

**ML
Humidification
System**

**Installation, Operating and
Maintenance Manual**

for

**Letterhead Press Inc.
16800 Ryerson Road
New Berlin, WI 53151**

**MLPRO 500 PLC Pump Station
(100) Flex Nozzles**

Project #: 2060220

September 2014

Supplied by:

**Nortec Systems, 1860 Renaissance Blvd., Sturtevant, WI 53177
Phone: 262-884-4669 Fax: 262-884-4670**

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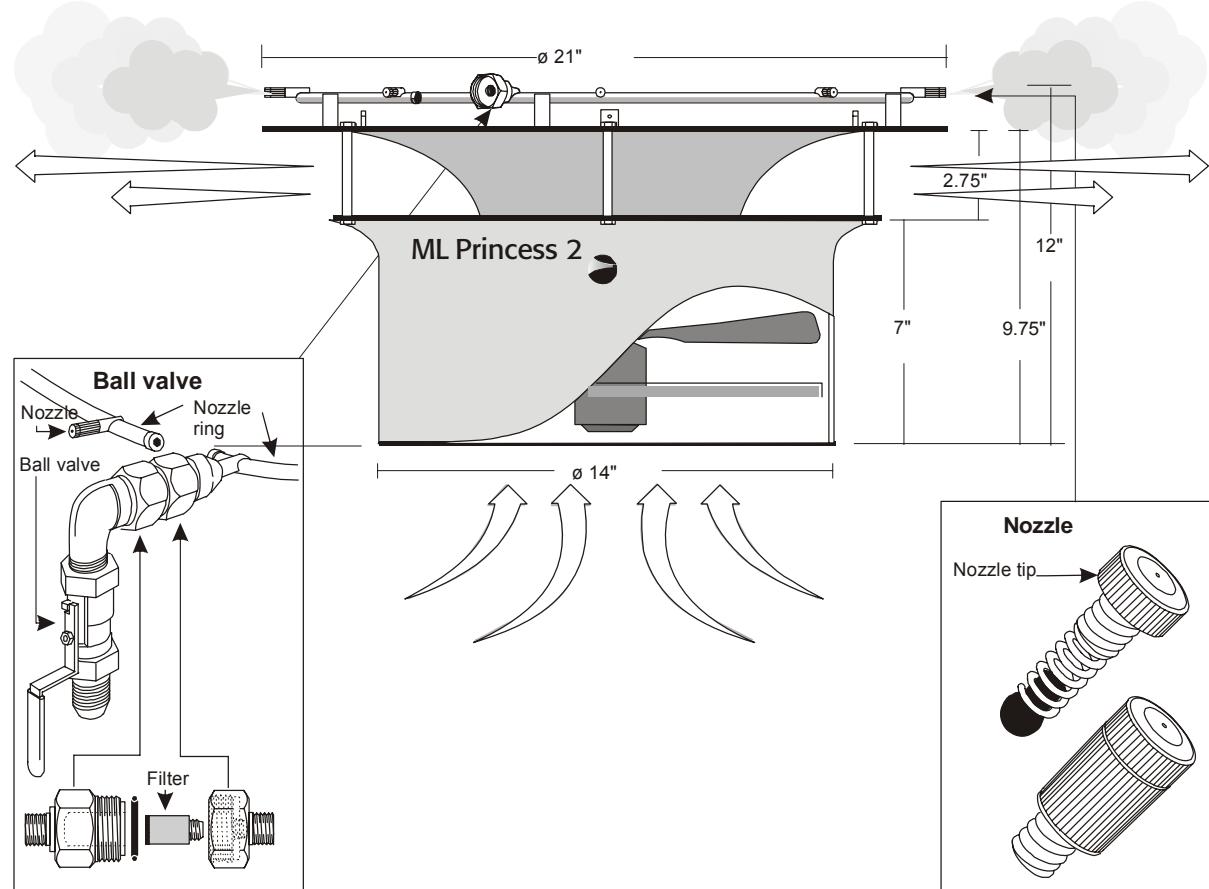
Technical

ML Princess 2

TECHNICAL DATA

TD064GB-02 | 15-05-08 | LR/KK

ML Princess 2 is part of a complete high pressure humidification system with one or more humidification units. Every unit consists of a nozzle ring with 8 nozzles and a built-in fan. Humidity is produced as water under high pressure is atomized into micro-sized particles. The fan distributes the fog particles, thus securing a uniform humidity throughout the entire room.



Technical data for ML Princess 2

Weight	13 lbs
Height	12"
Diameter	14"/21"
Material	Powder painted steel 37
Motor	75 W, 900 RPM 120 VAC, 50/60 Hz, IP44
Wire guard	Epoxy treated
Noise level	55 dBA
Capacity	990 CFM
Color	Aluminium

Technical data for nozzles

Capacity	61-88 lbs/hr
Capacity/nozzle	7.7-11 lbs/hr
Working pressure	525-1070 PSI
Material	316 stainless steel
Antidrip valve	Standard

Technical data for nozzle ring

Material	316 stainless steel
Prefilter	20 micron

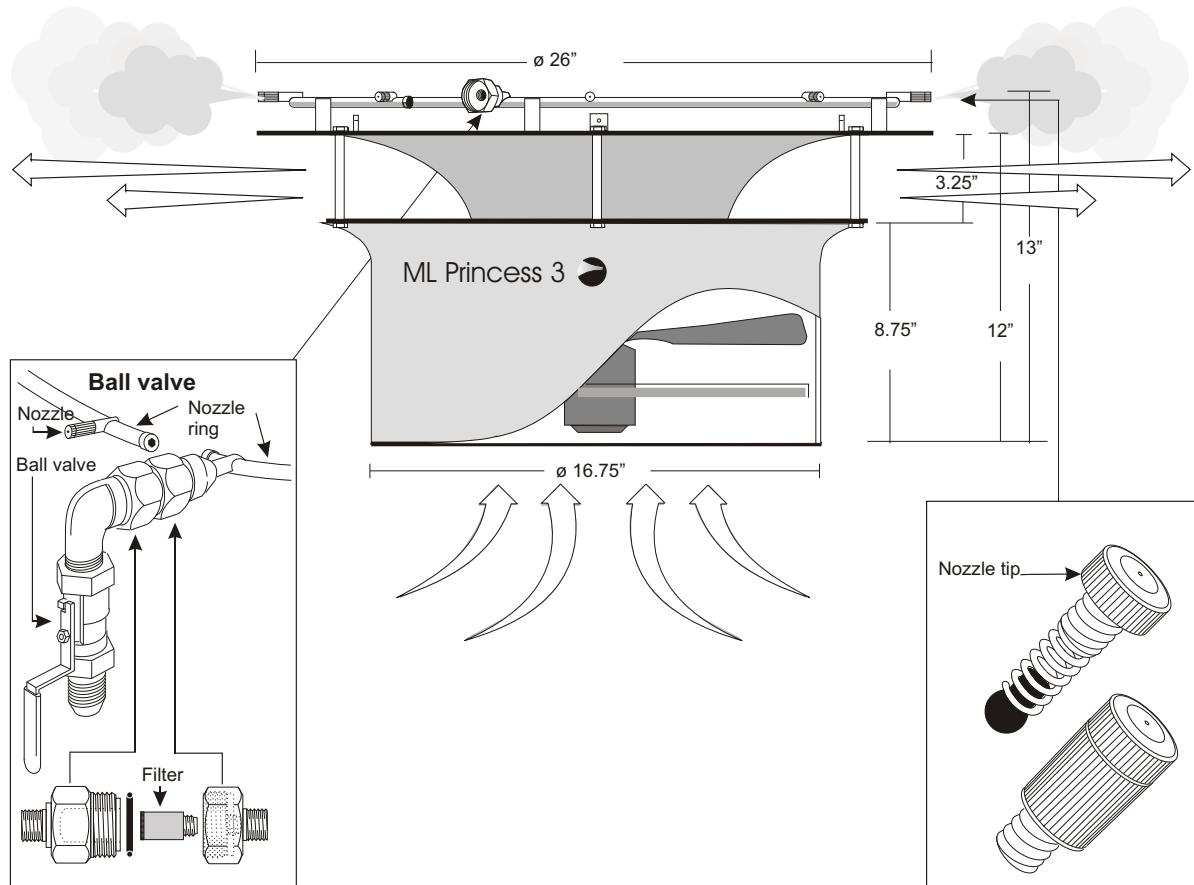


ML Princess 3

TECHNICAL DATA

TD065US-02 | 14.12.05 | MLK/VM

The ML Princess 3 is part of a complete high pressure humidification system with one or more humidification units. Every unit consists of a nozzle ring with 12 nozzles and a built-in fan. Humidity is produced as water under high pressure is atomized into micro-sized particles. The fan distributes the droplets, thus insuring a uniform humidity throughout the entire room.



Technical data for ML Princess 3:

Weight:	20 lbs
Height:	12"
Diameter:	16.75"/26"
Material:	2 mm anodized aluminium
Motor:	120 W, 900 RPM 120 VAC, 60 Hz, IP 44
Wire guard:	Epoxy treated
Noise level:	59 dBA
Capacity:	1980 CFM
Colour:	Aluminium

Technical data for nozzles

Capacity:	61-120 lbs/hr
Capacity per nozzle:	7.7-11 lbs/hr
Working pressure:	525-1070 PSI
Material:	316 stainless steel
Check valve:	Standard

Technical data for nozzle ring

Material:	316 stainless steel
Pre-filter:	20 micron

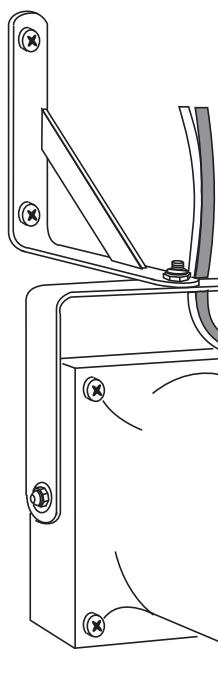


ML Solo 1

Technical information

TD030US 17.06.04

Humidification unit for small spaces and low ceiling heights. Ideal for 'quiet' areas. Offers a low noise level and the same capacity as traditional compressed-air nozzles.



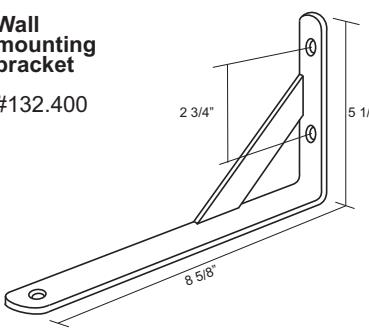
Humidification principle: The humidity is produced when water under high pressure (750-1050 PSI) is atomized into micron-sized particles that immediately evaporate.

Application: For direct humidification and rooms with little demand.

Recommended ceiling height 8'.

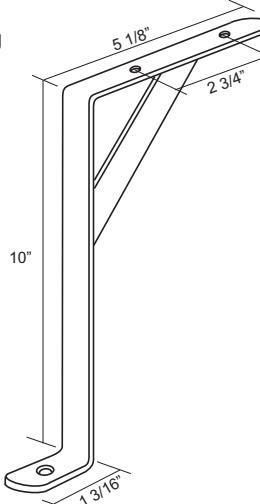
Wall mounting bracket

#132.400



Ceiling mounting bracket

132.401



Technical Data

Weight:

Approx. 2.2 lbs.

Size (L x W x H):

6 5/16" x 4 3/4" x 4 3/4" (4 1/4")

Installation:

Ceiling or wall mount

Material:

Powder finished steel

Water connection:

1/8" ML hydraulic hose

Electrical connection:

Must be connected to approved switch .

The unit is delivered with 6.5' wire 3 x 18 gauge

Fan:

Fantec type A12 B05 HTB RFO, 24 VAC, 50/60Hz, 20W

Air capacity:

75 CFM

Humidity capacity:

5.5 - 10 lbs/hr

Noise level:

34/37 dB (A)

MTBF:

50,000 hours

Approval (fan)

UL, CSA, CE, VDE

Min. Distance from nozzle:

10'

Accessories:

Wall bracket #132.400 or ceiling bracket #132.400



ML System
humidification world-wide

ML Solo 2

TECHNICAL DATA

TD092GB-01 | 08.05.08 | LR/KK



ML Solo 2 is a humidification unit with a very low noise level and the same capacity as traditional compressed air nozzles.

ML Solo 2 replaces compressed air nozzles in most places.

Humidification principle:

The humidity is produced when water under high pressure (700-1050 psi) is atomized into micron-sized particles that are immediately absorbed in the air.

Application:

For direct humidification, and rooms that need a low humidity level.

Recommended floor to ceiling height in rooms is a minimum of 8'.

Weight	2.5 pounds	
Size (H x W x D)	6.3 x 5.9 x 6.6 inches	
Material	Painted steel	
Noise level	40/43 dB (A)	
Humidity capacity	Max. 20 pounds per hour	
Operating pressure	700 – 1050 psi	
Voltage	24 VAC 50/60 Hz – 15/16 W	
Installation height	Min. 8'	
Min. distance to ceiling	8'	
Min. distance from nozzle	10'	
Nozzle type	2 pc. part no. 103.150.000 at 10 pounds per hour, 2 pc. part no. 103.160 at 5 pounds per hour	
Suspension	Wall, part no. WHITE: 132.400.001	Ceiling, part no. WHITE: 132.401.001
Water connection	2 pcs. 1/8 " ML high pressure hydraulic hose	

	Description
132.220.000	ML Solo 2, 2 x 5 pounds per hour, 24 VAC 50/60 Hz



Complete Nozzles

Stainless Steel, SS-MTP1812

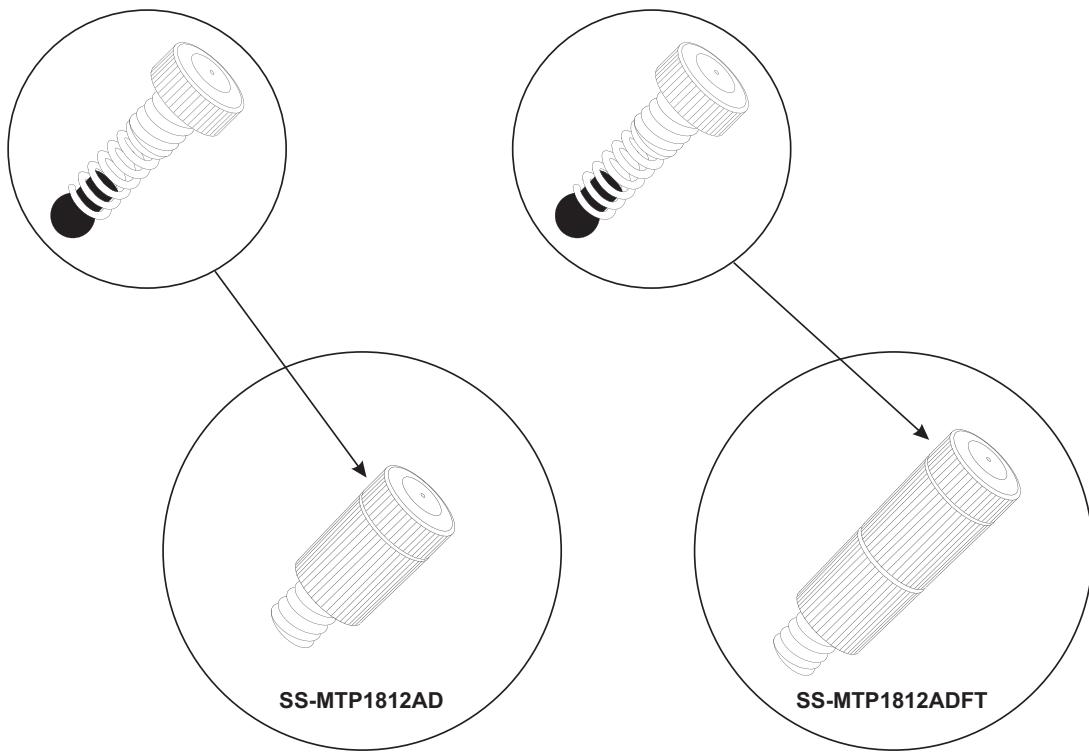
TECHNICAL INFORMATION

103.130 | 30.06.99 | 29230699

Description:

High-pressure nozzles for humidification and fog cooling.

The nozzles atomize water under high pressure into millions of micron-sized water particles which immediately evaporate generating the desired effect of humidifying the surrounding air.



Specifications:

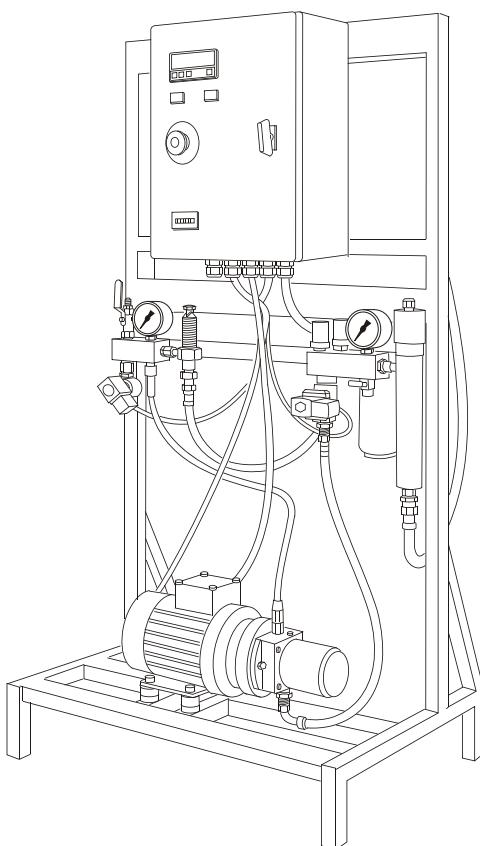
Capacity:	7.7 - 11.0 lbs/h (3.5 - 5.0 l/h)
Working pressure:	525 - 1050 PSI (35 - 70 bar)
Material:	Stainless steel
Anti-drip check valve:	Standard
Thread:	12/24 UNC/2A



MLP High Pressure Pump

TECHNICAL DATA

TD035US-03 | 29.11.05 | VM/MLK



Description

High-pressure pump station specially developed by ML System. The pump station is mounted on a surface coated steel frame and all components assembled and tested in our factory.

All pump types are equipped with the following components:

- Type approved water meter
- 1µ filtration with pressure gauges for reading drop
- UV light for sterile water
- Thermostat and pressure switch for protection of pump
- Test water spigot
- Pressure controller set to 1075 PSI at 0 lbs/hr
- Operational hour meter
- Phase loss relay

All components exposed to water are made of corrosion-resistant materials.

High-pressure pump

The oil-free piston pump with 5 pistons provides smooth and vibration free operation. The pump is made of stainless steel; all other parts are made of corrosion-resistant material.

Maintenance/Service

The service life of the pump is approximately 8000 operating hours. It is possible to order a new pump for immediate replacement. The pump is designed in such a way that leakage is not possible. Pump replacement can be executed with minimum downtime.

Warranty

The PAH pump carries a warranty of 21 months or 8000 hours, whichever comes first.

The pump unit is delivered with a starter for one or more sections. All connections to the thermostat, pressure switch, valves and motor are completed at the factory. Power supply must be connected according to local regulations.

The only external sensors are a humidity sensor and max humidistat.



MLP High Pressure Pump

TECHNICAL DATA

TD035US-03 | 29.11.05 | VM/MLK

Mechanical specifications:

Item No.		Description	Pump type PAH	Min. flow lbs/hr	Max flow lbs/hr	Inlet fitting	Outlet fitting	Filtration
One section	Several sections							
104.700	104.701	MLP100	2	26	264	3/4"	1/4"	1µ 10"
104.705	104.706	MLP300	4	52	700	3/4"	1/4"	1µ 10"
104.710	104.711	MLP500	6,3	92	1161	3/4"	3/8"	1µ 20"
104.715	104.716	MLP800	10	158	2085	3/4"	3/8"	1µ 20"
104.720	104.721	MLP1000	12,5	242	2772	3/4"	3/8"	1µ 20"
104.750	104.751	MLP 2x800	2 x 10	388	4435	3/4"	3/8"	1µ 20"
104.740	104.741	MLP 2x1000	2 x 12,5	484	5280	3/4"	3/8"	1µ 20"

Electrical specifications:

Dimensions & weight:

Item No.		Description	Motor type	Voltage 3-phase	Power kW	Current A	Dimensions w x d x h			Weight lbs
One section	Several sections									
104.700	104.701	MLP100	MG 80 A4	208 / 480	0,5	2,6/1,5	26"	20"	51"	110
104.705	104.706	MLP300	MG 90 SA4	208 / 480	1,1	3,85/2,22	26"	20"	51"	121
104.710	104.711	MLP500	MG 90 LA4	208 / 480	1,5	4,75/2,75	26"	20"	51"	143
104.715	104.716	MLP800	MG 100 LB4	208 / 480	2,2	9,00/5,20	26"	20"	51"	160
104.720	104.721	MLP1000	MG112 MA4	208 / 480	3	11,4/6,60	26"	20"	51"	165
104.750	104.751	MLP 2x800	2xMG100LB4	208 / 480	2x2,2	2x9,00/5,20	32"	24"	51"	340
104.740	104.741	MLP 2x1000	2xMG112MA4	208 / 480	2x3	2x11,4/6,60	32"	24"	51"	350

MLP RO 100

TECHNICAL DATA

TD075GB-03	08-07-09	LR/LJA
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Combined high-pressure pump station and reverse osmosis system with a capacity of 100 l/h.

