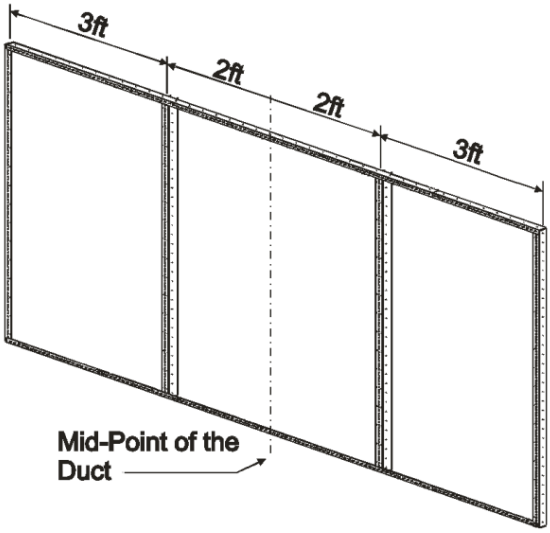


Figure 26: Large Duct Mounting Channel Locations

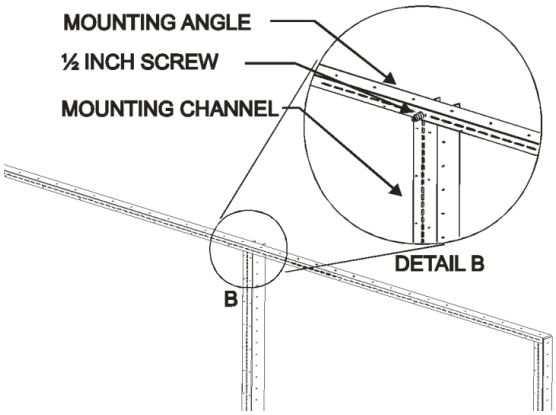


Figure 27: Mounting Channel Installation

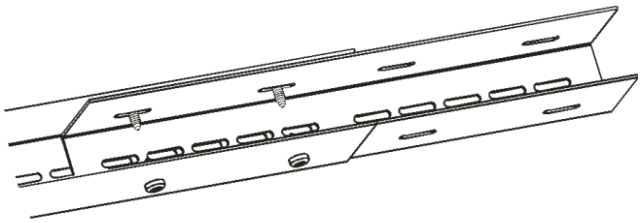


Figure 28: Mounting Channel Extension Kit

Installing 1 inch Screws/Studs

In the final step of this instruction Media Clamping Strips are used to secure the media to the frame. In this step the screws used to fasten the Media Clamping Strip to the finished assembly must be installed. Each Media Clamping Strip requires 3 screws evenly spaced. Clamping strips are 46 inches in length upon arrival from the factory however if the Clamping Strip is cut to fit the duct size it will still require 3 screws evenly spaced to properly secure it. After each screw is installed use the factory supplied nuts to lock them in place.

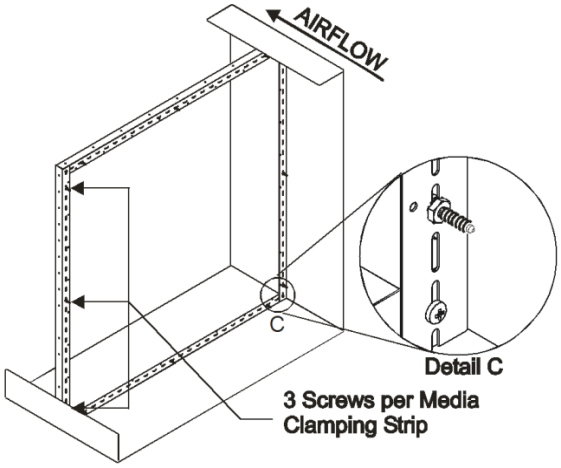


Figure 29: 1 Inch Screw / Stud Installation

Installation of Wire Mesh

The 4ft wide Wire Mesh can now be cut to length (duct height or top mounting stud to bottom mounting studs.) To fasten the Wire Mesh to the assembly use the factory supplied self-threading ½ inch screws starting from the top angle and middle channels working out and down. Be sure to install the wire mesh square when first fastened otherwise it will not align properly at the opposing end. Notch around screws previously installed for best results.

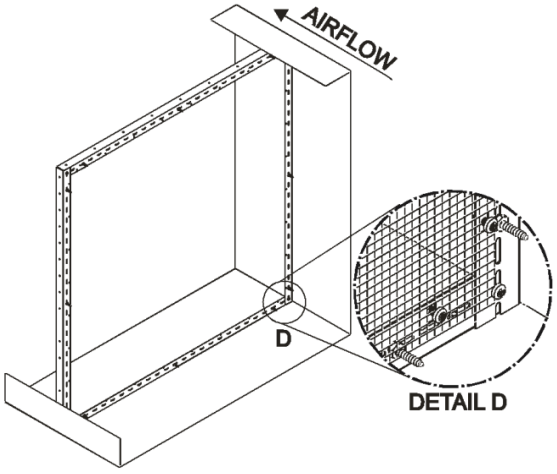


Figure 30: Mesh Installation

Media Installation

The recommended way to install the media is taking the entire roll and securing its leading edge to the top of the assembly by working the 1inch screws/studs though the media, see Figure 31: Mesh Installation. Then carefully rolling it downward until it reaches the bottom of the duct. Cut the media at the bottom of the assembly to fit. Once cut, go back and work the rest of the screws through the media. If the recommended method cannot be followed, use a flat, clean surface to pre-cut the media. Be sure to cut the media with precision so not to be short on the final section of the assembly.

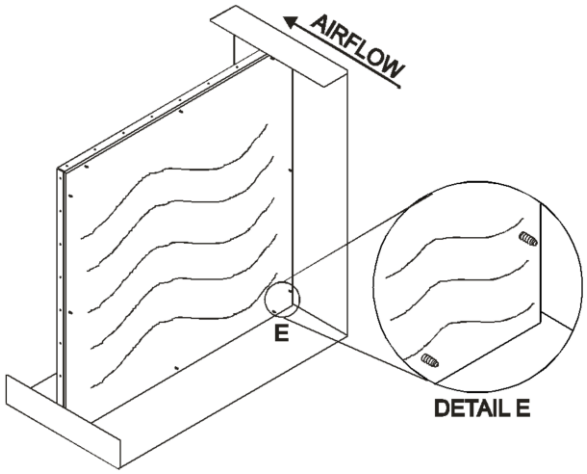


Figure 31: Mesh Installation

Media Clamping Strip Installation

The final step is to secure all components of the assembly using the media clamping strip. Place the strips so the 1 inch screw/studs pass through the slotted holes on the media clamping strip then fasten a factory supplied nut to hold the assembly in place. See Figure 32: Clamping Strip Installation.

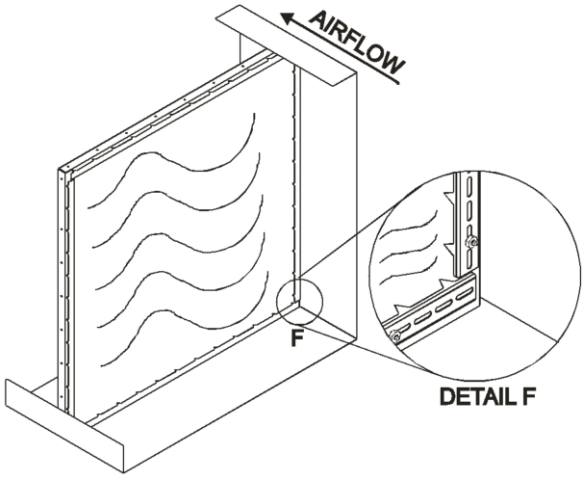


Figure 32: Clamping Strip Installation

Start-up, Operation, & Maintenance

Initial Commissioning and Start-Up

Installing the Membrane and Preparing Unit for Flush

This section describes initial step-by-step commissioning of the unit. The procedure described here after assumes that the system has been installed correctly in accordance with the information in sections above.

Initial commissioning must be completed by an authorized service technician from your local Condair supplier.

1 Unscrew the filter housing using spanner part number 104.570.

When fitting the water filter, wear sterile gloves to keep the filter bacteria-free.

Figure 33: Removing Filter Housing

2 Bleeding the filter.

a. Remove the bleeding screw on top of the filter.
b. Slowly open the water supply and fill the filter.
c. Refit the bleeding screw.

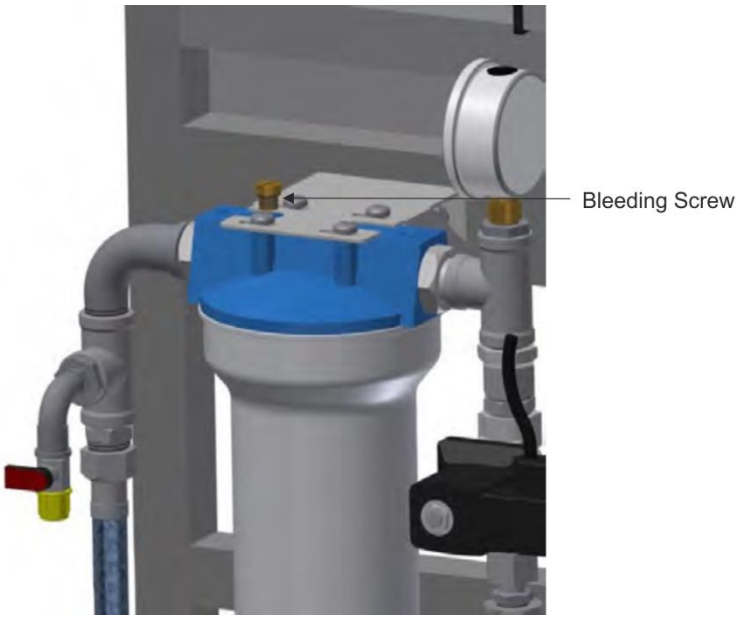


Figure 34: Bleeding Screw

3 Remove the protective plug from the high-pressure hose (from the REG valve block) and put the open end of the hose to a drain. Fix the hose in this position so it cannot move.

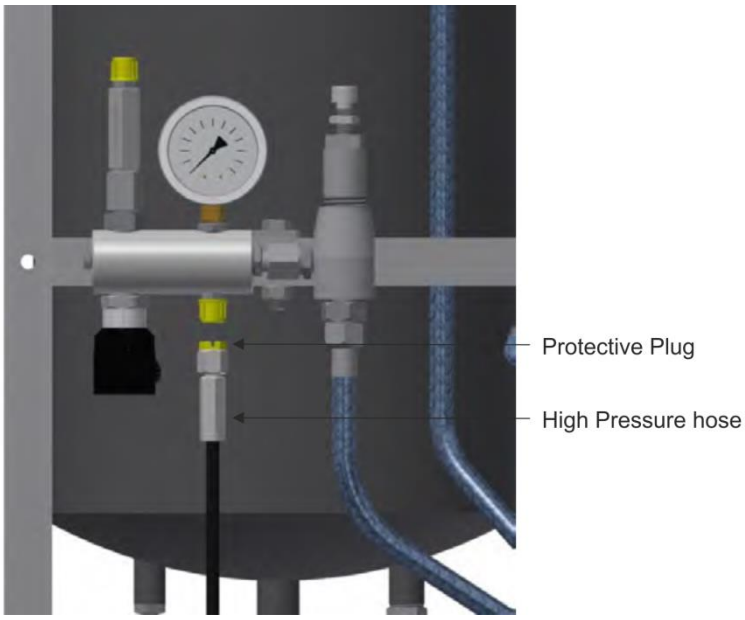


Figure 35: Protective Plug

4 Bleeding of the HP Pump

a. The high pressure hose should already be disconnected and lead to a drain (Step 3 above).

b. Start the system by increasing the set point on the humidity controller.

c. Flush through the pump for a minimum of 20 seconds.

d. Turn off the system and reconnect the high-pressure hose to the REG valve block.

Figure 36: Reconnecting High Pressure Hose

They system is now ready for operation. As soon as a humidity demand is present, the supply valve will open and the HP pump will start.

When the necessary pressure is reached, one, two, or all three step valves will open depending on the current humidity demand.

HP High Pressure Atomizing Humidifier Start-Up Check List

The check list below must be filled out during the first commissioning and signed by the corresponding service technician.