The combined system is developed by ML System with focus on reliable and hygienically corrects humidification solutions.

The system is fitted on a frame and all components are assembled, tested, and ready to use.

MLP RO 100 is equipped with the following components:



Standard:

- PLC control for up to 4 departments with integrated start-up automatics
- Reservoir tank closed with 0.2 µm breathing filter
- Overflow protection
- Stainless high-pressure pump
- High-pressure gauge
- Type approved water meter for produced permeate
- 5 µm filtration
- UV system for sterilization of water
- Thermostat and pressure switch for protection of pump
- Operational hour meter
- Safety circuit for max hygrostat

Options:

- Active carbon filter
- Supply to moistening water mixer
- Conductivity meter/alarm.

Benefits:

- Compact unit
Based on water hydraulics i.e. stainless and oil free - no oil change.
- Delivered on frame easy to place.
- Fully assembled and tested.
- All components exposed to water are made of corrosion resistant material.
- The hoses are stainless steel braided or high-pressure hoses.

Technical specifications on page 2

MLP RO 100

TECHNICAL DATA

TD075GB-03 | 08-07-09 | LR/LJA

Specifications:

High-pressure pump:	Piston pump PAH 2 with 5 pistons
Working pressure:	30-70 bar (435-1015 PSI)
Capacity:	10-100 l/h at 50Hz + 20 % at 60Hz
Capacity, RO water*:	100 l/h at 15°C, TDS<625 mg/l
Permeate quality:	5 < EC < 30 µS/cm.
Permeate/Concentrate ratio:	approx. 50 / 50 %
Reservoir tank:	50 l
Size (LxWxH):	860 x 700 x 1600 mm
Weight:	125 kg
Sound pressure level:	< 75 dB
Power supply:	3 x 400 VAC+GND+N, 50Hz, 1,8KW, 16A or 3 x 230 VAC+GND+N, 50Hz, 1,8KW, 16A or 3 x 208 VAC+GND+N, 60Hz, 1,6KW, 16A
Dissolved salt removal:	> 95 %
Water connection, tap water:	3/4" RG
Water connection, RO-water:	3/4" RG

* Capacity may vary depending on the quality of the tap water and decreases by approx. 3 % per decrease in °C of the temperature of the water.

Preconditions:

Water supply:	Drinking Water Quality, 2.5-7 bar @200 l/t
Hardness:	max. 20 °dH
Conductivity:	250-1000 µS/cm
Free chlorine:	max. 0.1 mg/l
TDS:	max. 625 mg/l
Silt index:	max. 3.0
KMnO ₄ :	max. 10 mg/l
Fe:	max. 0.2 mg/l
Mn:	max. 0.05 mg/l
NTU:	max. 1.0
Temperature:	max. 15 °C

MLP RO 300

TECHNICAL DATA

TD083GB-02	08-07-09	LR/LJA
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Combined high-pressure pump station and reverse osmosis system with a capacity of 265 l/h.

The combined system is developed by ML System with focus on reliable and hygienically corrects humidification solutions.

The system is fitted on a frame and all components are assembled, tested, and ready to use.

MLP RO 300 is equipped with the following components:



Standard:

- PLC control for up to 4 departments with Integrated start-up automatics
- Reservoir tank closed with 0.2 µm breathing filter
- Overflow protection
- Stainless high-pressure pump
- High-pressure gauge
- Type approved water meter for produced permeate
- 5 µm filtration
- UV system for sterilization of water
- Thermostat and pressure switch for protection of pump
- Operational hour meter
- Safety circuit for max hygrostat

Options:

- Active carbon filter
- Supply to moistening water mixer
- Conductivity meter/alarm.

Benefits:

- Compact unit
Based on water hydraulics i.e. stainless and oil free
- no oil change.
- Delivered on frame easy to place.
- Fully assembled and tested.
- All components exposed to water are made of corrosion resistant material.
- The hoses are stainless steel braided or high-pressure hoses.

Technical specifications on page 2

MLP RO 300

TECHNICAL DATA

TD083GB-02	08-07-09	LR/LJA
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Specifications:

High-pressure pump:	Piston pump PAH 2 with 5 pistons
Working pressure:	30-70 bar (435-1015 PSI)
Capacity:	30-265 l/h at 50Hz + 20 % at 60Hz
Capacity, RO water*:	275 l/h at 15°C, TDS<625 mg/l
Permeate quality:	5 < EC < 30 µS/cm.
Permeate/Concentrate ratio:	approx. 50 / 50 %
Reservoir tank:	50 l
Size (LxWxH):	860 x 700 x 1600 mm
Weight:	130 kg
Sound pressure level:	< 75 dB
Power supply:	3 x 400 VAC+GND+N, 50Hz, 2,5KW, 16A or 3 x 230 VAC+GND+N, 50Hz, 2,6KW, 16A or 3 x 208 VAC+GND+N, 60Hz, 2,7KW, 16A
Dissolved salt removal:	> 95 %
Water connection, tap water:	3/4" RG
Water connection, RO-water:	3/4" RG

* Capacity may vary depending on the quality of the tap water and decreases by approx. 3 % per decrease in °C of the temperature of the water.

Preconditions:

Water supply:	Drinking Water Quality, 2.5-7 bar @550 l/h
Hardness:	max. 20 °dH
Conductivity:	250-1000 µS/cm
Free chlorine:	max. 0.1 mg/l
TDS:	max. 625 mg/l
Silt index:	max. 3.0
KMnO ₄ :	max. 10 mg/l
Fe:	max. 0.2 mg/l
Mn:	max. 0.05 mg/l
NTU:	max. 1.0
Temperature:	max. 15 °C

MLP RO 500, MLP RO 800

TECHNICAL DATA

TD102GB-02	05-11-09	LR
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Combined high-pressure pump station and reverse osmosis system with a capacity of 440 l/h and 790 l/h respectively.

The combined systems are developed by ML System with focus on reliable and hygienically correct humidification solutions. The built-in reverse osmosis system eliminates (> 95 %) salts and minerals from main water with a capacity of 500 l/h and 750 l/h respectively. The system applies a membrane separation process whereby water molecules may pass through the membrane, while the majority of salts and minerals are retained.

The systems are fitted on frames with a separate reservoir tank and all components are assembled, tested, and ready to use.



MLP RO 800 front view

MLP RO 500 and MLP RO 800 are equipped with the following components:

Standard:

- PLC control for 4 or 8 sections
- Separate reservoir tank closed with 0.2 µm breathing filter
- Overflow protection
- High pressure manometer
- Type approved water meter for produced permeate
- 5 µm filtration of the tap water
- UV system for disinfection of water
- Thermostat and pressostate for protection of pump
- Operational hour meter
- Safety circuit for max. hygrostate

Options:

- Water softener
- Active carbon filter
- UV system for sterilization of water
- Conductivity meter/alarm
- Dosage unit for regulation hardness

Benefits:

- Compact unit. The high pressure part is based on water hydraulic, that means stainless and oil free - no oil changing
- Delivered on stainless steel frame and with separate reservoir tank
- Fully assembled and tested
- All components exposed to water are made of corrosion resistant material
- The hoses are stainless steel braided or high-pressure hoses

Technical specification on page 2

MLP RO 500, MLP RO 800

TECHNICAL DATA

TD102GB-02	05-11-09	LR
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Specifications:	MLP RO 500:	MLP RO 800:
High-pressure pump:	Piston pump, PAH 6.3 with 5 pistons	Piston pump, PAH 10 with 5 pistons
Operating pressure:	30-70 bar	30-70 bar
Capacity:	35-440 l/h at 50Hz + 20 % at 60Hz	60-790 l/h at 50Hz + 20 % at 60Hz
Capacity, RO water*:	500 l/h at 15 °C, TDS < 625 mg/l	750 l/h at 15 °C, TDS < 625 mg/l
Permeate quality:	5 < EC < 30 µS/cm	5 < EC < 30 µS/cm
Permeate/Concentrate ratio:	approx. 75 / 25 %	approx. 75 / 25 %
Reservoir tank:	200 l	500 l
Size, frame (LxWxH):	860 x 700 x 1600 mm	1400 x 700 x 1600 mm
Size, reservoir tank (LxWxH):	600 x 600 x 995 mm	790 x 790 x 995 mm
Weight:	240 kg	270 kg
Sound pressure level:	< 80 dB	< 80 dB
Supply voltage:	3x400 VAC+GND+N, 50Hz, 3,5KW, 16A or 3x230 VAC+GND+N, 50Hz, 3,5KW, 20A or 3x208 VAC+GND+N, 60Hz, 3,1KW, 16A	3x400 VAC+GND+N, 50Hz, 5,2KW, 16A or 3x230 VAC+GND+N, 50Hz, 5,2KW, 20A or 3x208 VAC+GND+N, 60Hz, 4,7KW, 16A
Dissolved salt removal:	> 95 %	> 95 %
Water connection, tap water:	3/4" RG	3/4" RG
Water connection, RO-water:	3/4" RG	3/4" RG

* Capacity may vary depending on the quality of the tap water and decreases by approx. 3 % per decrease in °C of the temperature of the water.

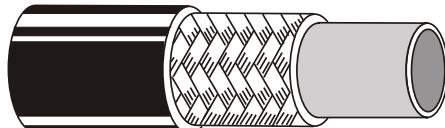
Preconditions:	MLP RO 500	MLP RO 800
Water supply:	Drinking Water Quality, 2.5-7 bar @700 l/h	Drinking Water Quality, 2.5-7 bar @1100 l/h
Hardness:	max. 1 °dH	max. 1 °dH
Conductivity:	250-1000 µS/cm	250-1000 µS/cm
Free chlorine:	max. 0.05 mg/l	max. 0.05 mg/l
TDS:	max. 625 mg/l	max. 625 mg/l
Silt index:	max. 3	max. 3
KMnO ₄ :	max. 10 mg/l	max. 10 mg/l
Fe:	max. 0.2 mg/l	max. 0.2 mg/l
Mn:	max. 0.05 mg/l	max. 0.05 mg/l
NTU:	max. 1.0	max. 1.0
Temperature:	max. 15 °C	max. 15 °C

Hydraulic Hose

TECHNICAL DATA

TD026US-01 | 17.02.04 | LR / VM

Technical specification for Hydraulic Hose type EX1



Construction

Inner tube: Polyester elastomer
 Reinforcement: High tensile carbon steel wire brass plated
 Cover: Polyurethane

Temperature range

- 40°F to 208°F

	EX 1.1	EX 1.2	EX 1.4	EX 1.6
Item No.	107.100	107.101	107.104	107.105
Hose I.D. inch	1/16"	1/8"	1/4"	3/8"
Hose I.D. mm	1.6	3.4	6.6	9.8
Hose O.D. inch	3/16"	5/16"	7/16"	5/8"
Maximum Operating pressure Bar	100	350	325	250
	1,440	5,100	4,700	3,600
Minimum Burst Pressure @70°F Bar	1.600	1.400	1.300	1.000
	23,200	20,400	18,000	14,400
Minimum Bend Radius inch	1-1/8"	1-3/8"	2-1/4"	2-3/4"
Nominal Weight oz/ft	.45	.65	1.77	2.47

Use only stainless steel hose couplings supplied by **ML System a/s**

Coupling Type	Item No.	108.100	108.101	108.102	108.103
Tool	Item No.	160.000	160.001	160.005	160.006

Properties

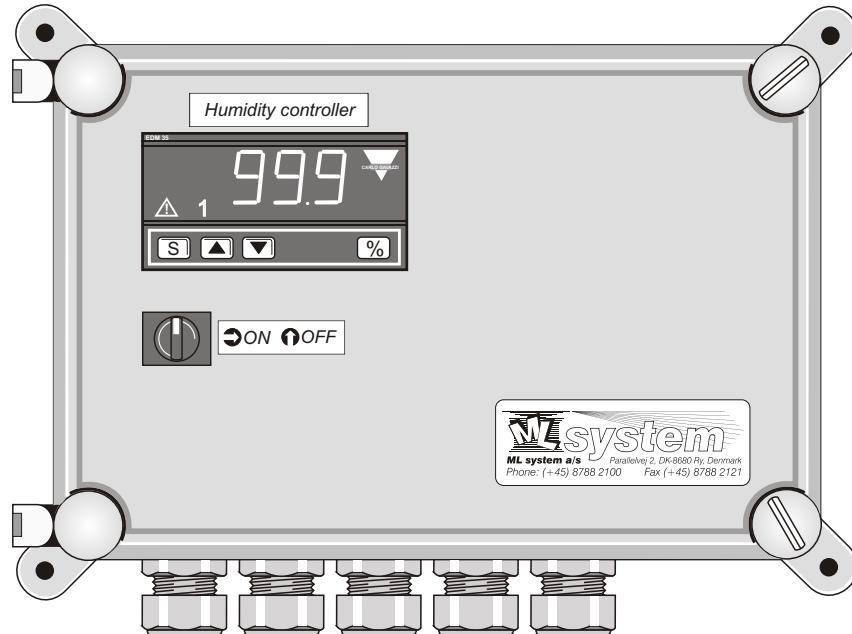
- Safety thermoplastic hose works at higher operating pressures
- Excellent flexibility and flex fatigue
- Excellent resistance to chemicals and solvents
- UV and Ozone resistant
- Suitable for water based hydraulics up to 160°F
- Excellent abrasion resistance
- Low volumetric expansion for quick hydraulic response time
- Static free - 100% electrical conductivity
- Exceeds SAE 100 R1, R2 and DIN requirements
- Minimum flow resistance



Humidity Controller type EDM35

Technical Data

TD017US | 08.03.01 | ASK



The specially developed humidity controller EDM35 is a computer operated control unit for optimum utilization and control of humidification systems with high pressure and it is especially designed for ML system®. EDM35 is normally built together with the starter and thermal motor protection of pump station.

EDM35 controls the air humidity in the range from 20-80% RH without any risk of saturation. The controller is a so-called PI-controller where set-point, cycle time and proportional band are freely programmable. The controller offers flexibility for the various types and sizes of rooms and spaces, depending on the air change, temperature, etc.

Programmable settings:

Set-point:	20 - 80% RH
Proportional band:	10 - 90%
Cycle time:	1-9.9 min. (cycle time = ON time + PAUSE time)
Flush time:	0 - 1 min.
Max. pause time:	10 - 250 min.
Minimum ON time for pump:	0.1 - 5.0 min.
Minimum PAUSE time for pump:	0.1 - 9.9 min.
Opening time for pressure release valve:	0.1 - 2 min.
Humidity sensor HST-010:	Electronic humidity sensor: 15 - 98% RH, output signal 0 - 10 V

HUMIDITY CONTROLLER type MLDM35

TECHNICAL DATA

TD101GB-01 | 25-04-07 | MLK/KK



- PI humidity controller optimized for operation of high-pressure pumps
- Easy-to-read display with background light
- Simple installation
- Alarm output
- Acoustic alarm
- Switch to enable discontinuation of humidification
- Time counter for humidification
- Relay output for fan control system (option)

The specially developed humidification controller MLDM35 is a microprocessor controlled humidification controller for optimal operation and control of high-pressure humidification systems, and has been specially designed for controlling a ML System® humidification system with several humidification zones.

MLDM35 controls humidity in an individual section in the area of 20 – 80 % RH, with no risk of condensation. The controller is a so-called PI controller, where set point, period and proportional band are individually programmable. This means that the control may be optimized for various types of buildings and sizes of rooms, depending of ventilation, temperature etc.

As an option the humidity regulator is available with a relay output for a fan control system. The relay output turns on the fan in the humidification module for 1.5 seconds before the humidification starts and turns off about 6 seconds after the humidification process has stopped.

Technical data for humidification controller for one section

Programmable settings:

Set point, proportional bands, period, rinsing time, max. pausing, min. ON-time for the pump, min. PAUSE-time for the pump, opening time for the release valve.

Supply voltage:

230 VAC ±10 % 50/60 Hz 10 VA

Inputs:

0-10 VDC analogue input for humidity sensor
Digital input (potential free switch) for discontinuation of humidification in a section,
24 VDC / 5 mA

Outputs:

Relay output for ML section solenoid valve and release valve
Relay output for alarm, potential free switch max. 230 VAC / 1 A
Relay output for fan control, potential free switch max. 230 VAC/ 2A
24 VDC ± 20 % supply for humidification controller, max. 20 mA

Accessories:

Humidity sensor HST-010, electronic humidity sensor: 0 - 100 % RH, Output signal 0 - 10 V

Product number:

Humidification controller, standard
Humidification controller, with fan control

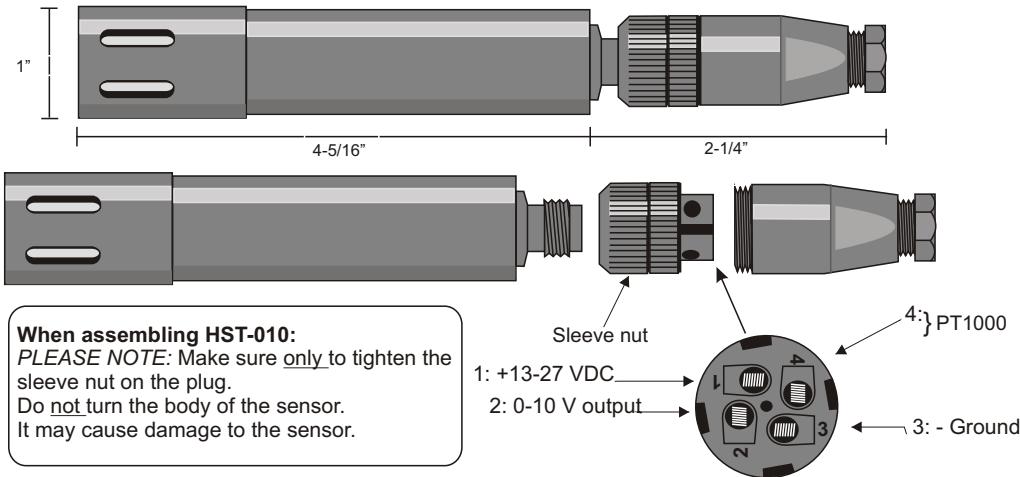
105.316.001
105.319.001



Humidity + temperature sensor HST-010

Technical Data

105.501 | 28.01.99



Specification:

Electronic sensor for measuring temperature and humidity in facility

The reading of the humidity sensor is a 0 VDC - 10 VDC signal corresponding to 0% RH - 100% RH.
 Also, the sensor has a PT1000 temperature reading.

The humidity sensor HST-010 is ideal in combination with electronic controls and for indication of the actual humidity.

Suitable in greenhouses, printing houses, textile industries, etc.

Technical data

Area of measuring	10% RH -100% RH
Tolerance:	± 5% RH up to 60% RH ± 8% RH at 90% RH
Temperature coefficient:	-0.22% RH/°C
Area of temperature:	0°C-100°C / PT1000 signal
Supply:	13 VDC-27 VDC
Power consumption:	< 10 mA at 27 VDC < 4 mA at 13 VDC

Connection:

Max. cable length: 165': 3 x 20 gauge
 Plug 1: + 13 VDC -27 VDC
 Plug 2: 0 VDC -10 VDC output
 Plug 3: Ground
 Plug 4, 5: PT1000 temperature signal

Material:

Body:	POM, black
Renewable filter:	Stainless steel
Accessories:	4-20 mA converter type CC-420 U/I no. 105.502

CC-420 U/I converter

Accessories for HST-010 Humidity sensor

TECHNICAL DATA

TD022GB | 14.03.01 | ASK

CC-420 converts the output signals from humidity sensor HST-010 into a 4-20 mA analog signal.

The CC-420 is used for long distances, or when an analog 4-20 mA signal is suitable.

Usable with HST-010:

Direct connection to HST-010 via plug.