Client:_____

Location:_____ Date: _____

Pump Model: _____ **Pump Voltage:** _____

Nozzle Type: _____ Humidifier Serial #:_____

Humidification Capacity: _____ **Demand Signal:** _____

Software Version: _____ **Tag / Zones Served:**_____

1 Visual Inspection

Hoses properly fixed and anti-chafe spiral hose mounted where necessary?	☐
Connections: High-pressure pumping station – Step Valve Block	☐
Hose connections in the duct	☐
Connection MV REG1 to spray circuit 1/7	☐
Connection MV REG2 to spray circuit 2/7	☐
Connection MV REG3 to spray circuit 4/7	☐
Connection MV5 flush valve to drain	☐

2 Control/Configuration

Are the electrical connections for the Master and Slave units (if available) done correctly in accordance with the appropriate wiring diagram? • Are the step valve cables wired correctly? • Is the control signal wired correctly? • Is the external safety loop wired correctly (Master and Slaves) or is a jumper installed? • Is the power supply wired correctly and correctly fused?	☐

Are the control units (Master and Slave) correctly configured (Power up control units and check configuration). • Is the control signal correctly configured (is the internal controller deactivated, if an external controller is connected)? • Is the number of Slave units correctly configured in the control unit of the Master? • Is the power limit correctly configured?	☐

3 Pump Station

Flush supply line for a min. 5-10 minutes before connecting	☐
Flush high-pressure piping for 5-10 minutes	☐
Room equipped with floor drain?	☐
Flushing line and housing drain connected and hoses secured?	☐
Flow pressure of 30 – 145 psi (2-10 bar)	☐
Manual shut off valve on main water supply open?	☐
No leaks at the pump?	☐

4 Nozzle Unit

Nozzle pipes tight?	☐
Drain within the humidification distance present and connected with a P-trap? Is the P-trap the correct height based on the duct static pressure?	☐
Spray angle of the nozzles (Min. 50°, Optimal 70°)	☐
Minimum distance from the first nozzle to the duct wall is correct (no droplet formation on the duct wall)?	☐
Step 1/7	☐
Step 2/7	☐

Step 3/7	☐
Step 4/7	☐
Step 5/7	☐
Step 6/7	☐
Step 7/7	☐

5 Mist Eliminator

Mist eliminator installed correctly according the installation manual?	☐
Drain after the mist eliminator present and connected with a P-trap? Is the P-trap the correct height based on the duct static pressure?	☐
No droplet carry over after at least 1 hour of full output (fan and humidifier)	☐

Notes:

_____
_____
_____
_____
_____
_____
_____

Installed by:_____
(Company Name and Business Address)

Inspected by:_____
(Company Name and Business Address)

Signed: _____ Date: _____

Operation

Touch Screen

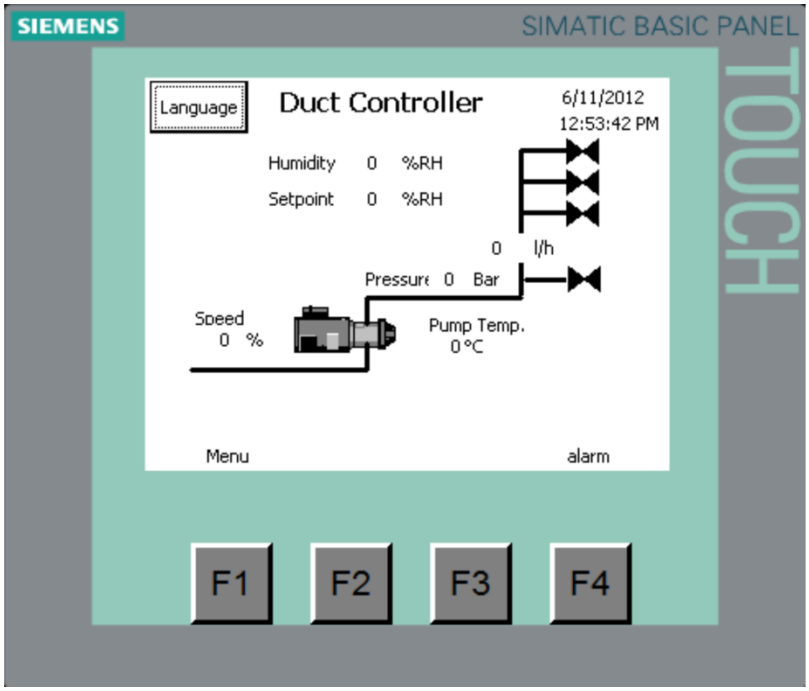


Figure 37: Normal Operating Screen

The screen is equipped with four F keys. Each of the keys is used to navigate between the different screens. When these are used, the individual key's function is indicated in the description directly above the key.

The actual touch screen can be operated by gently tapping a finger or a fingernail against the required "buttons" on the screen. 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. In case you make an incorrect entry, this can be deleted by means of 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 protected against unwanted changes by means of passwords.

The different user groups have different passwords and different rights.

1 User – no password – can read operational information and alarms.

2 User 1 – password 1234 – as above + changes of set points.

3 Technician – password 197 – as above + changes of operational parameters and choice of membrane rinse.

4 Master – password xxxx – as above + option choices, reset to factory settings.

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

When a password is required in order to change parameters, a screen will appear where the password can be entered. Change to numerical keyboard by means of the keys 0-9. Once the password has been entered, the system will remain unlocked at the relevant level for five minutes.

Alarm Display

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 (high limit) – Max Hygrostat has dropped out because the humidity is too high. The system has stopped and must be restarted once the humidity level has dropped.

- Water Pressure Too Low – The water pressure of the water inlet to pump is too low.

- Sensor Error – The signal from one of the humidity sensors is outside the expected range of 20-80% RH. In order to ensure that it will be possible to start in very dry surroundings, 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.

- High Pressure Too Low – The high pressure in the hoses is too low, (default <40 bar / 580 psi) the system is stopped and must be restarted using the reset button.

- High Pressure Too High – The pressure in the hoses is too high, (default >80 bar / 1160 psi) the system is stopped and must be restarted using the reset button.

- Emptying Tank – Water Too Hot – The water is too hot (above 40°C / 104°F). The tank will be emptied to start level and filled with cold water. The pump will continue to run.

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

- Tank Full – The water level in the tank is too high:

    - Lower the water level and reset the system

    - Check that the inlet valve closes tightly when the system is idle.

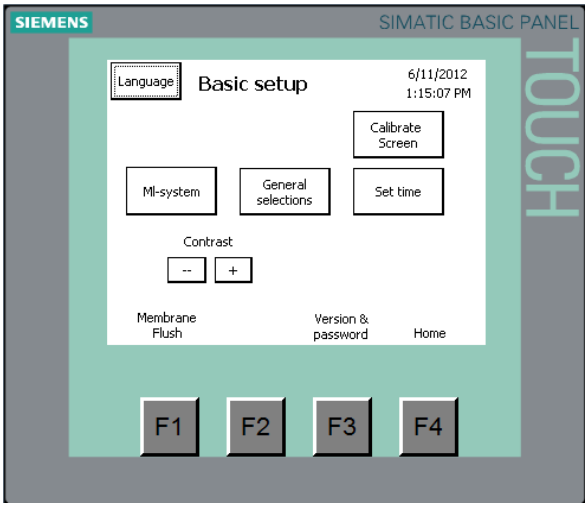
- Thermo Relay Error – The protective motor switch for the high pressure pump is disengaged. Engage the relay and try restarting.

Message Display

- Water Level Below Start Level - The water level in the container is too low for the pump to start. Once an adequate level has been reached, the system will start automatically.