Temperature output: plug 1: +13 VDC - 27 VDC

plug 3: 4-20 mA

(4 mA = 0°C, 20 mA = 100°C)

Humidity output:: plug 2: +13 VDC - 27 VDC

plug 4: 4-20 mA

(4 mA = 0% RH, 20 mA = 100% RH)

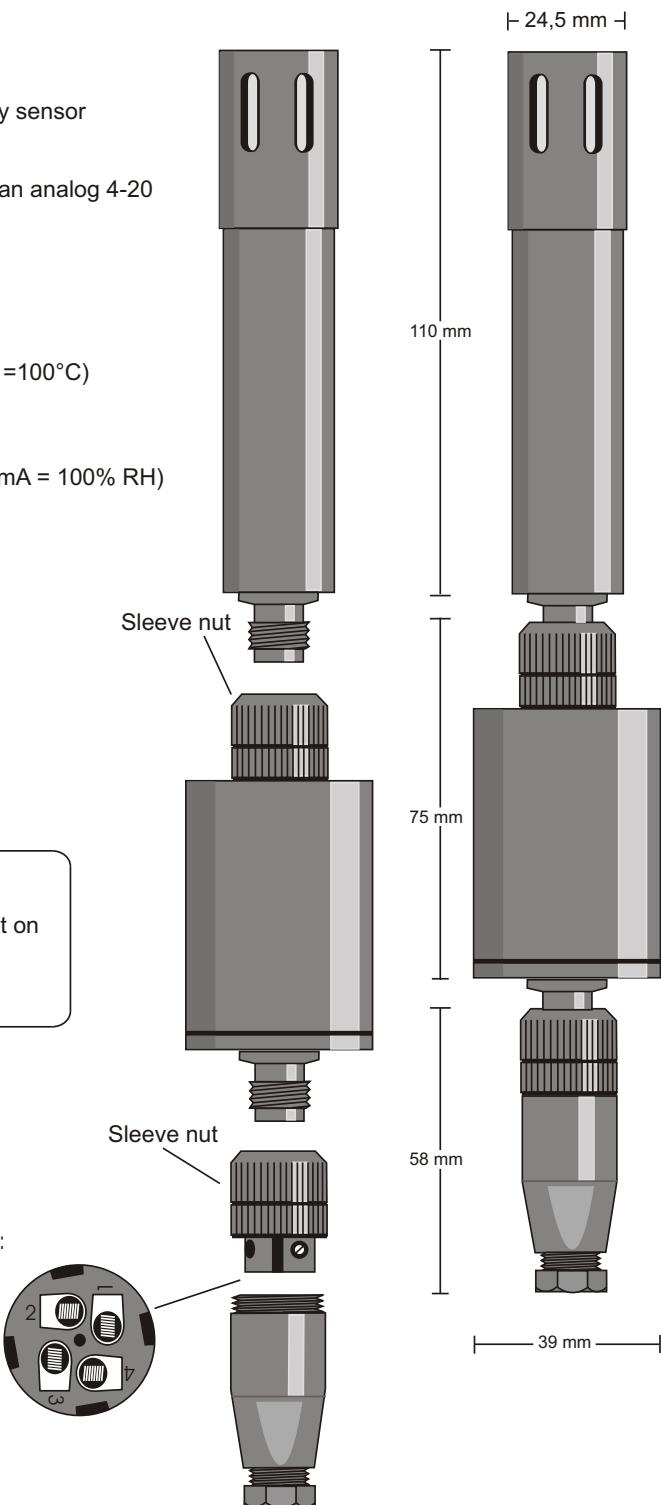
When assembling HST- 010:

PLEASE NOTE!

Make sure only to tighten the sleeve nut on the plug and on the converter.

Do not turn the body of the sensor or converter - It may cause damage.

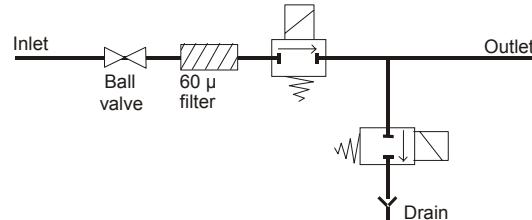
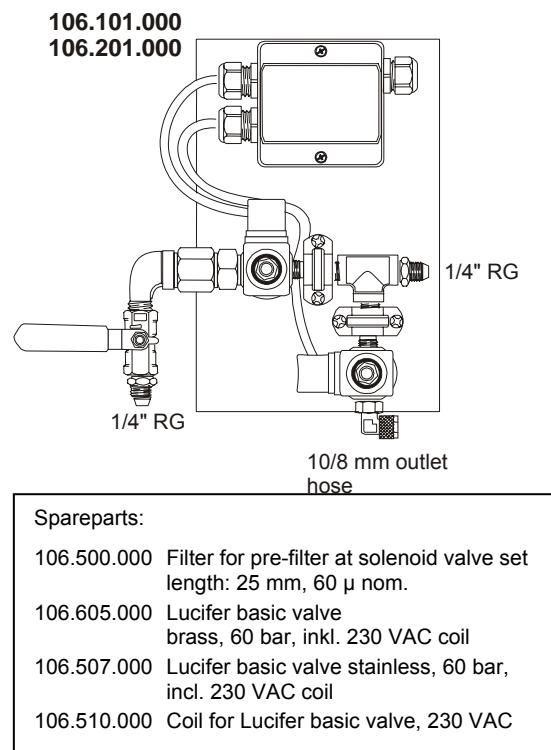
Plug connection in CC-420:
Plug 1: +13-27 VDC
Plug 2: +13-27 VDC
Plug 3: Temp: 4-20 mA
Plug 4: Humidity: 4-20 mA



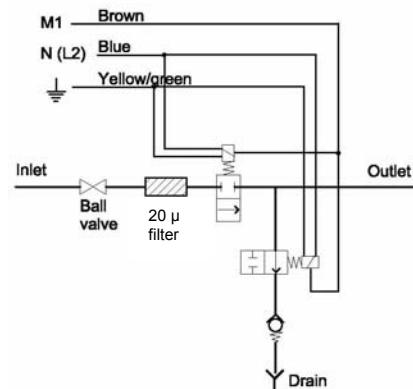
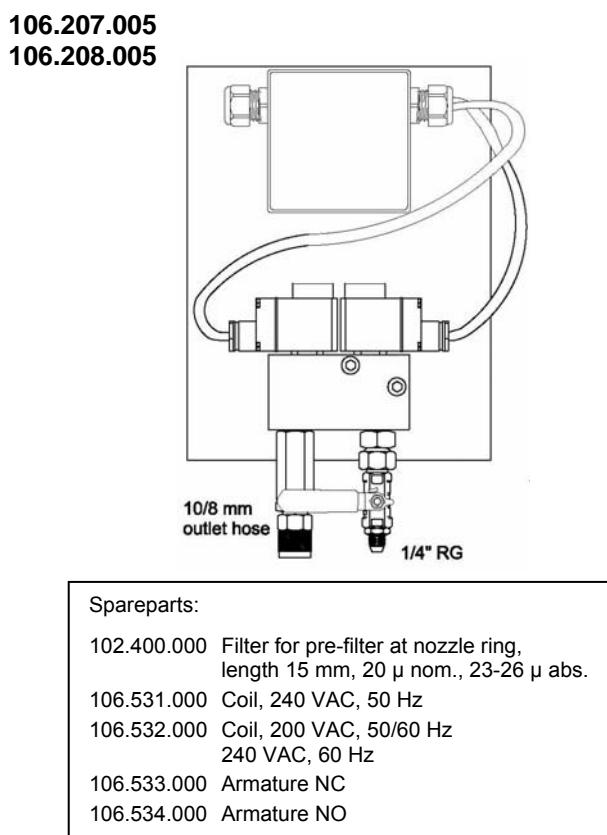
Solenoid Valve Set

TECHNICAL DATA

TD025GB-04 | 03-06-09 | MLK/KK



	106.101.000	106.201.000
Flow range	0-77 l/h	
Water type	Raw water and softened water	RO-water and water with conductivity <50 µS/cm
Inlet and outlet fittings	1/4 "	
Connection for outlet hose	10/8 mm PA hose	
Filtration	60 µ	
Valve type	Lucifer basic valve 60 bar brass	Lucifer basic valve 60 barstainlessi
Coil power	208 VAC/60 Hz or 230 VAC/50 Hz	
Power consumption	28 VA, 14 W	

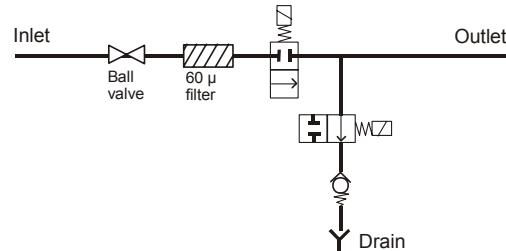
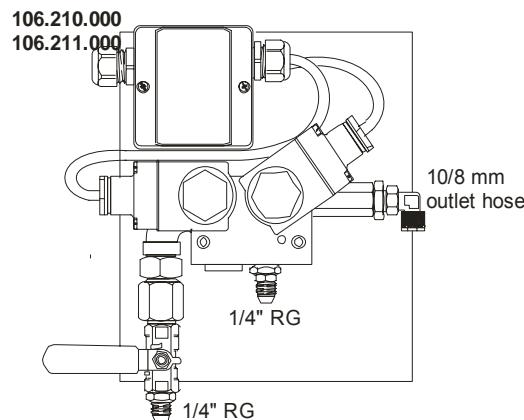


	106.207.005	106.208.005
Flow range	0-76 l/h	
Water type	All types	
Inlet and outlet fittings	1/4 "	
Connection for outlet hose	10/8 mm PA hose	
Filtration	20 µ	
Valve type	3/2-ways valve with built-in counter block, stainless steel	
Coil power	240 VAC/50 Hz	200 VAC 50/60 Hz 240 VAC/ 60 Hz
Power consumption	42 VA, 20 W	
Power consumption, cut-in	88 VA	

Solenoid Valve Set

TECHNICAL DATA

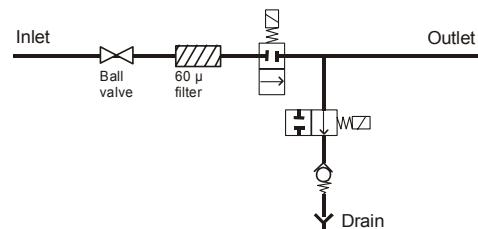
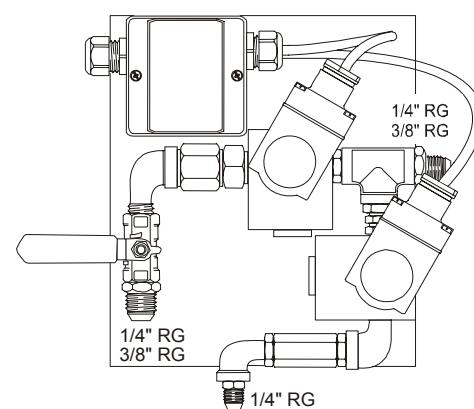
TD025GB-04 | 03-06-09 | MLK/KK



Spareparts:	106.210.000	106.211.000
106.500.000 Filter for pre-filter at solenoid valve set, length: 25 mm, 60 μ nom.		
106.531.000 Coil 240 VAC, 50 Hz		
106.532.000 Coil 200 VAC, 50/60 Hz 240 VAC, 60 Hz		
106.533.000 Armature NC		
106.534.000 Armature NO		
106.535.000 Piston kit (1 pcs. piston)		

	106.210.000	106.211.000
Flow range	60-360 l/h	
Water type	All types	
Inlet and outlet fittings	1/4 "	
Connection for outlet hose	10/8 mm PA hose	
Filtration	60 μ	
Valve type	Combination of NC and NO in a common block with check valve stainless steel	
Coil power	240 VAC/50 Hz 200 VAC 50/60 Hz 240 VAC 60 Hz	
Power consumption	42 VA, 20 W	
Power consumption, cut-in	88 VA	

106.215.000 106.220.000
106.216.000 106.221.000



Spareparts:	106.215.000	106.216.000	106.220.000	106.221.000
106.500.000 Filter for pre-filter at solenoid valve, length: 25 mm, 60 μ nom.				
106.531.000 Coil 240 VAC, 50 Hz				
106.532.000 Coil 200 VAC, 50/60 Hz 240 VAC, 60 Hz				
106.533.000 Armature NC				
106.534.000 Armature NO				
106.535.000 Piston kit (2 pcs. piston)				

	106.215.000	106.216.000	106.220.000	106.221.000
Flow range	120-1800 l/h			
Water type	All types			
Til- og afgangs-fitting	1/4 "	3/8 "		
Connection for outlet hose	1/4 "			
Filtration	60 μ			
Valve type	Directional valve NC and NO with stainless steel check valve			
Coil power	240 VAC/ 50 Hz	200 VAC/ 50/60 Hz	240 VAC/ 50 Hz	200 VAC 50/60 Hz 240 VAC/ 60 Hz
Power consumption	42 VA, 20 W			
Power consumption, cut-in	88 VA			



ML Flex System

TECHNICAL DATA

TD081US-00 | 30.01.04 | LR / VM

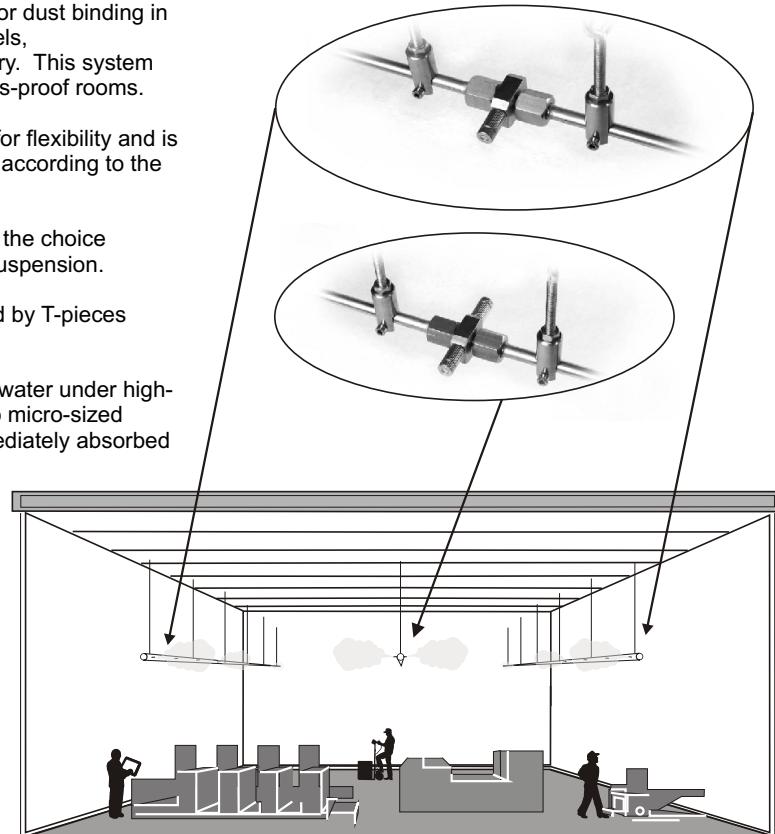
ML Flex system is well suited for humidification in the industrial and the horticultural sector, and for dust binding in rooms with high dust levels, such as the textile industry. This system can be used in explosions-proof rooms.

The system is designed for flexibility and is dimensioned individually according to the room conditions.

ML Flex System enables the choice between wall or ceiling suspension.

The nozzles are mounted by T-pieces which pivot individually.

Humidity is produced as water under high-pressure is atomized into micro-sized particles, which are immediately absorbed into the surrounding air.



SPECIFICATIONS:

Wall/Ceiling fitting	1 per 3'
Weight x lbs/foot	8 oz.
Material	Stainless
Noise level	32 dB
Working pressure (psi)	500-1000
Min. distance to ceiling	8"
Min. distance/atomizing zone	5'

DIMENSIONING:

Ceiling height in meters	Recommended nozzle size	Recommended running factor
> 19'	4,5 l	70%
13'-19'	2,5 l	50-60%
6'6"-13'	1,5 l	50-60%

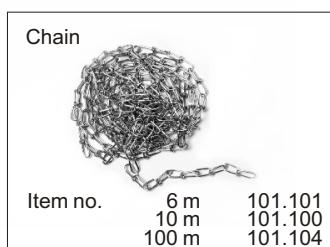
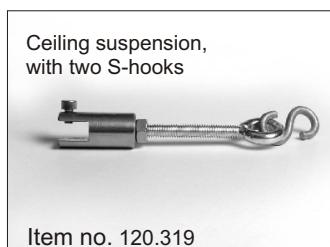
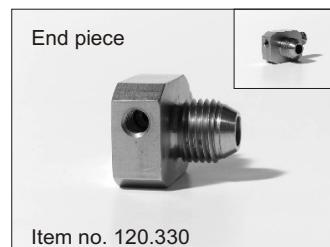
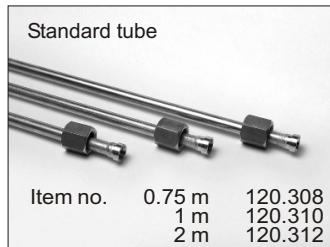


ML Flex System

TECHNICAL DATA

TD081US-00 | 30.01.04 | LR / VM

Components for ML Flex System:



Installation ML Princess
and ML Solo



Installation and Operating Instructions for ML Princess

Declaration of Conformity.

We, ML System a/s, hereby declare with responsibility that the ML Princess, which is designed to be used with ML humidification systems, is in conformity with the Council Directive 89/392 on the approximation of the laws of the EU Member States relating to machinery.

Standards used: EN 60 335-1, VDE 0530 Teil 1 ,VDE 0730 Teil 1, DIN IEC 38 DIN1952 DIN 24163 DIN 45635

Ry 10.10.99

Leo Rasmussen
Technical Manager

Description of the unit: See Technical data

Mounting and safety instructions

Should be placed at a height of minimum 2,0 m above floor-level to the lower edge of the unit, to eliminate danger caused by possible touching of the impeller/ fan when operating. The fan is not equipped with guard grill at the outlet side of the fan, therefore the power to the fan should be switched off if work is done within a 0,5 m safety area from the outlet of the fan.

Vibration-noise

Transmitted noise from vibrations is minimised during mounting, by equalizing the force in all hanging points. (See separate mounting instruction for ML Princess)

Electrical connection

Electrical connection should be made according to local rules by authorized people.
The fan should be connected to an external voltage switch.

Service and maintenance

The impeller and the internal side of the cabinet/body should be cleaned for dust and dirt at least once every year, or when necessary. Should be cleaned in water and soap, or special cleaning solution for aluminium. Do not use organic dissolutions or other strong chemicals for the cleaning.

Before the cleaning procedure is started, the power supply must be safely switched off, and it must be secured that the power cannot be switched on again during the cleaning.

Sound level

Sound level measured 1 metre from motor: 55 dB(A) at 50 Hz supply.

To be changed without notice.
Rev. 01/99

ML SYSTEM A/S - Parallelvej 2, DK 8680 Ry - DENMARK

Tel: +45 8788 2100 Fax: +45 8788 2121

F:\MANUALER\CE erklæringer\CE gamle



Installation and Operating Instructions for ML Solo

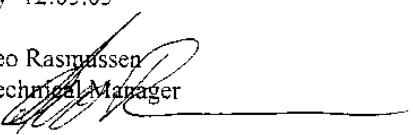
Declaration of Conformity.

We, ML System a/s, hereby declare with responsibility that the ML Solo, which is designed to be used with ML humidification systems, is in conformity with the Council Directive 89/392 on the approximation of the laws of the EU Member States relating to machinery.

Standards used: EN 60 335-1, DIN IEC 85, AMCA 210, DIN 45635

Ry 12.05.03

Leo Rasmussen
Technical Manager


Description of the unit: See Technical data

Electrical connection: 24 VAC, (21-27 VAC) 50 Hz

Degree of protection: IP 55

Mounting and safety instructions

Should be placed at a height of minimum 2,0 m above floor-level to the lower edge of the unit, to eliminate danger caused by possible touching of the impeller/ fan when operating. The fan is not equipped with guard grill at the outlet side of the fan, therefore the power to the fan should be switched off if work is done within a 0,5 m safety area from the outlet of the fan.

Vibration-noise

Transmitted noise from vibrations is minimised during mounting, by using the supplied fixture for the unit. (See separate mounting instruction for ML Solo)

Electrical connection

Electrical connection should be made according to local rules by authorized people.
The fan should be connected to an external voltage switch.

Service and maintenance

The impeller and the internal side of the cabinet/body should be cleaned for dust and dirt at least once every year, or when necessary. Should be cleaned in water and soap, or special cleaning solution for aluminium. Do not use organic dissolutions or other strong chemicals for the cleaning.

Before the cleaning procedure is started, the power supply must be safely switched off, and it must be secured that the power cannot be switched on again during the cleaning.

Sound level

Sound level measured 1 metre from motor: 43 dB(A) at 50 Hz supply.

To be changed without notice.

**ML system a/s · Parallelvej 2 · DK-8680 Ry
Tlf. 8788 2100 - Fax 8788 2121**

ML Princess

Installation Instructions

Description of the system

ML SYSTEM

ML System is a modular humidification system consisting of fan units that are equipped with high-pressure nozzles. These units may be ML Princess or ML Solo. Humidity is produced when water under high pressure is atomized into micron-sized particles which flash evaporate and are absorbed into the surrounding air. The fans distribute the air to ensure uniform humidity throughout the entire space.

ML Princess is also used alone as a ventilation unit at times when it is not necessary to add humidity to the air. The fans are designed in a way that any temperature differences from floor to ceiling will be eliminated when air is constantly recirculated.