- Pump Will Start Automatically After Delay – The pump has been set on pause, e.g. after disinfection. The pump will start automatically after the expiry of the set time.

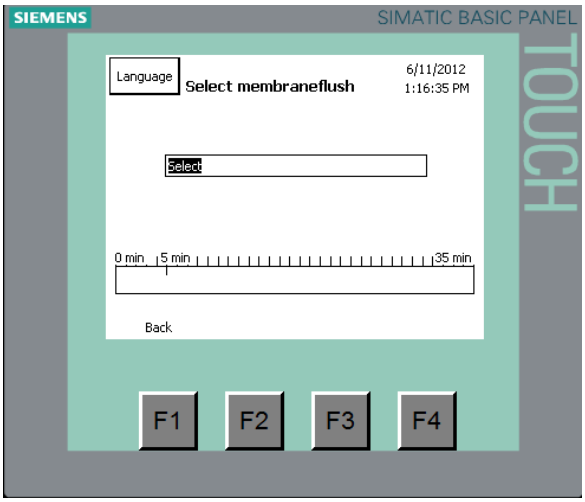
Start Page – Basic Settings



The start page provides access to pages and choice of functions:

- Selection of language
- General selections
- Calibration of screen
- Setting of clock
- Display software version and administration of passwords

Once these choices have been made, press OK to continue.

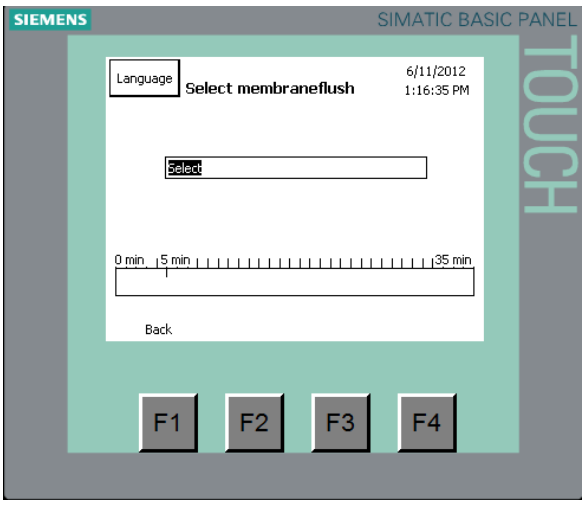


Choose whether membrane rinse is to be used.

Select – Requires a chose to be made

Membrane Flush – Run rinse of RO membranes (Takes at least 35 min.)

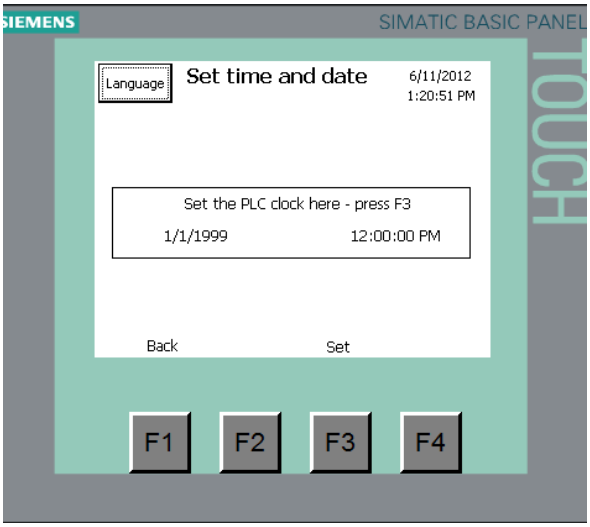
Normal Operation – Run normal operation



Choose between the different functions and options.

Please note that some options require hardware changes to the pump station.

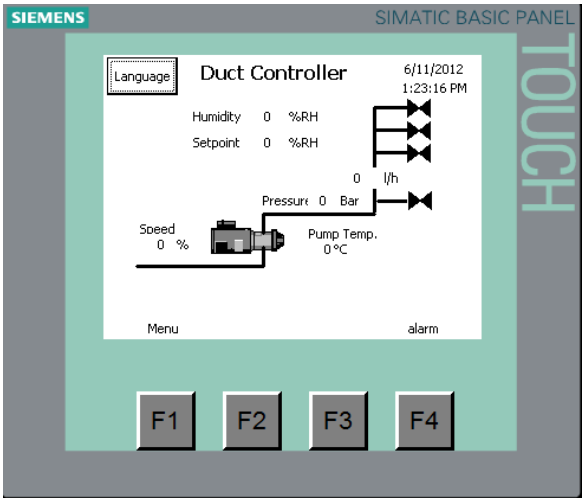
Analog Mode	*Humidity Controlled Capacity*
	Direct Controlled Capacity
Register Mode	*3 Valves – 7 Step*
	4 Valves – 15 Step
	5 Valves – 31 Step
RO Options	*No EC Monitoring*
	EC Monitoring
	EC Monitoring + RV/CO2
	EC Monitoring + MB + CO2



Setting of the clock and date.

Once settings have been chosen, press F3.

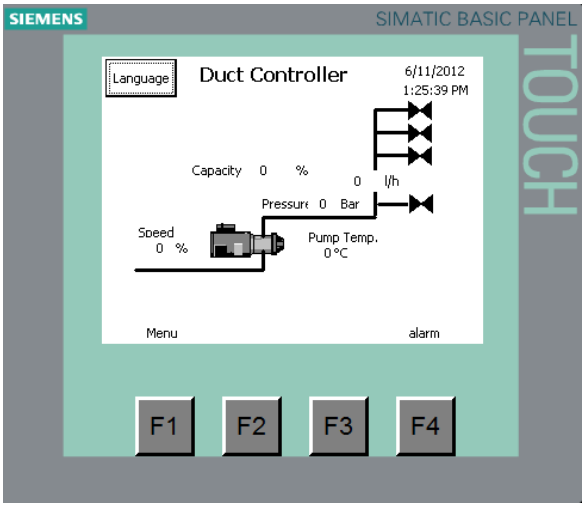
Operation and Alarm Page



Normal operation page:

The current image depends on the choice of control mode.

If humidity controlled capacity has been selected, the current humidity and the required set point are displayed.



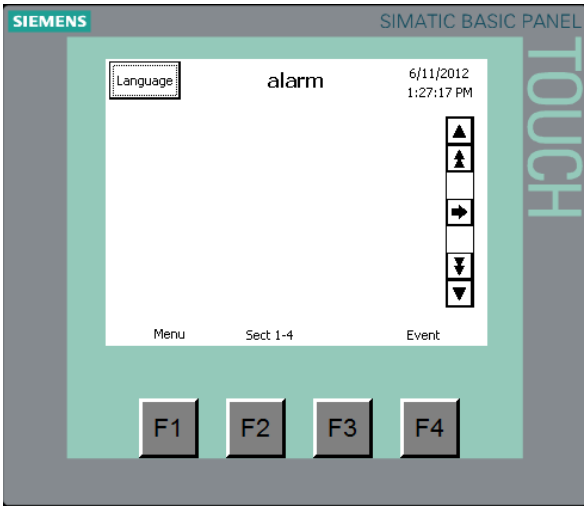
If directly controlled capacity has been selected, the current capacity is displayed in %.

In both cases, the pump's temperature and the current capacity in liters per hour are shown.

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

The menu page and alarm page can be reached via the buttons on the screen.

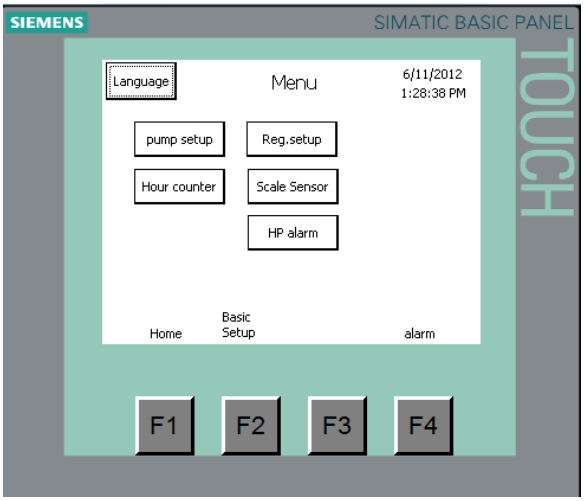
Alarms and User Messages



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

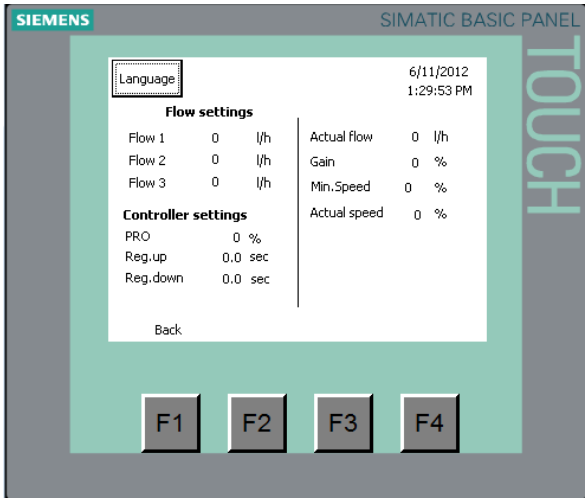
Please note that the alarm log will be reset after a power cut.

Parameter Change Menu



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

Settings For Control Parameters

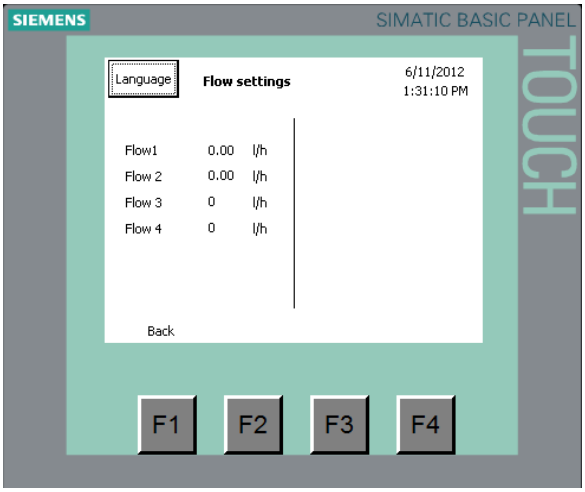


Parameters for control settings.

Enter the flow values for the individual nozzle strings as liters per hour.

PRO – Used for control with humidification signals. A lower value here will give a more aggressive adjustment.

Reg.Up/Reg.Down – Indicates the regulation rate in seconds.



Section parameters for sensor scaling:

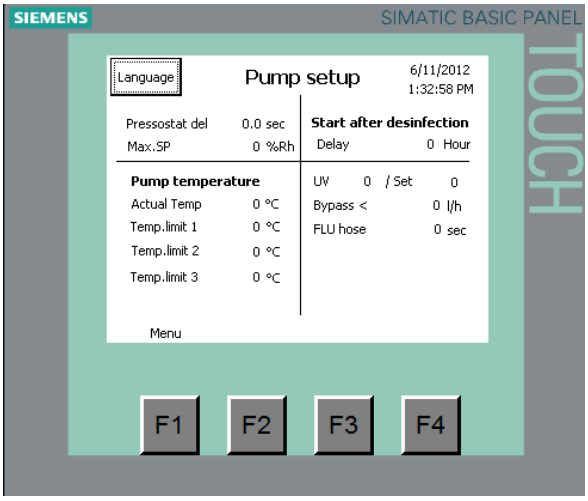
HIE – Highest electrical signal

LOE – Lowest electrical signal

HI – Reading at HIE

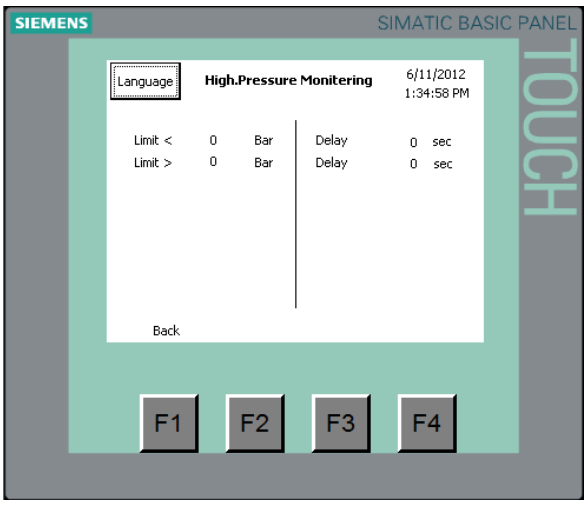
LO – Reading at LOE

Pump



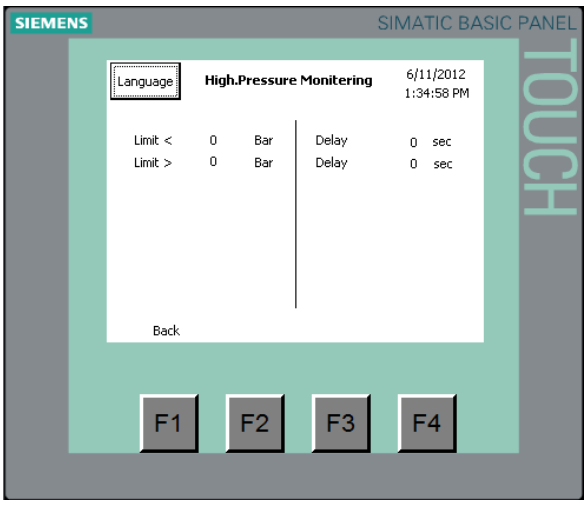
Pump alarm settings.