Installation Instruction for ML Princess

Electrical connection of fan

The fan should be connected to (2) 120 VAC power supply by authorized electrician. The fan is connected to run 24 hours a day for constant air circulation.

- Installation of nozzle ring on fan

The nozzle ring is installed on top of the fan using the fittings that are included. Fasten the fittings under the plastic bolts that hold the baffle plate in place.

All nozzle rings are equipped with ball valve, filter unit and automatic air exhaust.

- Suspension of fan

Drawing shows how the body and baffle plate are to be assembled and suspended.

- Final installation of nozzle ring

Do not install the air escape nozzle until the whole system has been flushed.

- Installation of ball valve and filter union on nozzle ring

Assemble ball valve and filter union as shown on the drawing. Make sure that the filter fixture is attached securely and the O-ring is in place before assembling the filter union. Close the ball valve when the unit is finally installed.

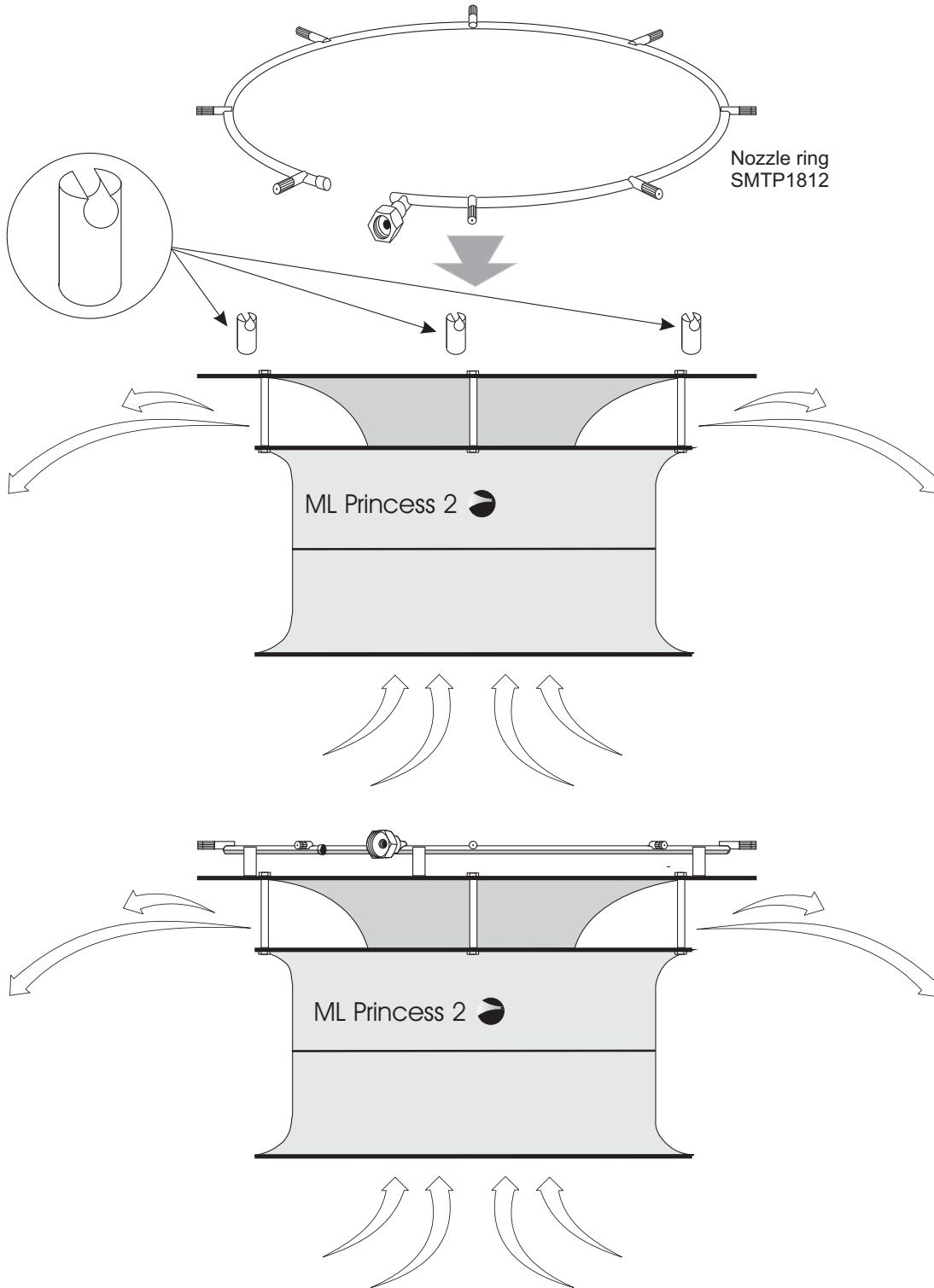
During flushing and bleeding of ML Princess, adjust the chain so that the unit is true to level. After that, remove the excess chain and close S-hooks.



ML Princess + ML Nozzle ring

Installation Instruction

MA002US-00 | 02.07.03 | LR



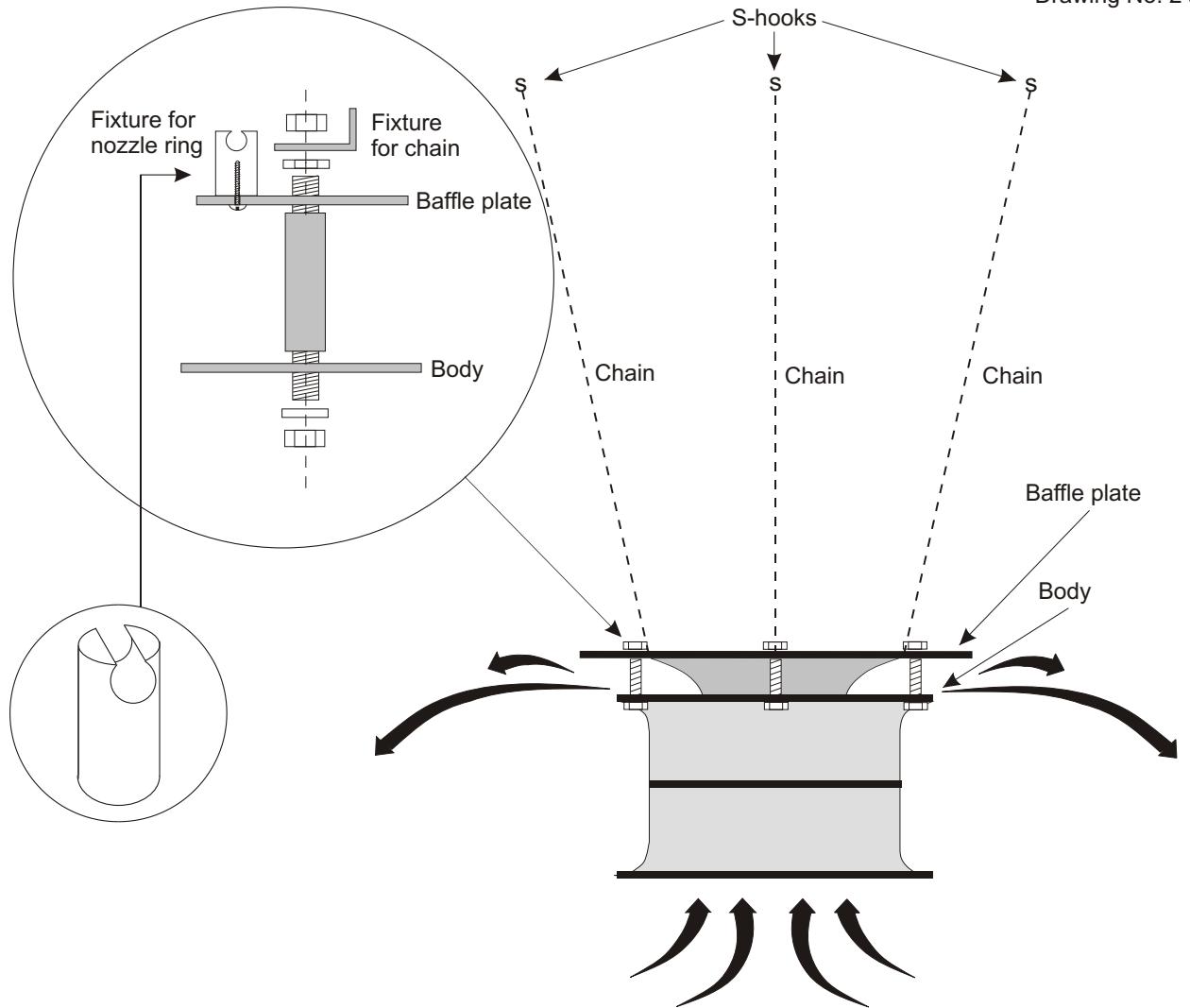


ML Princess

Installation Instruction

MA001USB | 06.09.02 | LR

Drawing No. 2 a



Note:

The baffle plate **must** be positioned as indicated on the drawing and **always** with the pointed end turning towards the fan blades in order to secure correct operation.

Installation

Fit the baffle plate to the body of the unit as indicated and attach the chains to the housing.

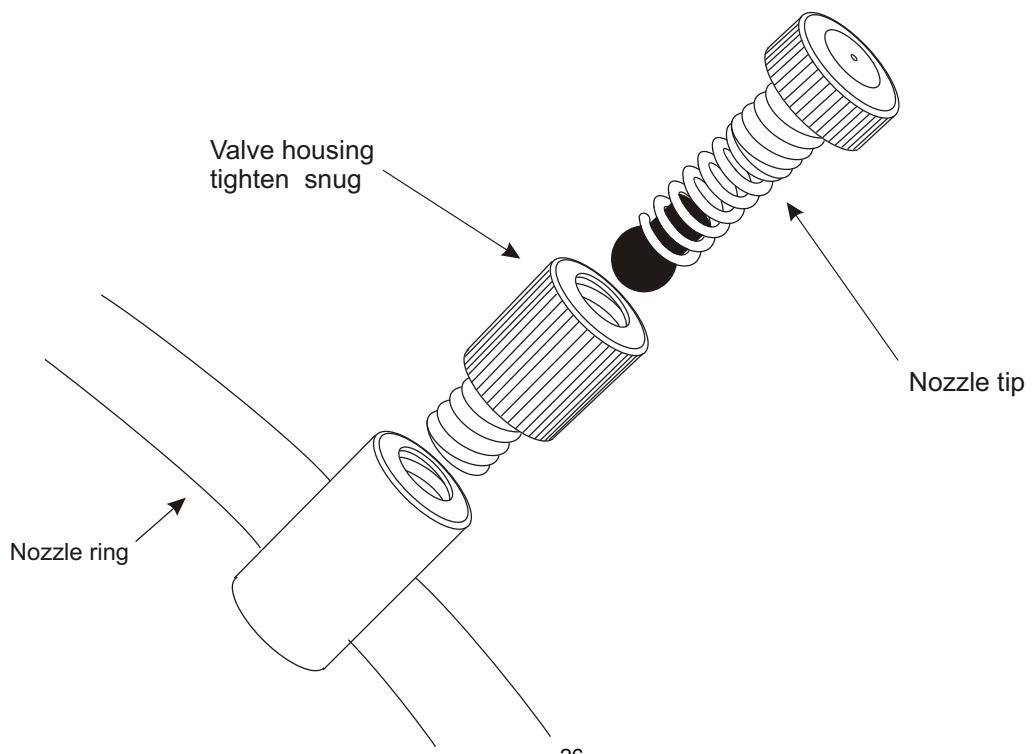
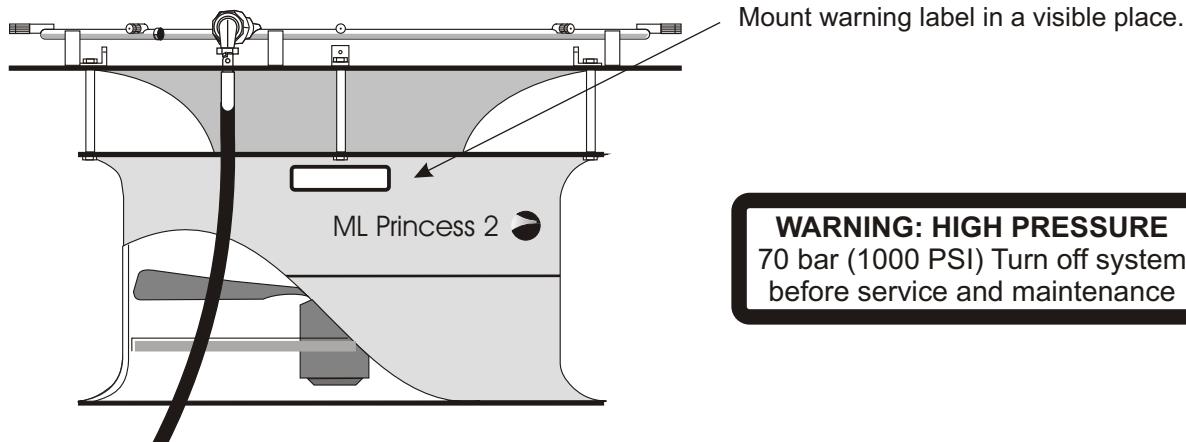


Final assembly of Nozzle Ring

Drawing No. 2 b

MOUNTING INSTRUCTION

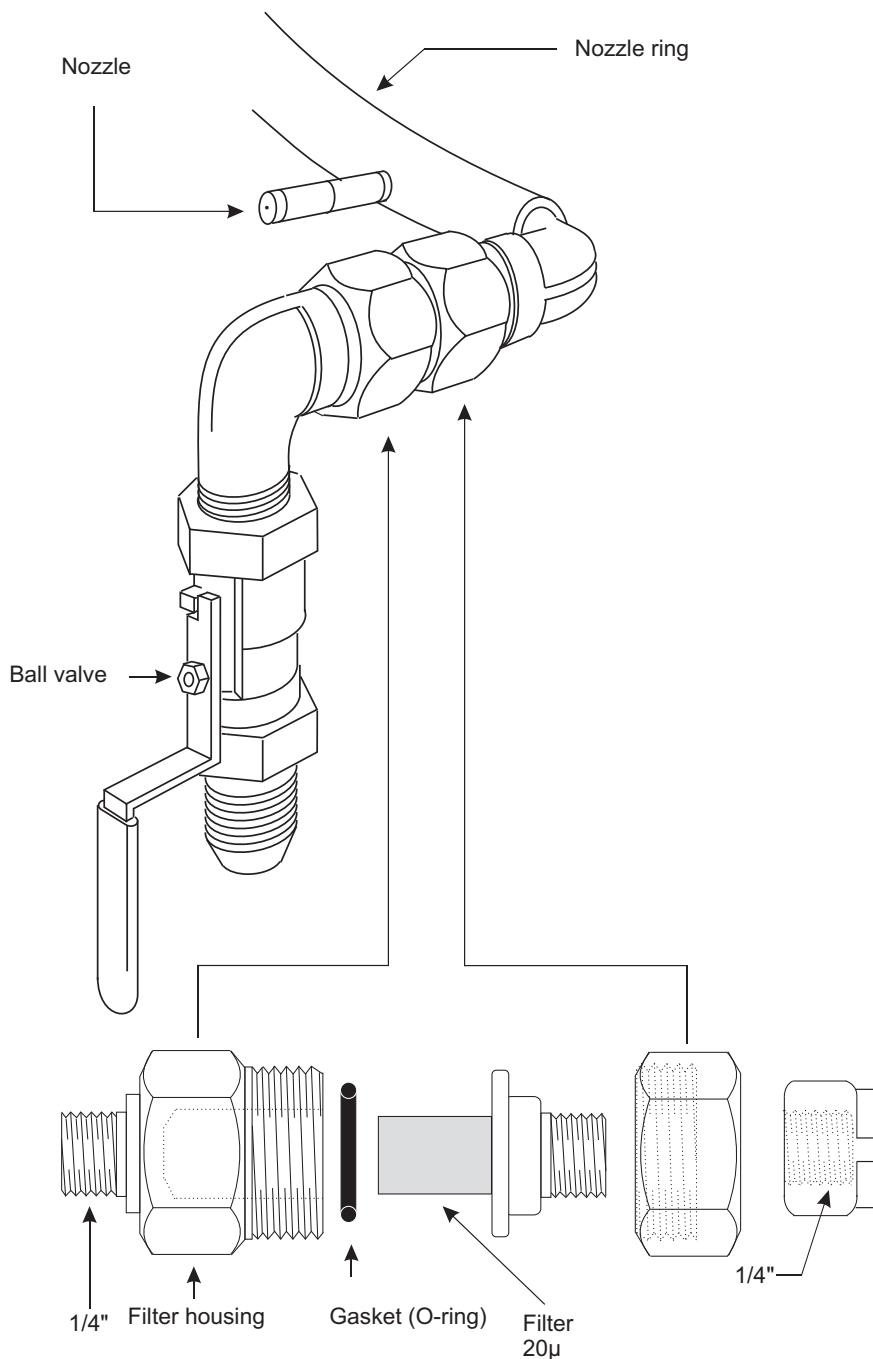
MA005US-01 | 11.08.03 | LR





Pre-Filter for Nozzle ring

Installation Instruction

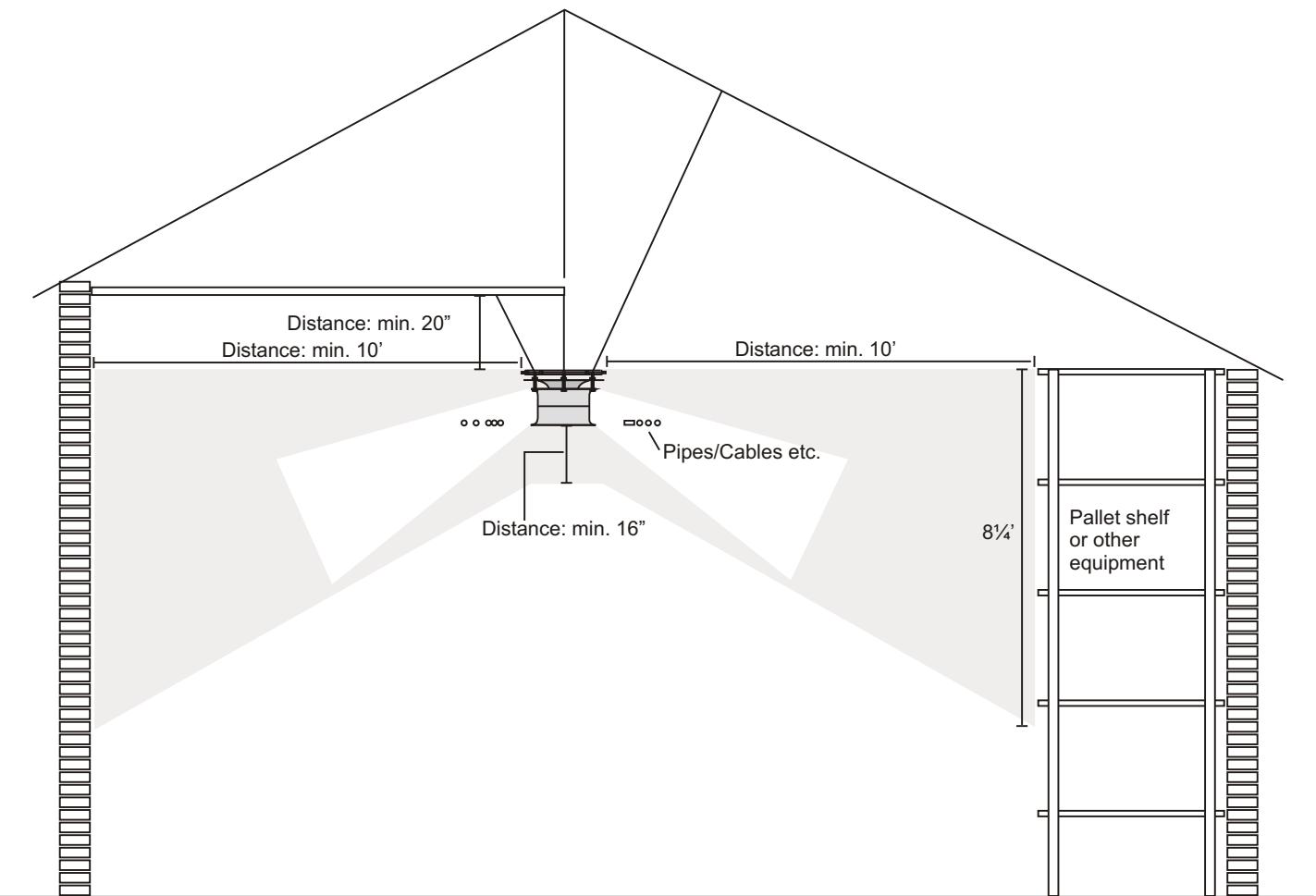




Positioning - ML Princess

Installation Instruction

28660399 | 14.01.99





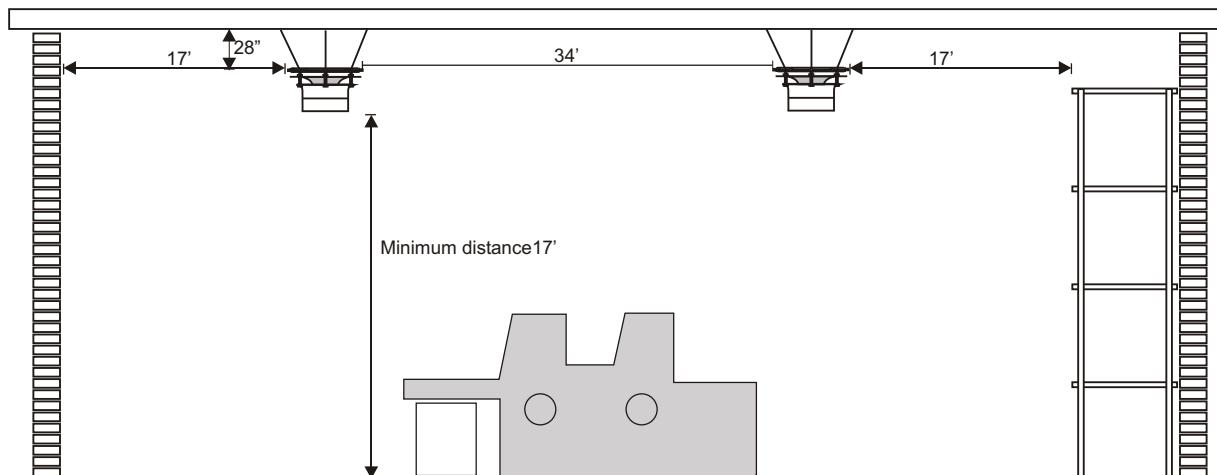
Distance sketch ML Princess 3

Technical Information

TI066US | 18.11.02 | HR

ML Princess 3 is well suited for large production rooms or other high-ceiling rooms.

Upon placing ML Princess 3, it is important to pay attention to the distance of 17 feet, in order for the fan to distribute the water properly.



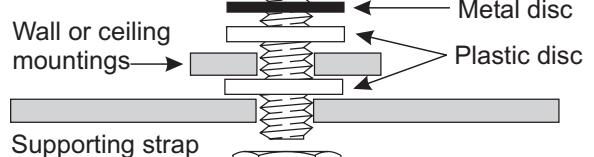
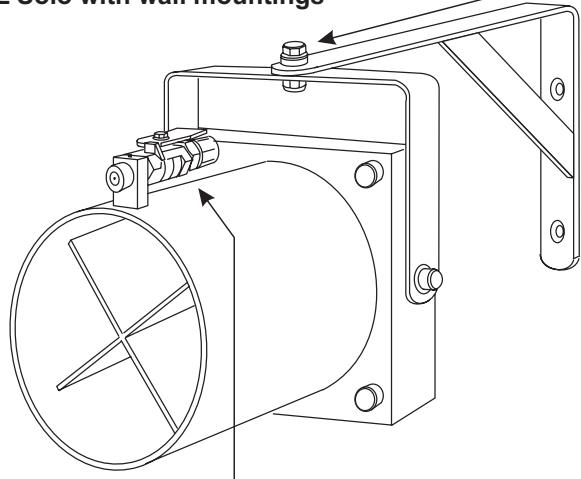
	ML Princess 3
Minimum distance to floor	17feet
Distance to ceiling	28 inches
Distance between nozzle and item	17 feet
Maximum output	13 gallons per hour
Maximum duty factor	90%

Assembly of ML Solo

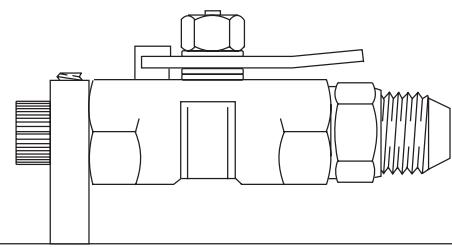
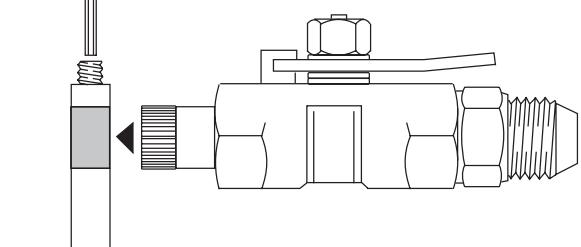
MOUNTING INSTRUCTION

MA039GB | 11.01.01 | ASK

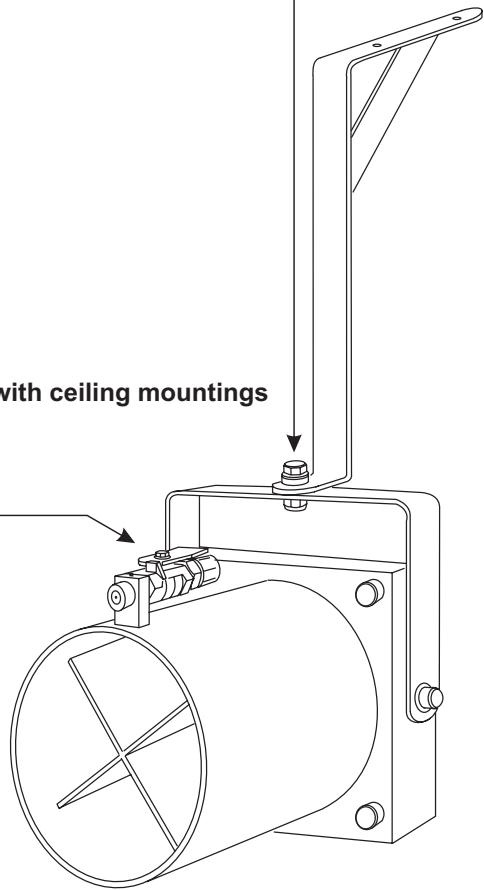
ML Solo with wall mountings



2 mm Allen key



ML Solo with ceiling mountings

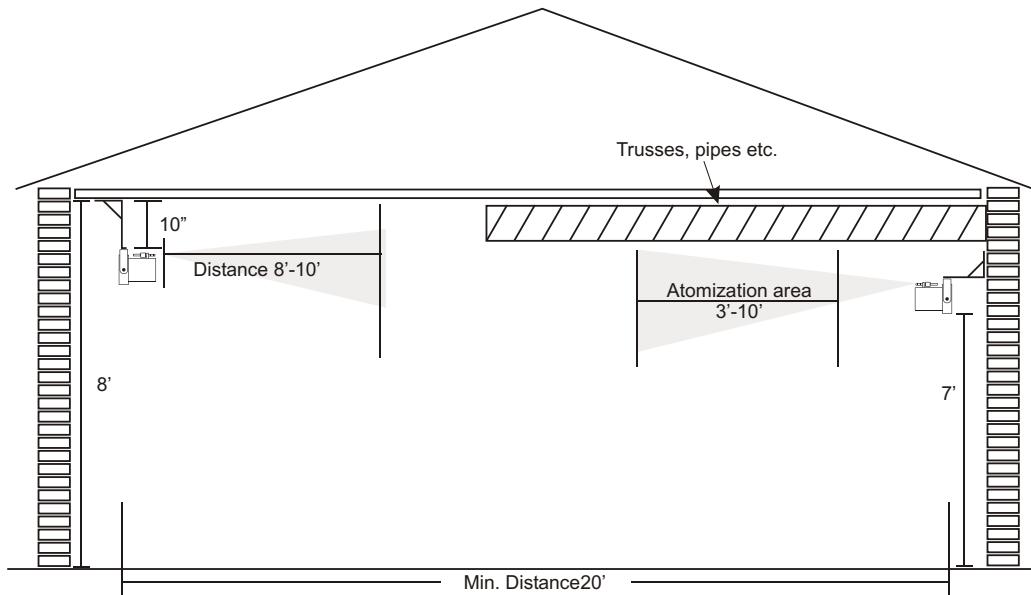




Positioning - ML Solo

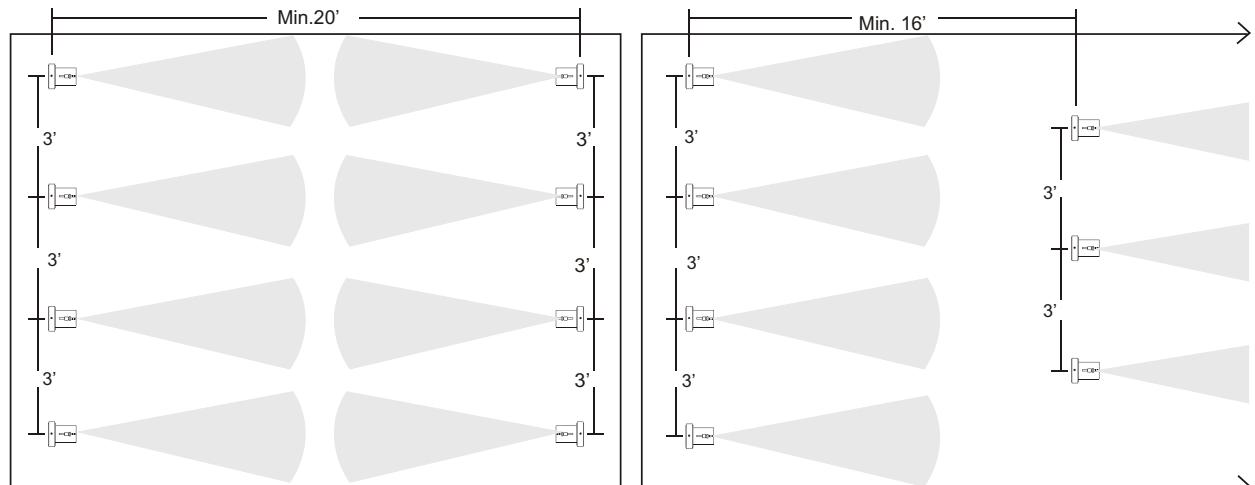
Technical Information

TI028US 11.01.01 LR



Because ML Solo is often placed at very low ceiling heights, the following must be observed: Atomization close to a person will often feel like being in a draft. This means that no stationary work places should be within the atomization area of 3' - 10' from the nozzle.

The ideal placement of ML Solo is in open walk way areas where the range of the nozzle can be respected.



If ML Solo units are placed one after another it must be ensured that the units placed ahead do not draw humidified air from those at the back.



Installation of **ML Flex07 System**



ML Flex07 System

MOUNTING INSTRUCTION

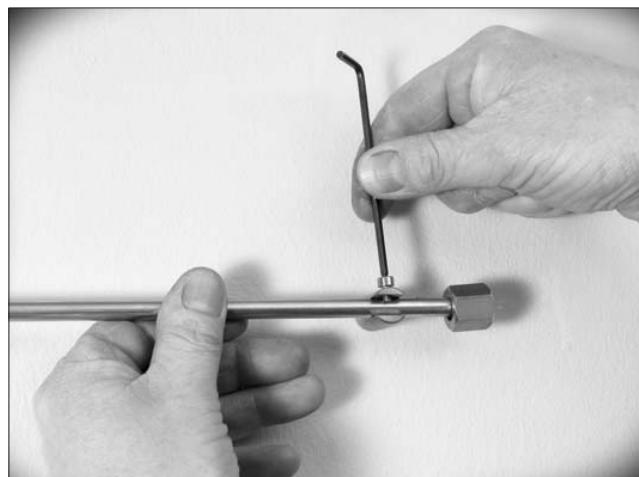
MA081GB-00 | 29.08.06 | LR / KK

The installation of ML Flex system is described step by step on the following pages.
The installation should only be carried out by trained personnel



1)

The desired suspension is positioned.
At least one suspension per meter flexible tube is mounted.



2)

The nozzle tube is mounted in the suspension,
and is locked by the Allen screw.



ML Flex07 System

MOUNTING INSTRUCTION

MA081GB-00 29.08.06 LR / KK



3)

Mount the T-piece for connections with the O-ring in place.

Note:

The hole for the nozzle must always be on top.



4)

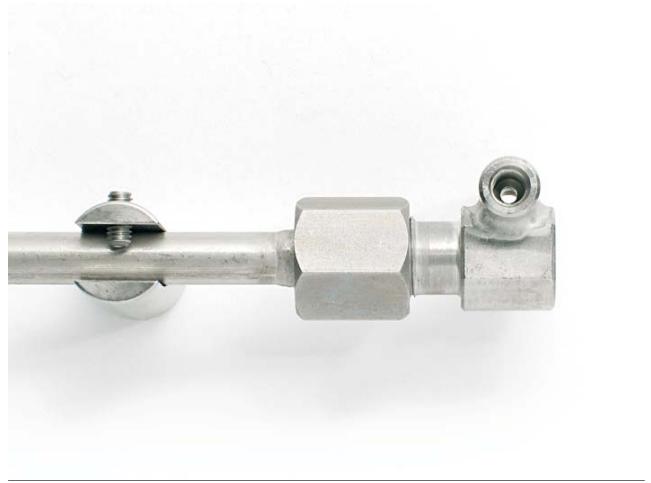
Screw T-piece for the nozzle together with coupling and retighten with NV17.
Keep the T-piece in such a way that the nozzle points in the desired direction.



ML Flex07 System

MOUNTING INSTRUCTION

MA081GB-00 29.08.06 LR / KK



5)

Mount the end piece with the O-ring in place.

Note:

The hole for the nozzle must always be on top.



6)

Is kept and retightened with NV 17.



ML Flex07 System

MOUNTING INSTRUCTION

MA081GB-00 29.08.06 LR / KK



7)

Connect 1/8" hose at nipple on the connecting point.

NOTE:

The hole for the nozzle must always be on top.



8)

After thorough rinsing-through and airing of the whole system, mount the desired nozzle type.

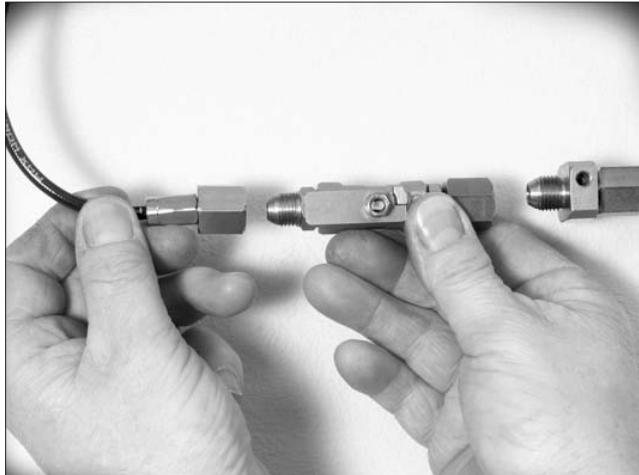




ML Flex07 System

MOUNTING INSTRUCTION

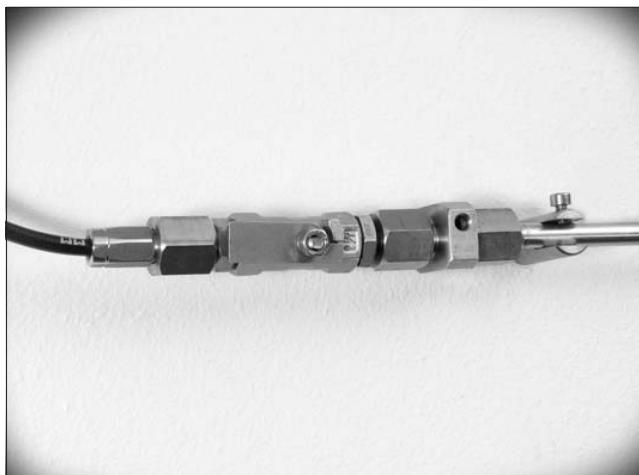
MA081GB-00 29.08.06 LR / KK



**9)
BALL COCK AS OPTION**



Fasten coupling with NV 17.
Hold with NV 17 in reverse direction on nipple.





ML Flex07 System

MOUNTING INSTRUCTION

MA081GB-00 29.08.06 LR / KK



10)

Ceiling suspension

With chain and the same lock system as wall-suspension.

High-pressure Pump, Hydraulic Hose, Fittings, and Solenoid Valves

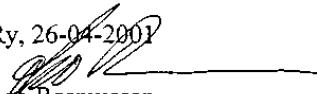


Installation instructions for MLP - High Pressure Pump

Declaration of Conformity.

We, ML System a/s, hereby declare with responsibility that the high pressure pumps type MLP 100, MLP 300, MLP 500, MLP 800, MLP 1000, MLP 2000, which is designed to be used with ML Humidification System for humidification in industrial rooms, are in conformity with the Council Directive 89/392 on the approximation of the laws of the EU Member States relating to machinery. Standards used: IEC 34-1, IEC 34-5, IEC 34-5, IEC 34-6, IEC 34-7, IEC 34-8, IEC 34-9, IEC 14, IEC 72 or corresponding DIN-Standards.

Tested according to the following standards: IEC 801-2, IEC 801-3, IEC 801-4, EN 55022
Marking: CE mark.

Ry, 26-04-2001


Leo Rasmussen
Technical Manager

Description of the unit: See technical data **Functions:** See technical data

Placing

The high pressure pump should be placed on a vibration free foundation AT floor level. The pump frame is provided with vibration dampers. To be placed with easy access to the maintenance areas on the pump. The pump must not be covered. Max. ambient temperature: + 30 degrees C.

Safety instructions

Rotatory parts are screened according to current regulations. Power supply must be switched off before service on the pump and it must be secured that the power supply cannot be switched off again unintentionally.

Electrical connection

Electrical connection to be made according to local rules by authorized people. The pump engine should be connected to ML Pump Control Unit, which is connected to the power supply according to regulations for safety cut-out.

Service and maintenance

Please refer to maintenance plan. The pump unit should be cleaned on the outside for dust and dirt at least once a year, or when necessary. Clean with compressed air or with water and soap. Before the cleaning procedure is started, the power supply must be safely switched off, and it must be secured that the power supply cannot be switched on again during the cleaning.

Sound level

Sound level measured 1 metre from pump unit: < 80 dB(A) at 50 Hz supply.

To be changed without notice.

ML SYSTEM a/s - Parallelvej 2 - DK 8680 Ry - DENMARK
Tel: +45 8788 2100 - Fax: +45 8788 2121

High-pressure Pump, Hydraulic Hoses, Fittings and Solenoid Valves

Installation Instructions

The system is designed with a centrally located high-pressure pump which supplies water at 1000 PSI for humidification in one or more sections, depending on the structure of the system.

. Principle drawing/Flow diagram

The drawing illustrates how the units are placed in the room. Pump, hydraulic hoses and solenoid valves are also indicated.

All hoses and fittings are 1/8", 1/4" and 3/8", respectively. Following the instructions of the flow diagram as to hose dimensions, you will have trouble-free operation without any risk of air trapped in the system, or dripping nozzles.

. High-pressure pump

The pump is an oil-free stainless steel piston pump with 5 cylinders which ensures smooth and vibration-free operation. The pump comes on a steel frame with all components installed and tested at the factory.

The wiring is done through the pump starter as described in the chapter "Wiring Diagrams". When connecting the power supply, check the motor's direction of rotation. The direction of rotation is marked with an arrow on the pump.

Carefully read the instructions for starting up the system.

Connect water at the water meter with the use of approved hoses with 1/2" - 3/4" union. Connection to hydraulic hose on the outlet side is done with the use of 1/4" or 3/8" hose.

Water is supplied to the pump from the regular water installation. Depending on the structure and application of the system, water is treated by way of AQA or Reverse Osmosis system.

According to type of water treatment, the water is filtrated as follows:

. Filter unit

The system filtrates the water in 4 steps:

1. A 20-micron 20" filter installed before the water treatment system, if any, to remove impurities from the water.
2. A 1-micron filter unit installed between water treatment and high-pressure pump which filtrates the utility water and removes impurities from the water treatment. A water meter is attached to this filter unit for registration of the water consumption in the system.
3. A 60-micron filter union installed immediately before each solenoid valve set to remove any impurities from hoses, fittings and pumps. This filtration only applies to systems with more than one section.

4. A 20-micron filter union is installed before every Princess nozzle ring.

Install an approved backflow preventor at the point of connection to the water supply to prevent treated water to run back in the water pipe in case of pipe failure.

. Installation of couplings on hydraulic hose

Be careful that the inner tube does not block the water flow after installation of the insert.
Carefully follow the instructions.

. Installation of hydraulic hose

Install the hydraulic hose from the pump to the nozzle units, if possible at a level lower than the nozzle units to avoid air pockets in the hoses. However, if you follow the flow diagram in regard to hose dimensions, etc., the hoses can be placed higher than the nozzle rings without any problems.

Install all ball valves at the solenoid valve set, and at the humidification units on the hydraulic hose and close them. Do not connect solenoid valves and nozzle ring until the system has been thoroughly flushed.

. Solenoid valve set

This applies only to systems with more than one section (or prepared for more sections).