These values should be changed by Condair Technicians only.



Settings for the High Pressure Guard

These values should be changed by Condair Technicians only.



Hour counter for the pump and for each section, which show the total running time.

Setting the Unit into Daily Operation

The procedure described here after assumes that the system has been installed correctly in accordance with the information in sections above and initial commissioning has been carried out by a service technician from the manufacturer/manufacturers' representative.

Proceed as follows to set the Condair HP into operation:

1 Check all system components and installations for possible damage.

A damaged system or system with damaged installations must not be set into operation.

2 Open manual shut off valve on the water supply line.

3 Activate the service switch of the power supply line to the pump station, and to the Slave control units (if applicable).

4 Activate the power switch of the pump station, and to the Slave control units (if applicable).

5 The touch screen will now start up and show the basic setup screen. They system will carry out a system test and flush the system.

6 If a failure occurs during the system test, a corresponding error message will be shown on the display.

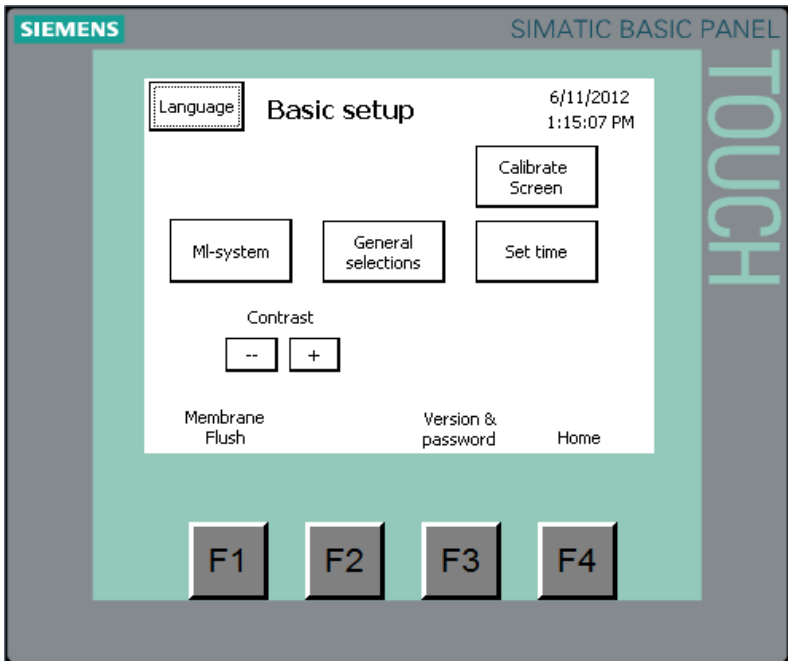


Figure 38: Main Setup Screen

7 Press F4/Home on the display and the controller will show the normal operating screen.

8 As soon as a humidity demand is present, the supply valve will open and the HP pump will start.

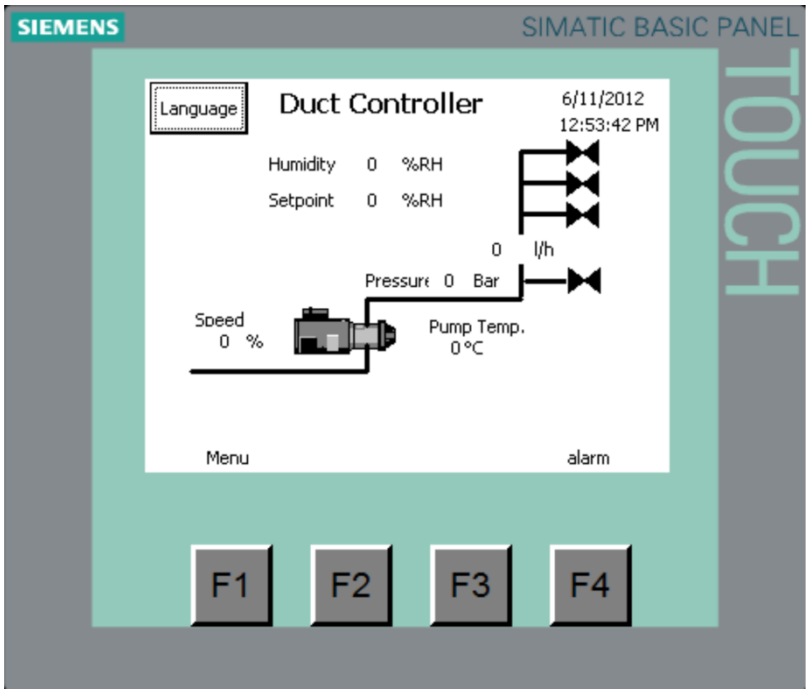


Figure 39: Normal Operating Screen

9 Detailed information regarding the operation of the control unit and the settings can be found on pg. 48.

Inspections During Operation

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

- The whole humidification system for any leaks.
- The nozzle manifold and other system components for any damage.
- The electrical installation for any damage.
- The operating display for any warning or error messages.
- If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components, take the Condair HP out of operation as described in the section below. The necessary corrections or fixes must be completed by a qualified specialist or service technician from your Condair supplier.

Shutting Down the Unit

For hygienic reasons, it is highly recommended to leave the Condair HP on all the time, even in periods when no humidification is required. This ensures that the water circuit is flushed on a regular schedule thus preventing standing water within the system.

Proceed as follows to shut down the unit for maintenance:

1 Switch off the pump station and/or all Slave control units (if applicable).

2 Close the manual shut off valve of the water supply line and secure it to prevent inadvertent opening.

3 Open the test tab on the discharge manifold to relive pressure in the system.

4 Turn off the service switch on the main power supply lines to the pump station and to the Slave control units (if applicable). Then secure the service switches against inadvertent opening.

5 Let the fan of the ventilation system continue to run until the humidifier section is completely dry to prevent standing water.

6 Power down the ventilation unit and secure it to prevent inadvertent power up.

Maintenance

Important Notes on Maintenance

Qualification of Personnel – All maintenance work must be carried out by qualified and trained personnel authorized by the owner.

Maintenance and repair of the electrical installation must be carried out by a certified electrician.

It is the owners responsibility to verify proper qualifications of the personnel.

General Note

The instructions and details for maintenance work must be followed and complied with.

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

Only the use of original Condair spare parts are permitted.