The drawing shows the flow diagram for water through the solenoid valve set, and the electrical connection from the valve set to the humidity controller. The solenoid valve set may be installed where it is most appropriate, either in the actual space or close to the pump. Lead the outlet hose from the pressure release valve to drain. First flush the system very thoroughly and then connect hoses to the solenoid valve set.

If a failure should occur in the solenoid valve set in one section, the other sections will continue to operate if you close the ball valve in front of the solenoid valve.

**It is very important at the same time to switch off this section on
the humidity controller**

If the section is not switched off you risk that the pump will overheat and consequently break down.

Control of the system, MLP RO pump station

Operating instructions



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Humidification pump

The pump is driven by a three-phase motor powered by magnet controlled protective motor switches. The control consists of a PLC-control system regulating the area humidity. The regulation takes place by means of PI regulators to ensure a precise regulation of the area humidity.

The PLC program is built up in such a way that you on the first start-up choose the number of active sections. If e.g. three sections are chosen, section 4 is disconnected in safety circuits and on display. On extensions, this choice can be repeated by using password 196.

In the control six hour meters are built in. One hour meter to indicate the operation time of the pump to be used when determining the service intervals, one hour meter for the RO pump and one hour meter for each of the four sections summarizing the humidification time.

Safety equipment

- **Pressure switch**

The control is equipped with a locking device from the pressure switch placed on the inlet side of the RO pump, ensuring that the pump stops if the water pressure disappears.

If the water pressure falls under shift pressure of the pressure switch, the display will show alarm text. Restart is done by pressing “Alarm reset”.

- **Max hygrostat to secure against over-humidification**

If the humidity rises to a value higher than the one adjusted on the max-hygrostat, the system is stopped and the alarm lamp will light. The display shows in which section the max-hygrostat is released.

The system has two possibilities for switching on after error (chosen in the F6 area).

If automatic switch on is chosen:

If the system, before switching off, has run for minimum one hour (adjustable) without any MaxHygrostat error, it will be switched on automatically when the humidity is under the set value again. If a new error appears before one hour has passed (adjustable) it will not be switched on, but has to be switched on manually by pressing “Alarm reset”.

If manual switch on is chosen:

The system only restarts after acknowledge by pressing “Alarm reset”.

- **Thermostat**

For protection of the high pressure pump the control is provided with a multi-stage measurement of temperature.

- **Phase sequence relay**

The control is equipped with a phase sequence relay securing against wrong connection of the power cable. Both light-emitting diodes on relay E1, which is placed in the cabinet on the right, must light.

In case of light in both diodes, the pumps will operate in the right direction. The relay also secures against safety break.

Selecting RO type

The software of the control is made universally as to language choice choice of MLP RO-type. The choice of RO-type takes place at the first pass by the fact that VERS RO xxx 1003 appears on the display.

Here you choose between different options. (Options are only possible together with the hardware changes)

Selecting options

You can choose between following options

- Load-dependent by-pass - fan control - raw water mixer.

The choice takes place as to the diagram below.

The screen will display VERS. 60_0 . Then press “Enter”. The cursor will now blink under 0. Use the arrow keys to make the choice followed by “Enter”

	60 0	60 1	60 2	60 3	60 4	60 5	60 6
Load-dependent by-pass		X	X	X			
Raw water mixer			X		X		X
Fan control				X	X	X	

Selecting language

Having chosen RO-type, language choice must be made. The display shows LANGUAGE 1/3 xxx - where the variable is set to 1 - for DANISH - 2 - for ENGLISH - 3 - for GERMAN.

Version 60 0 rel 1006 >

To be used for 1 department with pressure release valve or for 4 departments with solenoid valve sets.

This has to be set up during the initial start.

Ex.1: 1 department with pressure release valve on the pump station:

Choose version: 60 X

Choose number of departments: 1

Press 2 for English

Press 0 for no membrane flush during start

Press F5

Type in password: 8599

Choose 0 at *Valve set* (default is 1)

Ex. 2: 3 departments with 3 solenoid valve sets

Choose version: 60 X

Choose number of departments: 3

Press 2 for English

Press 0 for no membrane flush during start

After having chosen type, language and options these only can be altered by typing the PASSWORD 8599. It is also possible to reset the whole system to the default settings by first activating the emergency stop and the deactivate it and holding the rest button for at least 25 seconds.

Using the password 8599 gives the possibility to change the membrane flush time. These may not be altered by others than authorized personnel from ML System a/s. If ML System a/s detects that the flush time has been altered all guarantee for the membrane will become void.

The control panel

The control system consists of a Siemens PLC 200-S7 and a control panel Siemens TD200. The control panel is used to show actual values and to change the various parameters used in the calculations of the control system.

The display shows the messages in two lines. If there are more than two messages, a flashing arrow - up or down - will mark that there are more messages. By pressing the arrow keys up / down you can scroll through the messages.

If you want to change a value, the cursor is placed on the desired line and you press enter. If the value is protected by a password, the display asks for password, and the values are changed by using the key arrows till you reach the desired value, and then press enter. When the password is entered, the control system shows the actual value, and you can change with the key arrows up/down. When the desired value is reached, press enter, and the desired value will be entered in the control system.

The display is constructed with four F-keys which combined with the SHIFT key make eight areas for output and changes of values. The keys F4 and F8 are only used as reset keys.

The functions in F1-F2-F3 are reached by pressing the key directly. The F5-F6-F7 are reached by pressing SHIFT - now a flashing "S" appears in the lowest right corner. Now you can press the actual F key.

The display is in standard mode when none of the F-keys have been chosen. You press an F-key for example to read or change values.

You return by pressing alarm reset or another F-key.

Anyhow the display returns to standard mode after five minutes.

Password:

The setups in F5-7 are protected by password as described in the following.
If you need to use it, the display writes

PASSWORD **0**

Another password for which you can be presented is when the display writes

PASSWORD REQUIRED
PASSWORD **0xxx**

Here it is a password in order to enter and change the setup of the display for communicating with the PLC unit. The setup may by no means be changed.

You get out of this and back to normal setup by pressing the ESC key.

Normal indications

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
HUM. SECT.1 xx %RH	The humidity in % of the section concerned		
HUM. SECT.2 xx %RH	The humidity in % of the section concerned		
HUM. SECT.3 xx %RH	The humidity in % of the section concerned		
HUM. SECT.4 xx %RH	The humidity in % of the section concerned		

Alarm indications

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
- ALARM -	System in alarm - is always shown together with one of the following:		
MLPRO > 500 PUMP TOO HOT	The temperature of the pump is too high. Wait for the tank to cool and reset by pressing the reset-key		
MLPRO < 800 PUMP HOT - EMPTYING	The temperature of the pump is too high. The tank is emptied and the system automatically switches on again.		
SENSOR xx	The signal from the sensor of the section concerned is outside the range. The section is switched off, but will automatically be switched on when the signal is within the range again.		
INLET PRESSURE LOW	The inlet pressure of the system has been under the shift pressure of the pressure switch. Correct the error and recouple by pressing the reset-key.		
MAX.HYG xxx	The max-hygrometer of the section concerned has exceeded the set humidity. Recouple by pressing the reset-key.		
OVERFLOW	The tank is overfilled. Recouple by pressing the reset-key when the water level has dropped. Control the stop point of the level bar.		

Further indications

In the F1 area - Humidity

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
SP1 xx %RH	The desired humidity of the section concerned	0-MAX.SP	50
SP2 xx %RH	The desired humidity of the section concerned	0-MAX.SP	50
SP3 xx %RH	The desired humidity of the section concerned	0-MAX.SP	50
SP4 xx %RH	The desired humidity of the section concerned	0-MAX.SP	50

Note: SP x = 0 describes that FLU (see description under the F7 range) is put out of operation.

In the F2 area - Hour meters

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
SECT. 1 x.x HOUR	Indication of the time humidified in the individual section		
SECT. 2 x.x HOUR	Indication of the time humidified in the individual section		
SECT. 3 x.x HOUR	Indication of the time humidified in the individual section		
SECT. 4 x.x HOUR	Indication of the time humidified in the individual section		
PUMP x.x HOUR	Indication of the total operating time of the pump.		
PUMP RO x.x HOUR	Indication of the total operating time of the RO pump.		

In the F3 range - Indication of pump temperature

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
MLPRO > 500 PUMP TEMP xxxx °C	Indication of the pump working temperature in °C		

Change of values

F5-F6-F7

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
PASSWORD xxxx	Password for changing values.		197

The password for changing operating parameters in F5-F6-F7 is **197**.

If the password is set to **196**, a text is shown in the display saying that the number of active sections can be changed between 1-4.

The password is reset again by pressing the reset-key.

In the F5 range - Scaling of sensors

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
1-HIE x.xx *LOE x.xx	HIE - Highest electric signal from the humidity sensors. LOE - Lowest electric signal from the humidity sensors.	1,00 - 25,00 0 - 20,0	V - 8,00 MA - 4,20 V - 2,00 MA - 1,80
1-HI xx *LO xx	HI - Indication at the highest electric signal. LO - Indication at the lowest electric signal.	10 - 200 0 - 200	80,0 20
2-HIE x.xx *LOE x.xx	HIE - Highest electric signal from the humidity sensors. LOE - Lowest electric signal from the humidity sensors.	1,00 - 25,00 0 - 20,0	V - 8,00 MA - 4,20 V - 2,00 MA - 1,80
2-HI xx *LO xx	HI - Indication at the highest electric signal. LO - Indication at the lowest electric signal.	10 - 200 0 - 200	80,0 20
3-HIE x.xx *LOE x.xx	HIE - Highest electric signal from the humidity sensors. LOE - Lowest electric signal from the humidity sensors.	1,00 - 25,00 0 - 20,0	V - 8,00 MA - 4,20 V - 2,00 MA - 1,80
3-HI xx *LO xx	HI - Indication at the highest electric signal. LO - Indication at the lowest electric signal.	10 - 200 0 - 200	80,0 20
4-HIE x.xx *LOE x.xx	HIE - Highest electric signal from the humidity sensors. LOE - Lowest electric signal from the humidity sensors.	1,00 - 25,00 0 - 20,0	V - 8,00 MA - 4,20 V - 2,00 MA - 1,80
4-HI xx *LO xx	HI - Indication at the highest electric signal. LO - Indication at the lowest electric signal.	10 - 200 0 - 200	80,0 20

In the F6 range - Common parameters

Indication in display	Explanation	Range	Standard
MAX.SP xx %RH	The maximum limit for adjustment of the set points.	40-90	60
INTEGRATION xx MIN	Time indication before the integration regulation is 100%	0-100	25
PRESSOSTAT x.x SEC	Time delay of missing water pressure	0-10,0	20,0
FAN.CONTR. xx 0/2 (OPTION)	Choice of function for the fan control of the humidifying modules. (0) No fan automatic (1) Automatic control (2) The fans are operating constantly	0-2	0,0
MAX.HYG.AUT 0/1 xxxx	Choice of reset function for Max Hygrostat security. (0) Manual reset (1) Automatic reset - however max. once an hour.	0-1	0
MLPRO > 500 TEMP LIMIT1 xxxx °C	The limit value for step 1 of the temperature protection. The system will start producing fresh RO-water if this limit is exceeded. This function only runs once every 12 hours.	10-60	30
MLPRO > 500 TEMP LIMIT2 xxxx °C	The limit value for step 2 of the temperature protection. The bypass valve of the pump will open and flush the water if this limit is exceeded.	10-60	40
MLPRO > 500 TEMP LIMIT3 xxxx °C	The limit value for step 3 of the temperature protection. The pump will stop if this limit is exceeded and will not start before the system has cooled down and is re-started.	10-60	50
AUT.HYG.TIME xx.x SEC	Setting the security time for automatic reset of Max Hygrostat-circuit.	0-10,0	1,0
RV.MIX.MODE 0/1 xxxx (OPTION)	Choice of active raw water mixer (0) Not active (1) active	0-1	0,0
Bypass < xx l/t (OPTION)	Setting the opening level of the bypass fan	0-1000	60,0

In the F7 range - Setting parameters for the humidity regulators

<i>Indication in display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
1*PRO xx - PER xx.x	PRO - Proportional belt for humidity regulation of the section PER -The period (a pulse & and a pause) in the section indicated in seconds.	0-50 10-1000	20 60,0
1*MON xx.x -PAU xx.x	MON - The lowest pulse time during which can be humidified in the section. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50,0 1-200,0	5,0 10,0
1*FLU xx.x - FLOW xx	FLU -The minimum time during which the section humidifies to ensure exchange of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liter per hour	0-2,0 0-1000	0,2 50
2*PRO xx - PER xx.x	PRO - Proportional belt for humidity regulation of the section PER -The period (a pulse & and a pause) in the section indicated in seconds.	0-50 10-1000	20 60,0
2*MON xx.x -PAU xx.x	MON- The lowest pulse time during which can be humidified in the section. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50,0 1-200,0	5,0 10,0
2*FLU xx.x - FLOW xx	FLU -The minimum time during which the section humidifies to ensure exchange of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liter per hour	0-2,0 0-1000	0,2 50
3*PRO xx - PER xx.x	PRO - Proportional belt for humidity regulation of the section PER -The period (a pulse & and a pause) in the section indicated in seconds.	0-50 10-1000	20 60,0
3*MON xx.x -PAU xx.x	MON- The lowest pulse time during which can be humidified in the section. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50,0 1-200,0	5,0 10,0

3*FLU xx.x - FLOW xx	FLU -The minimum time during which the section humidifies to ensure exchange of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liter per hour	0-2,0 0-1000	0,2 50
4*PRO xx - PER xx.x	PRO - Proportional belt for humidity regulation of the section PER -The period (a pulse & and a pause) in the section indicated in seconds.	0-50 10-1000	20 60,0
4*MON xx.x -PAU xx.x	MON- The lowest pulse time during which can be humidified in the section. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50,0 1-200,0	5,0 10,0
4*FLU xx.x - FLOW xx	FLU -The minimum time during which the section humidifies to ensure exchange of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liter per hour	0-2,0 0-1000	0,2 50

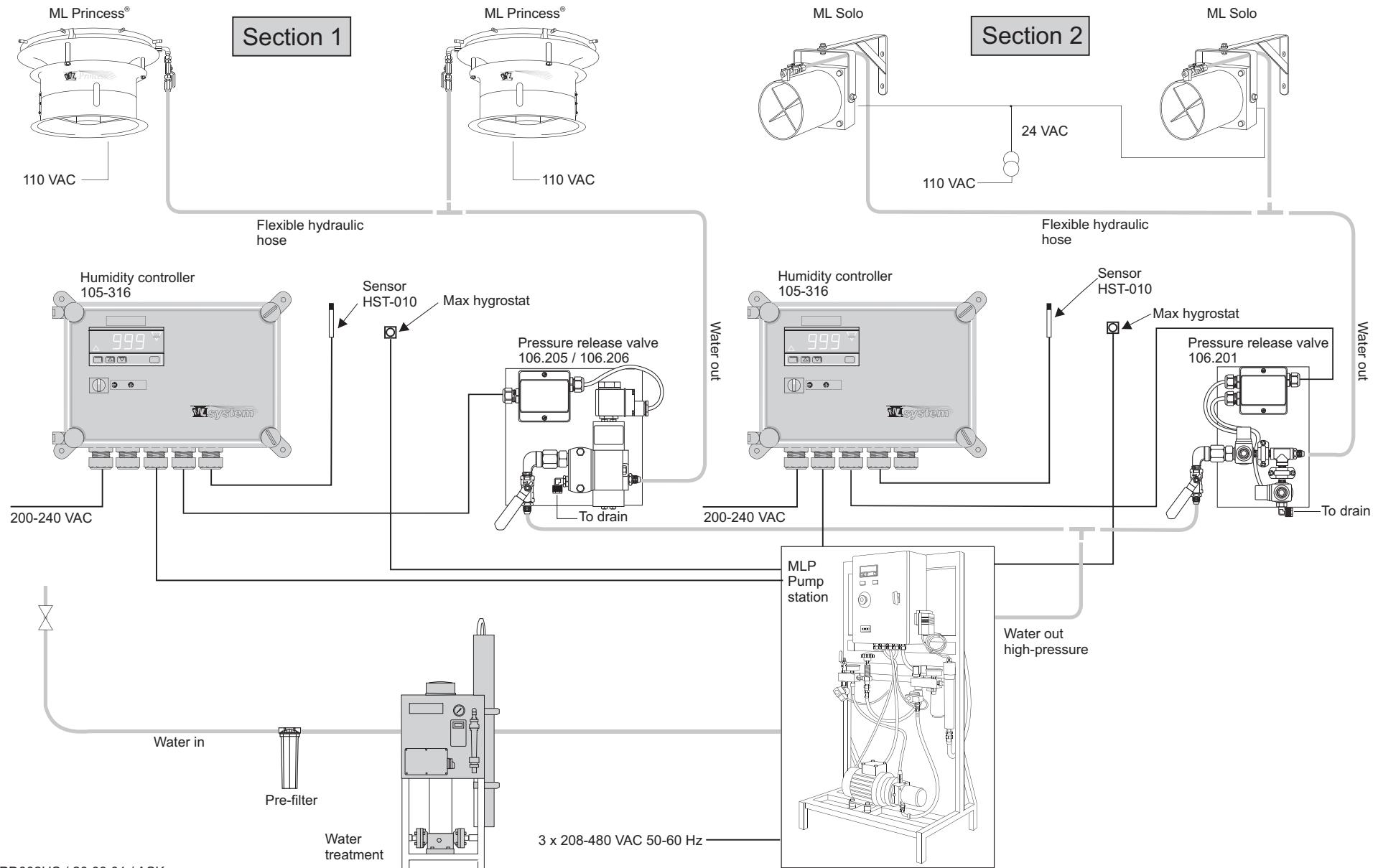
Reset to standard values

All settings can be reset to standard settings by pressing emergency stop for at least 10 seconds.

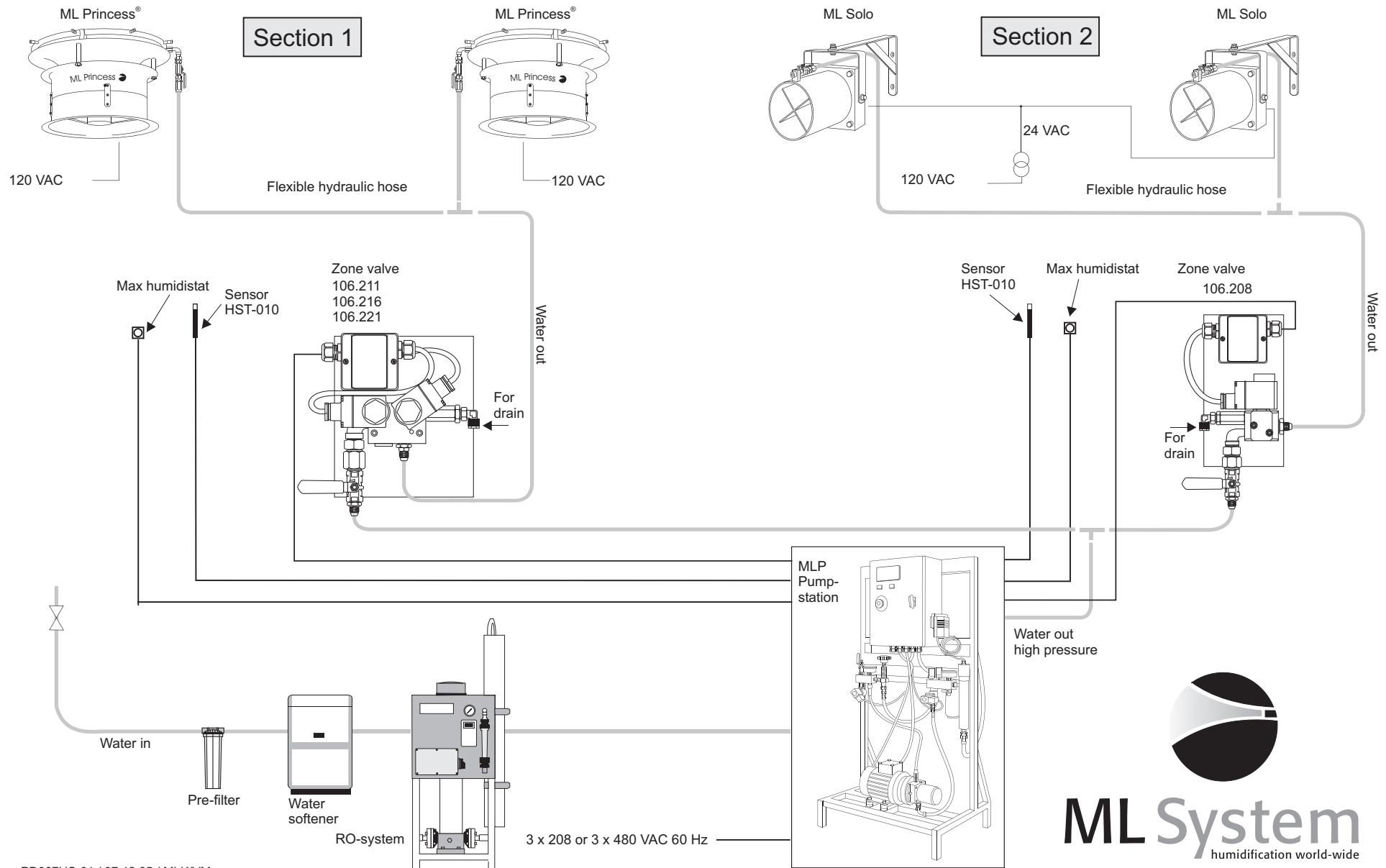
Then the emergency stop is loosened while the red reset key is pressed, the display writes after approx. 5 sec. *INITIALIZING*. Then you can release the reset key



Principle diagram: ML System® with common pump for several sections



Principle diagram: ML System® with PLC-control unit



PD007US-01 / 07.12.05 / MLK/VM

ML System
humidification world-wide

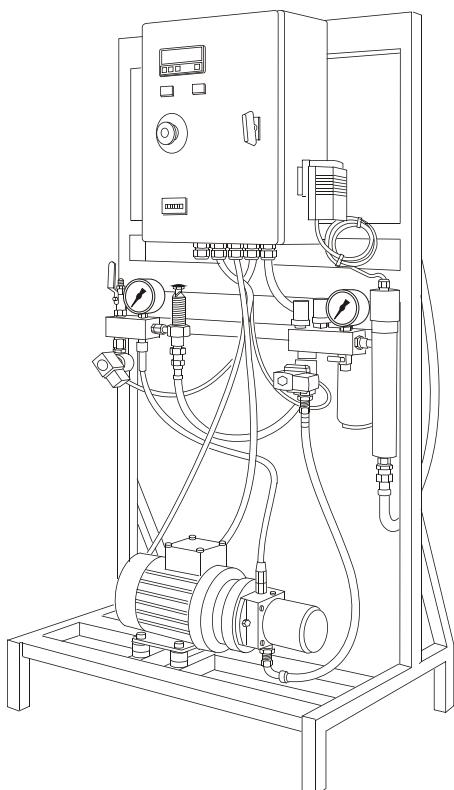


MLP Pump station

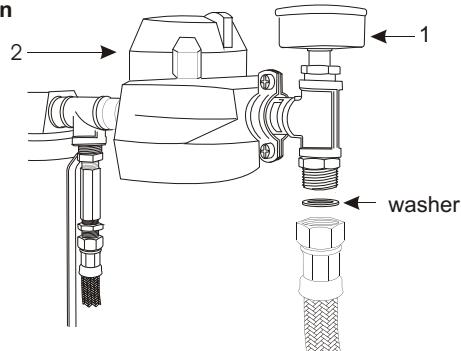
Installation Instruction

MA010US | 08.03.01 | ASK

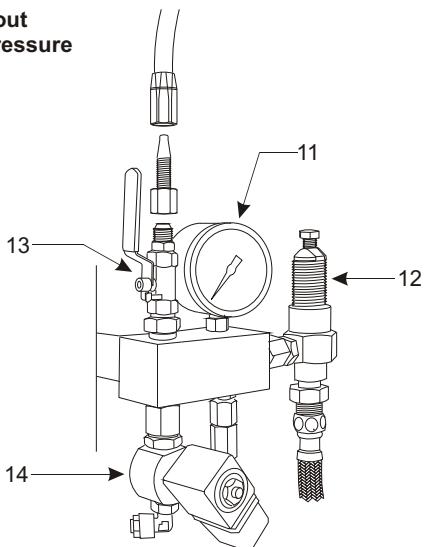
MLP Pump station



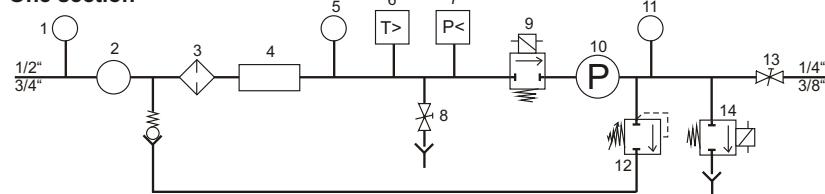
Water in



Water out
high pressure



One section

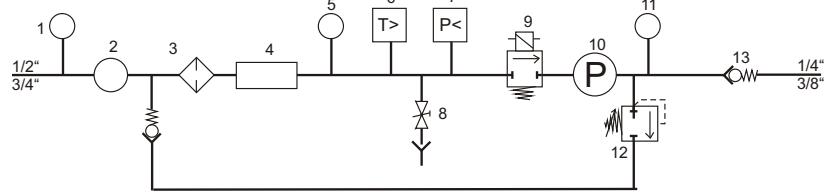


1. Pressure gauge 0-10 bar
2. Type approved water meter

3. 1µ filter
4. UV-light - optional
5. Pressure gauge 0-10 bar
6. Thermostat
7. Pressure switch
8. Test tap
9. On/off valve
10. Pump

11. Pressure gauge 0-100 bar
12. Pressure controller
13. Ball valve/non-return valve
14. Pressure release valve

Several sections

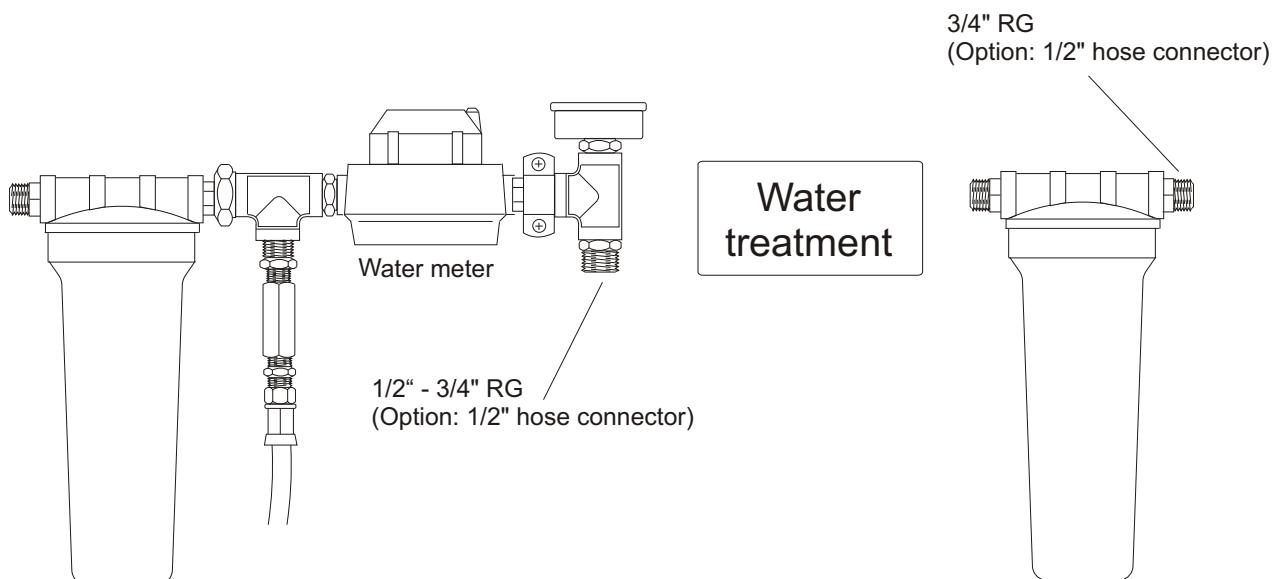




Filter Unit

Installation Instruction

MA017US | 14.03.01 | ASK



Size: 10"

Filtration: 1 μ

Size: _____ "

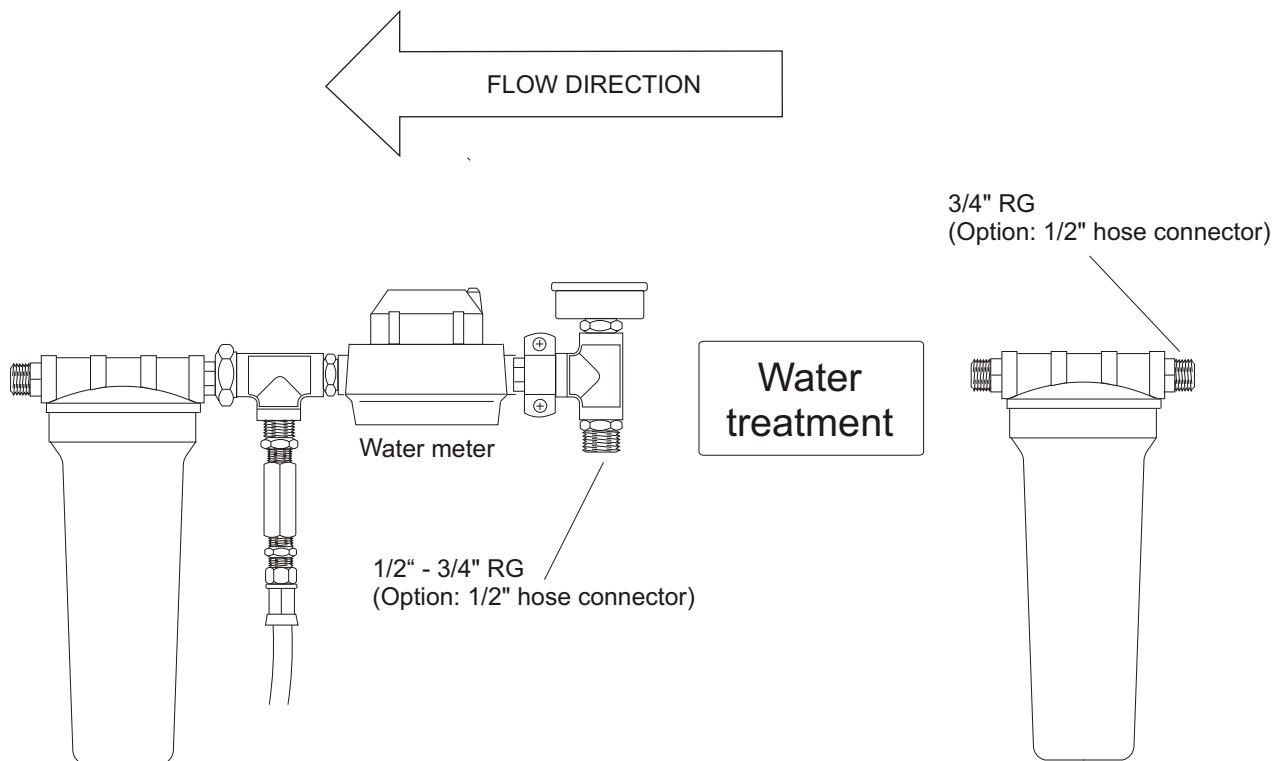
Filtration: _____ μ



Filter Unit

Installation Instruction

MA017US | 14.03.01 | ASK



Size: 20"

Filtration: 1 μ

Size: _____ "

Filtration: _____ μ



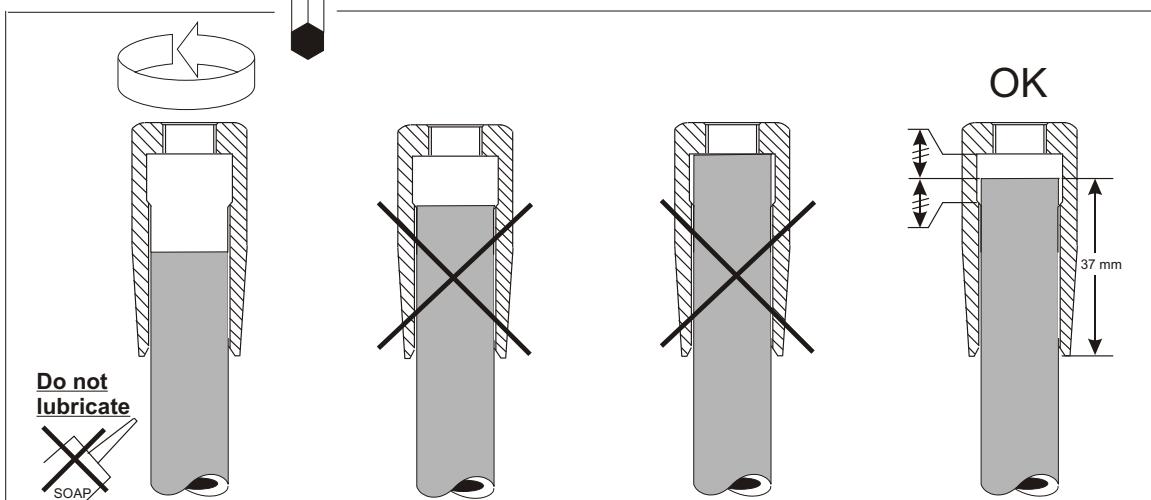
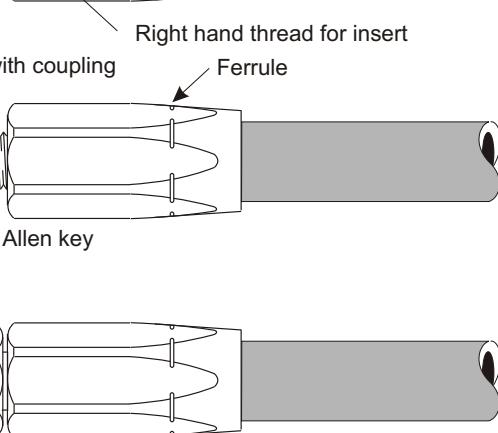
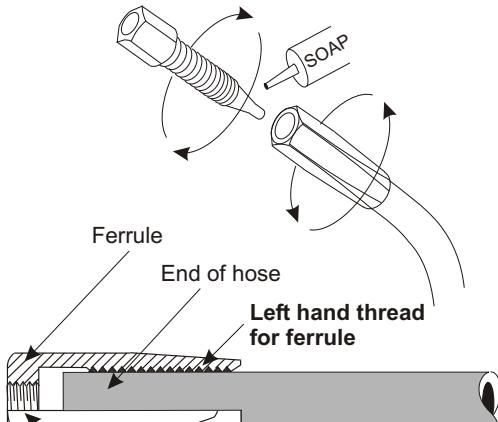
3/8" Stainless steel reusable fittings

Installation Instruction

MA064US-00 12.05.03 LR

Drawing no. 4

1. Saw or cut the hose to the right length.
- 1a. Check the hose diameter.
Tolerance outside: $5/8" \pm 1/64"$
Tolerance inside: $3/8" \pm 1/64"$
2. Clean the ends to remove metal filings.
3. Screw the ferrule onto the hose
- note that the ferrule has left-hand thread.
4. Screw the ferrule as far as it will go and then back off, allowing the hose to expand when the insert is screwed in (see drawing).
5. Lubricate the end of the insert with a detergent, and install the insert by means of an 8 mm Allen key.
6. Do not allow the hose to turn around while the insert is being screwed in - use special tool from ML system and screw in the insert in one continuous movement.
7. Insert **has to be** screwed completely **home** to be locked.





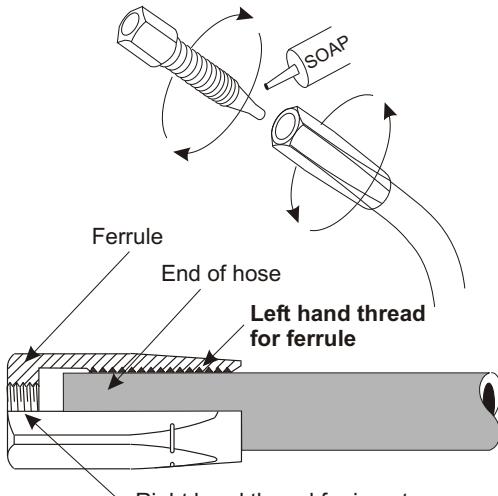
1/4" Stainless steel reusable fittings

Installation Instruction

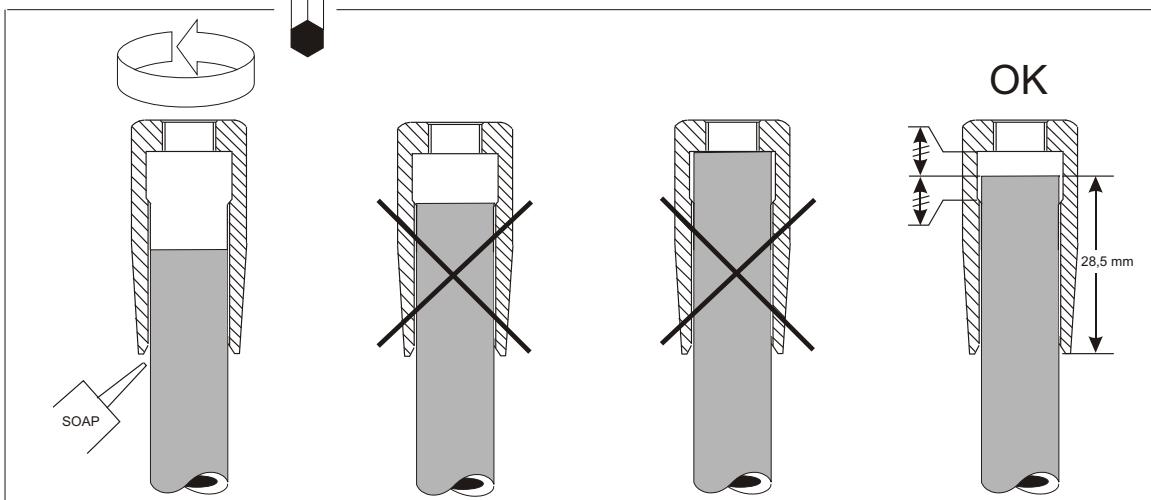
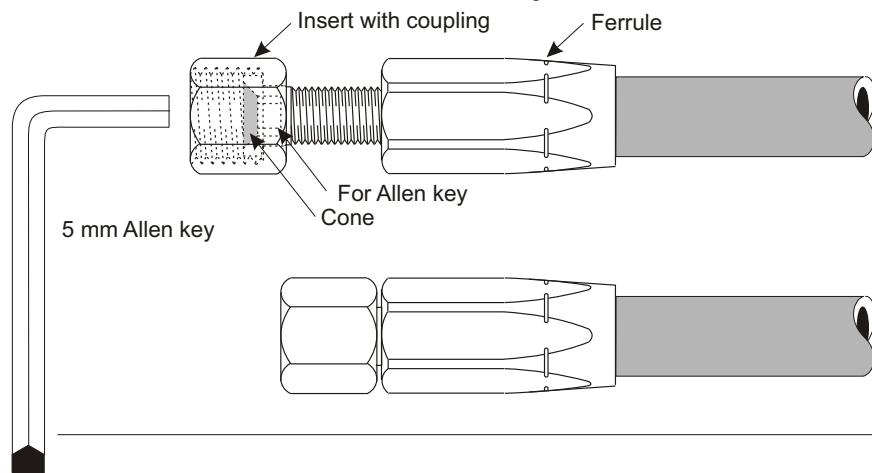
MA065US-00 | 12.05.03 | LR

Drawing no. 4

1. Saw or cut the hose to the right length.
- 1a. Check the hose diameter.
Tolerance outside: $7/16'' \pm 1/64''$
Tolerance inside: $1/4'' \pm 1/64''$
2. Clean the ends to remove metal filings.
3. Screw the ferrule onto the hose
- note that the ferrule has left-hand thread.
4. Screw the ferrule as far as it will go and then back off, allowing the hose to expand when the insert is screwed in (see drawing).
5. Lubricate the end of the insert with a detergent, and install the insert by means of a 5 mm Allen key.
6. Do not allow the hose to turn around while the insert is being screwed in - use special tool from ML system and screw in the insert in one continuous movement.
7. Insert **has to be** screwed completely home to be locked.