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

Maintenance Intervals

In order ensure safe, hygienic and economic operation of the Condair HP, components must be periodically checked and maintained according to the table below. The maintenance intervals and maintenance work stated below are guidelines only. Depending on the system specific conditions (quality of the supply air, the water, etc.), the maintenance intervals may be reduced.

Table 5: Maintenance

Work to be Carried Out	After the first 50 hr.	Monthly or every 500 hr.	Every 200 hr.	Every 4000 hr.
Pump Station				
Check high pressure pump and installations for leakage. Have defective components repaired or replaced by a Condair service technician.	x	x		
Check electrical connections and wires. Have defective components repaired or replaced by a qualified technician.	x	x		
Overhaul or replace PAH pump *(every 8000 hr.)				*
Nozzle Unit				
Check mounting of base frame for proper fastening. Tighten loose screws as required.		x		
Check nozzles for proper fastening. Moderately tighten (torque: approx. 1.5 ft.lb. (2.1 Nm)).		x		
Check hoses, tubing, and connections for possible leaks. Tighten connections or replace defective components as required.		x		
In humidification mode, set the nominal humidity value to 100% and check spraying angle of the nozzles (spraying cone: optimum 70°, 50° acceptable). If the spray angle is acceptable, set the nominal humidity back to the correct value. Clean/Replace nozzles with unacceptable spray patterns.				x
Check nozzles for scaling. Remove spray nozzles (see pg. 66) and clean them in an ultrasonic bath as required. Replace defective nozzles.				x
Clean nozzle unit (base frame, nozzle pipes, hoses, etc.) with a combined cleaning and disinfectant agent. Then rinse all components with water from the system and then dry components.			x	

Mist Eliminator

Check mist eliminator (Condair and third-party products) for possible damage. Repair or replace defective components.		x		
Clean Condair mist eliminator. Un-mount the boxes and clean all components including the base frame inside the duct with a combined cleaning and disinfecting agent. Then rinse all components with water from the system and then dry components.			X**	
Maintain mist eliminator (third-party product)	According to manufacturer			

Wet Section / Drain Pan

Check drains.			x	
Check drain pan (behind mist eliminator) for deposits or accumulation of water. If inspection reveals a considerable amount of accumulated water, check water drain and mist eliminators. Note: Water drops and a small accumulation of water in the pan behind the droplet separators are inherent to the system.			x	
Clean the drain pan and the entire wet section (including behind the mist eliminator) with a combined cleaning and disinfecting agent. Then rinse all components with water from the system and then dry all components.			x	

* Maintenance interval for PAH pump: Every 8000 hr.

** Maintenance indication: Droplets appear downstream from the mist eliminator (when system active)

After completing the maintenance work, fill in the maintenance checklist and sign it. Reset possible maintenance indications. The appropriate personnel is fully liable for any maintenance work not carried out.

Preventative Replacement Parts

Table 6: Replacements

Description	Part Number	HP 100	HP 300	HP 500	HP 800	Technical Life Time	Service B Every (1/2) Year	Service C Every (1st) Year	Service D Every (2nd) Year	Service E Every (4th) Year
Water Filter										
Filter 1 micron 20"				1bcde	1bcde	6 months	Change	Change	Change	Change
Filter 1 micron 9 7/8"		1bcde	1bcde			6 months	Change	Change	Change	Change
O-ring for water filter		1de	1de	1de	1de	24 months	Check	Check	Change	Change
Air filter										
Sterile breather filter 0.2µ		1cde	1cde	1cde	1cde	12 months	Check	Change	Change	Change
Carbon Filter (if installed)										
Filter, 20" activated carbon						3 months	Change	Change	Change	Change
Filter, activated carbon, 50L						6 months	Change	Change	Change	Change
Water Softener (if installed)										
AQA Total Refill 1500-4500 E/XP (Change by 400m3)						400m3 / 12 months	Check	Change	Change	Change
AQA Total Refill 5600 E/XP (Change by 600m3)						600m3 / 12 months	Check	Change	Change	Change
Service kit, Kinetico 30/2030 - 60/2060						24 months	Check	Check	Change	Change
Kinetico ion exchange substance						48 months	Check	Check	Check	Check

Hardness test kit						12 months	Check	Check	Check	Check
UV Filter (if installed)										
12W SQ-PA/2 Bulb		1cde				12 months	Check	Change	Change	Change
19W S2Q-PA/2 Bulb			1cde	1cde		12 months	Check	Change	Change	Change
26W S5Q-PA/2 Bulb					1cde	12 months	Check	Change	Change	Change
Quartz UV System (if installed)										
12W QS-212 Quartz		1e				48 months	Check	Check	Check	Change
19W QS-330 Quartz			1e	1e		48 months	Check	Check	Check	Change
26W QS-463 Quartz					1e	48 months	Check	Check	Check	Change
Bacteria/Sterile Filter (if installed)										
10" Bacterial filter						6 months	Change	Change	Change	Change
O-ring for filter housing						24 months			Change	Change
Electrical Control System										
PLC backup battery		1e	1e	1e	1e	12 months		Check	Check	Change
Relay, print frame relay		1cde	1cde	1cde	1cde	12 months		Change	Change	Change
Contactor, 230VAC 9A – S00		1e	1e	1e	1e	48 months		Check	Check	Change
Glow lamp for start/reset		1de	1de	1de	1de	24 months	Check	Check	Change	Change
PAH Pump (Max 8000 hr.)										
Service kit PAH 2		1de				8000 hr. / 24 months	Check	Check	Overhaul	Overhaul

Service kit PAH 4/6.3			1de	1de		8000 hr. / 24 months	Check	Check	Overhaul	Overhaul
Service kit PAH 10/12.5					1de	8000 hr. / 24 months	Check	Check	Overhaul	Overhaul
PAH Coupling										
Service kit coupling PAH 2/4						48 months			Check	Check
Service kit coupling PAH 6.3						48 months			Check	Check
Service kit coupling PAH 10/12.5						48 months			Check	Check
Pressure Gauge										
0-160 Bar Gauge							Check	Check	Check	Check
0-10 Bar Gauge							Check	Check	Check	Check
Section Valve										
Armature Kit, NC						48 months		Check	Check	Check
Armature Kit, NO						48 months		Check	Check	Check
Piston Kit NO/NC						48 months		Check	Check	Check
Pilot nozzle 1.0 mm						48 months		Check	Check	Check
Pilot nozzle 1.4 mm						48 months		Check	Check	Check
Valve for Co2 (if installed)										
Solenoid valve						24 months		Check	Change	Change
Humidity Sensor										
HST-010 humidity sensor						+/- 10%	Check	Check	Check	Check
Filter for Sensor						48 months	Check	Check	Check	Check
CC Converter, 4-20mA							Check	Check	Check	Check
Max Hygrostat						+/- 10%	Check	Check	Check	Check
Pressure Regulator										

Pressure regulator service kit		1cde	1cde	1cde	1cde	12 months		Overhaul	Overhaul	Overhaul
On/Off Valve										
On/off valve		1e	1e	1e	1e	48 months	Check	Check	Check	Change
Check Valve at Manifold										
Check valve 1/4"						24 months	Check	Check	Overhaul	Overhaul
Check valve 3/8"						24 months	Check	Check	Overhaul	Overhaul
Nozzles										
Nozzle ML 2.5 Stainless						5% yearly	Check	Check	Check	Check
Nozzle ML 4.5 Stainless						5% yearly	Check	Check	Check	Check
Nozzle ML 1.5 Stainless						5% yearly	Check	Check	Check	Check
Nozzle filter, 25 µ						12 months	Check	Change	Change	Change
Disinfection										
Barfry D50/500 4% 1L						Use for service	Use for service	Use for service	Use for service	Use for service
Hydrogenperoxide 3% 1L						Use for service	Use for service	Use for service	Use for service	Use for service
Water Sample										
BQ Water analysis incl. materials						Use for service	Use for service	Use for service	Use for service	Use for service

Maintenance Indications

The Condair HP RO as fixed adjusted maintenance counters. See pg. 56 for menu access.

Removal of Components

Removal/Installation of Spray Nozzles

1 Put the system out of service (see section: Shutting Down the Unit) and secure it to prevent inadvertent start-up.
2 Use the nozzle key to remove the spray nozzle.
3 Check the O-ring for damage. Replace if necessary.
4 Screw in the new or cleaned spray nozzle and tighten (torque: 1.5 ft.lb. (2.1 Nm)) using the nozzle key.

Figure 40: Removal/Installation of Spray Nozzle

Disassembling and Assembling Mist Eliminator Boxes for Cleaning

1 Put the system out of service (see section: Shutting Down the Unit) and secure it to prevent inadvertent start-up.
2 Undo retaining clips, then remove upper and lateral rubber seals.
3 Remove the connection plates on the lower or upper side of the mist eliminator boxes, then unhinge the boxes.
4 Undo the screws of the box frame and remove the separator profiles
5 The assembly of the mist eliminator boxes follows the reverse sequence. When assembling the mist eliminator profiles and the profile retainers, ensure that the profile retainers point to the bottom when the box is installed and the separator profiles are correctly mounted (see fig. 38).

Troubleshooting

Important Notes on Troubleshooting

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

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

Safety – When eliminating faults, the Condair HP must be taken out of operation (see section: Shutting Down the Unit) and prevented from inadvertent operation.

Make sure the power supply to the pump station and slave control units is cut off (test with voltage tester) and that the manual shutoff valve in the water supply line is closed.

Error Indication

Malfunctions during operation are indicated by a corresponding warning message on the display of the pump station or Slave control unit (if available). See pg. 80 for detailed error information.

Resetting the Error Indication

To reset the error indication, press the reset button underneath the touch screen.

Note: if the fault has not been eliminated, the error indication will reappear after a short while.

Safety Equipment

Pressure Switch - The control unit is equipped with a blocking function from the pressure switch, which is located on the inlet side of the RO pump, and ensures that the pump stops if the water pressure disappears. If the water pressure drops to below the pressure switch's shift pressure, the screen will display an alarm text. Restart by pressing 'Alarm reset'.

Humidity High Limit (Max. Hygrostat) - It is possible to connect a humidity high limit to the control cabinet. If humidity levels rise to a value that exceeds the value set on the high limit, the system will stop and the alarm lamp will light up. The system will not restart until the alarm is acknowledged by pressing 'Alarm reset'. If this function is not required, the input will short-circuit on the terminal block.

High Pressure Measuring – In order to ensure that the system runs with the correct high pressure, all pumps with a VFD controller are equipped with a Pressure Guard. If the pressure is too low or too high, the system will trigger an alarm.

High Pressure Measuring – 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.

1. If the temperature exceeds 30°C (86°F), the control unit will initially attempt cooling by starting the water treatment system and filling up the tank with cold water. If this makes the temperature drop to below 30°C (86°F), this function will reset and everything will continue unchanged. While the tank is being filled, the high-pressure pump will continue to operate and will not be affected.

2 If instead the temperature continues to rise to above 40°C (104°F), the pump will stop and start emptying the tank of overheated water and produce new water in the tank. During this process, the pump will remain idle with the alarm text displayed (until the start level has been reached). The pump will start automatically once the start level has been reached.

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

Table 7: Troubleshooting

Problem	Cause / Solution	Recommendations
Water droplets in the duct section downstream from mist eliminator	Mist eliminator defective.	Check/Replace mist eliminator.
	Excess air velocity (>787 fpm) in the duct	Reduce air velocity in the duct (<787 fpm).
	Fault location of spray nozzles or spraying circuits not conned to appropriate nozzles.	Check location of nozzles and piping of spraying circuits according to the supplied nozzle diagram. Relocate nozzles and/or connecting hoses as required.
Condair HP runs continuously	Nominal humidity value to high	Reduce set-point 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	Wrong system design (capacity too low)	Contact your Condair supplier.
	Step Valve(s) REG1, REG2, REG3 defective	Check the function of the step valve by increasing the set-point humidity value. Remember to reset the set-point humidity value to the correct value after checking.
	Spray nozzles clogged.	Remove and replace nozzles.
	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 on the control unit does not show anything	Service switch on the main power supply line is off	Set service switch on the main power supply to the On position.
	Fuses of the main power supply line blown	Have an electrician replace fuses on the main power supply line.
	Fuse of the control unit blown	Have an electrician replace fuse on the control unit.
	Display or control board defective	Have a Condair service technician replace the display or control board.
Excessive fluctuations in humidity control	Faulty electrical connections of the spray valves Y3,Y4, and Y5 or spraying circuits not connected to appropriate nozzles.	Have an electrician connect spray valves REG1, REG2, REG3 correctly (see wiring diagram). Check piping of spraying circuits and correct if required.

Danger of electrical shock: When replacing the fuse on the control unit, ensure that the switch on the pump station/slave unit is off and disconnected from the main power supply

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 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.

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 steam distribution systems.

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

U.S.A.
2700 90th St.
Sturtevant, WI 53177

835 Commerce Park Dr.
Ogdensburg, NY 13669-2209

CANADA
2740 Fenton Road
Ottawa, Ontario K1T 3T7

TEL: 1.866.NORTEC1
EMAIL: na.info@condair.com
WEBSITE: www.condair.com

condair