Right hand thread for insert



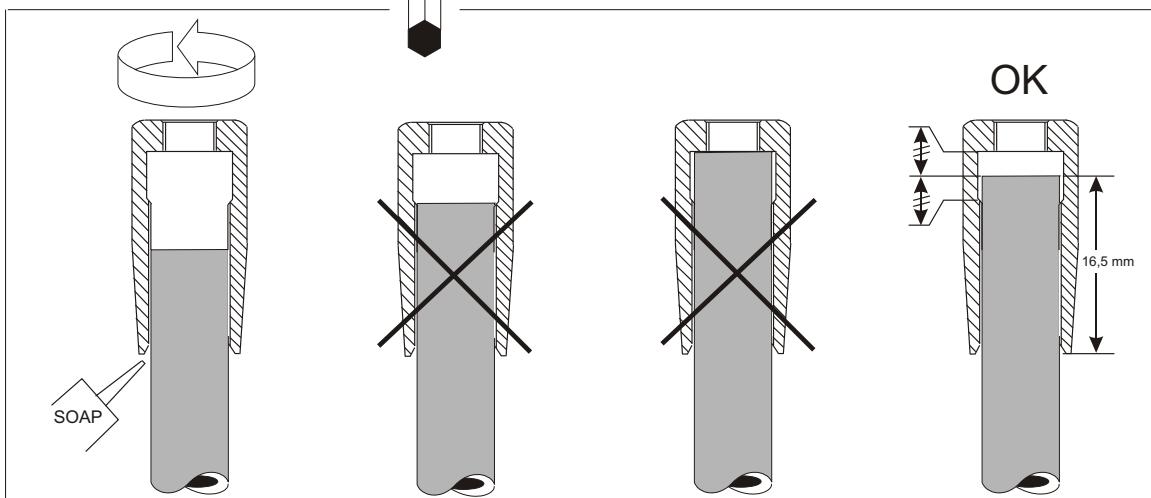
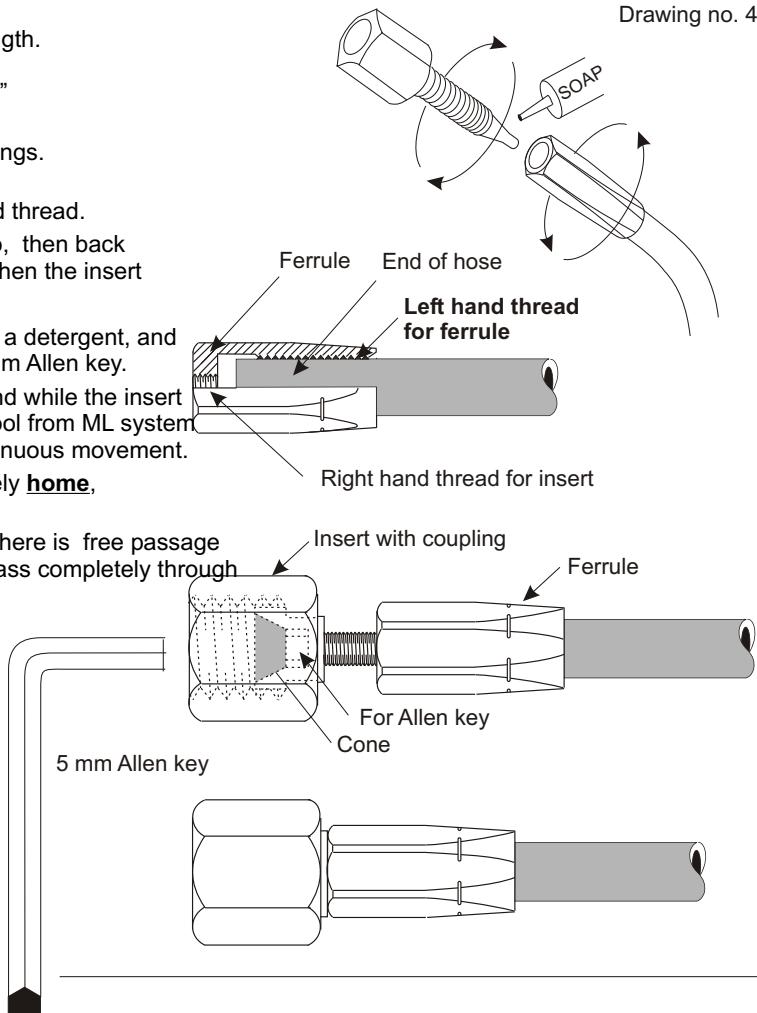
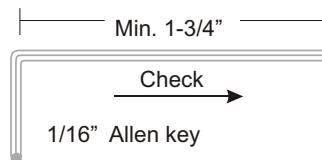


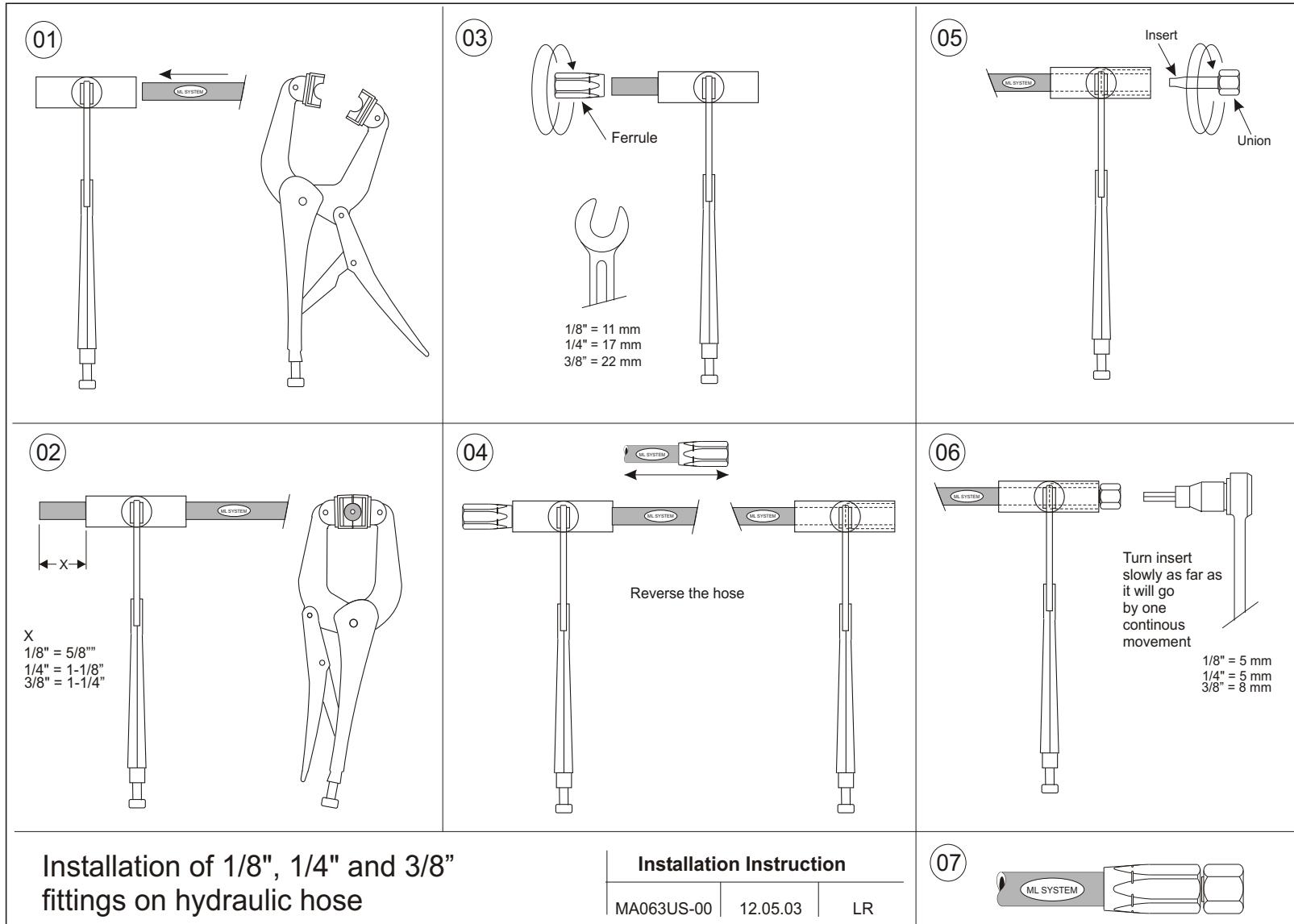
1/8" Stainless steel reusable fittings

Installation Instruction

MA066US-00 | 12.05.03 | LR

1. Saw or cut the hose to the right length.
- 1a. Check the hose diameter.
Tolerance outside: $5/16" \pm 1/64"$
Tolerance inside: $1/8" \pm 1/64"$
2. Clean the ends to remove metal filings.
3. Screw the ferrule onto the hose
- note that the ferrule has left-hand thread.
4. Screw the ferrule as far as it will go, then back off, allowing the hose to expand when the insert is screwed in (see drawing).
5. Lubricate the end of the insert with a detergent, and install the insert by means of a 5 mm Allen key.
6. Do not allow the hose to turn around while the insert is being screwed in - use special tool from ML system and screw in the insert in one continuous movement.
7. Insert **has to be** screwed completely **home**, to be locked.
8. Check with a 1/16" Allen key that there is free passage through the insert. The key must pass completely through





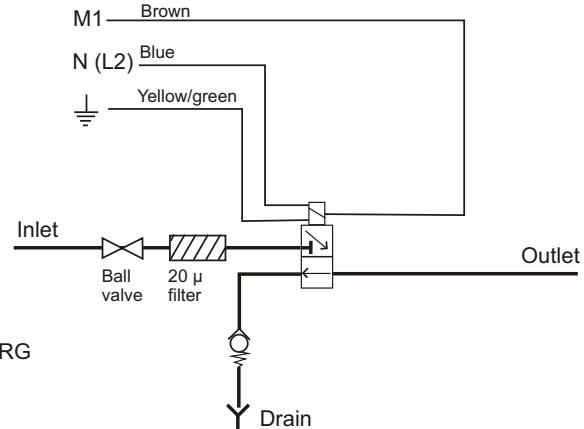
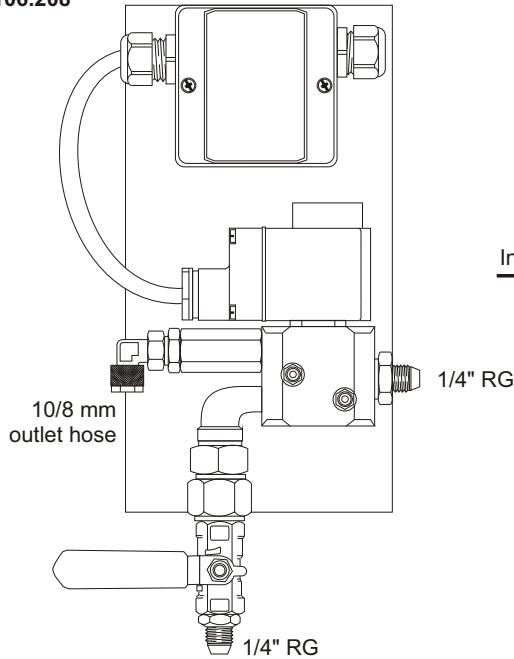


Solenoid Valve Set

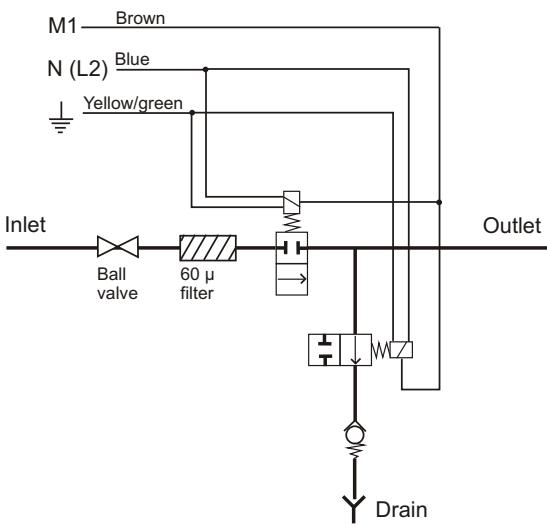
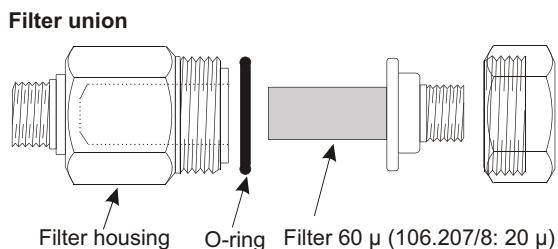
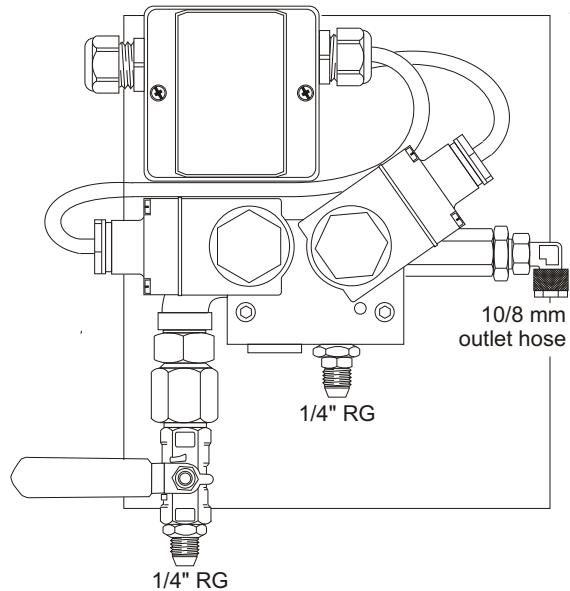
MOUNTING INSTRUCTION

MA013US-01 | 07.12.04 | MLK

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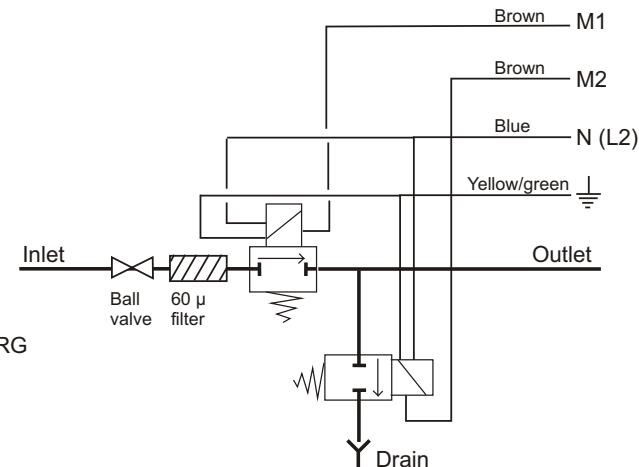
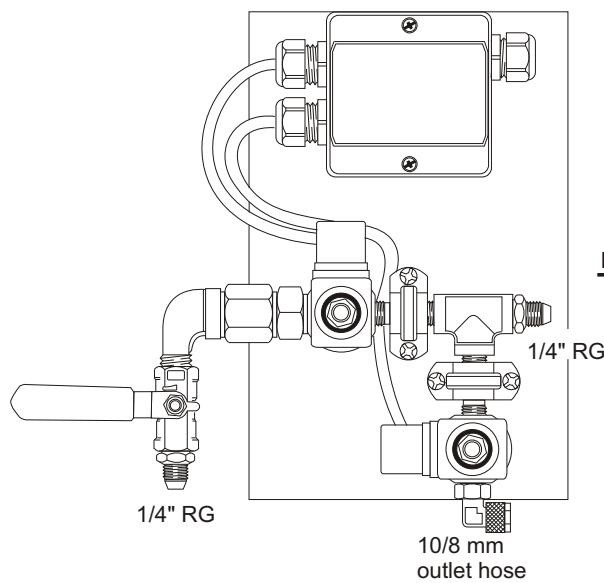


Solenoid Valve Set

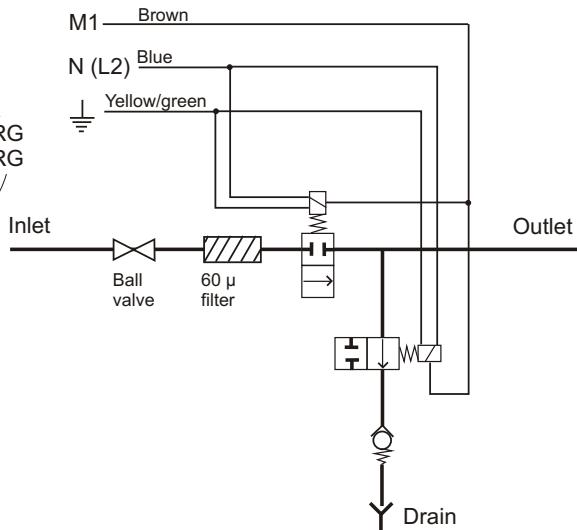
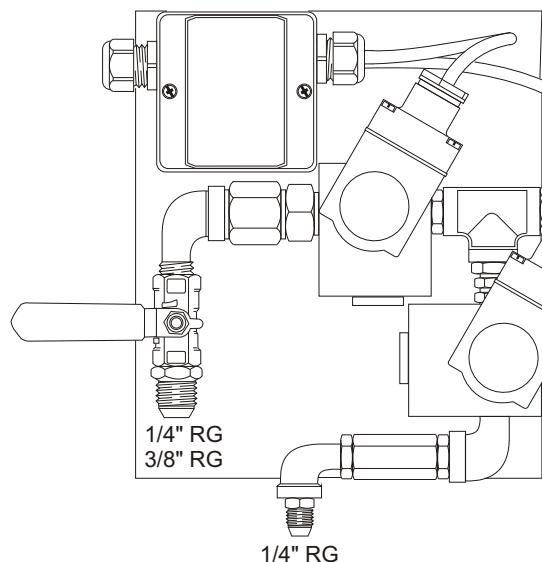
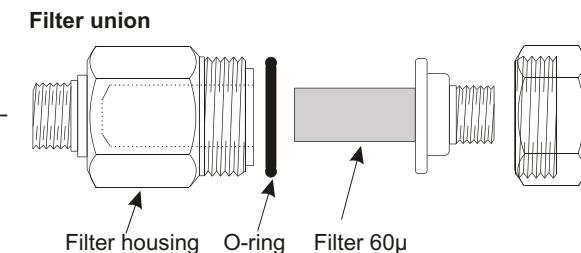
MOUNTING INSTRUCTION

MA013US-01 | 07.12.04 | MLK

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Electric Control Wiring Diagrams



Installation instructions for Control Parts for ML Humidification System

Declaration of Conformity.

We, ML System a/s, hereby declare with responsibility that the Pump Control, Humidity Controller, Humidity Sensor type HST-010, which is designed to be used with ML Humidification System for humidification in industrial rooms, are in conformity with the Council Directive 89/392 on the approximation of the laws of the EU Member States relating to machinery.

Tested according to the following standards: IEC 801-2, IEC 801-3, IEC 801-4, EN 55022
Marking: CE mark.

Ry 10.10.99

Leo Rasmussen
Technical Manager

Description of the units: See technical data **Function:** See technical data

Mounting:

To be placed and fixed at a height of 160-170 cm above floor level to the lower edge of the controlbox leaving the operating functions freely accessible.

Safety instructions

Power supply should be switched off before opening the controlbox. Connection and possible repairs must only be carried out by authorized people.

Electrical connection

Electrical connection to be made according to local rules by authorized people. The control systems should be connected to an external safety cut-out.

Service and maintenance

The controlbox should be cleaned on the outside for dust and dirt at least once a year, or when necessary. Clean in water and soap. Before the cleaning procedure is started, the power supply must be safely switched off, and it must be secured that the power cannot be switched on again during the cleaning.

Sound level

Sound level measured 1 metre from control units: 55 dB(A) at 50 Hz supply.

To be changed without notice.

Rev. 01/99

ML SYSTEM A/S - Parallelvej 2, DK 8680 Ry - DENMARK

Tel: +45 8788 2100 Fax: +45 8788 2121

F:\MANUALER\CE erklæringer\CE gamle

Electrical Control of the System

Installation Instructions

The electrical control of the system comprises a starter for the pump, and a number of humidity controllers with separate humidity sensors type HST-010.

Installation

The pump starter is installed on the pump frame. The humidity controllers must be installed at a vibration-free location in each individual section, or where reading of humidity is desirable.

The control boxes must be connected to power supply through a safety switch according to regulations.

Description

The pump starter gets the start signals from the humidity controllers in the sections (12 V DC). When one section requires humidity, the pump will start and the ON/OFF solenoid valve opens in that particular section. The start signal in the humidity controller is a no-voltage close switch and it is possible to leave out a two-wire cable between the humidity controllers and back to the starter (terminals 1 and 2).

Overload protection

All electric components must be additionally protected according to local regulations.

The pump is overload protected via thermo-trip placed in the starter box.

Wiring Diagrams

. Pump Starter Ver. 2.1

The individual components and their individual position, as well as the structure of the control unit, are shown on Page 1.

Pages 2 - 5 illustrate

- how to connect the power supply, connection from the humidity controllers and max-hygrostats etc. to the starter,
- how to connect to pressure switch, thermostat, motor and bypass valve, if any.

The designation and position of each individual terminal are indicated on Page 6.

. Humidity controller 105.316

The diagrams illustrate how to link the connection to/from the pump starter, solenoid valve set for ON/OFF and pressure release for the section, as well a humidity sensor HST-010. The cable for the humidity sensor can be extended up to 165' without problems. With cable lengths over 165', the sensor must have a U/I converter type CC420.

The humidity sensor should be installed at a location where the measured air reflects the average humidity in the room, and not at a location where the moisture from one of the nozzles will hit it directly. Please be aware of warm air flows and solar radiation.

Safety equipment

. Pressure switch

The pump starter is equipped with a blocking from the pressure switch placed on the intake side of the pump, to ensure that the pump will stop if the water pressure fails.

If the water pressure falls below the changeover pressure of the pressure switch (0.5 bar / 7.5 PSI), the display will show **-Pr.**

Reset is done by turning the starter off and on.

. Thermostat

Moreover, the pump is protected by a thermostat that will stop the pump if the water temperature at the intake exceeds 47°C / 116°F. The display will show **-Pr.**

Reset is done by turning the starter off and on.

. Max-hygrostats

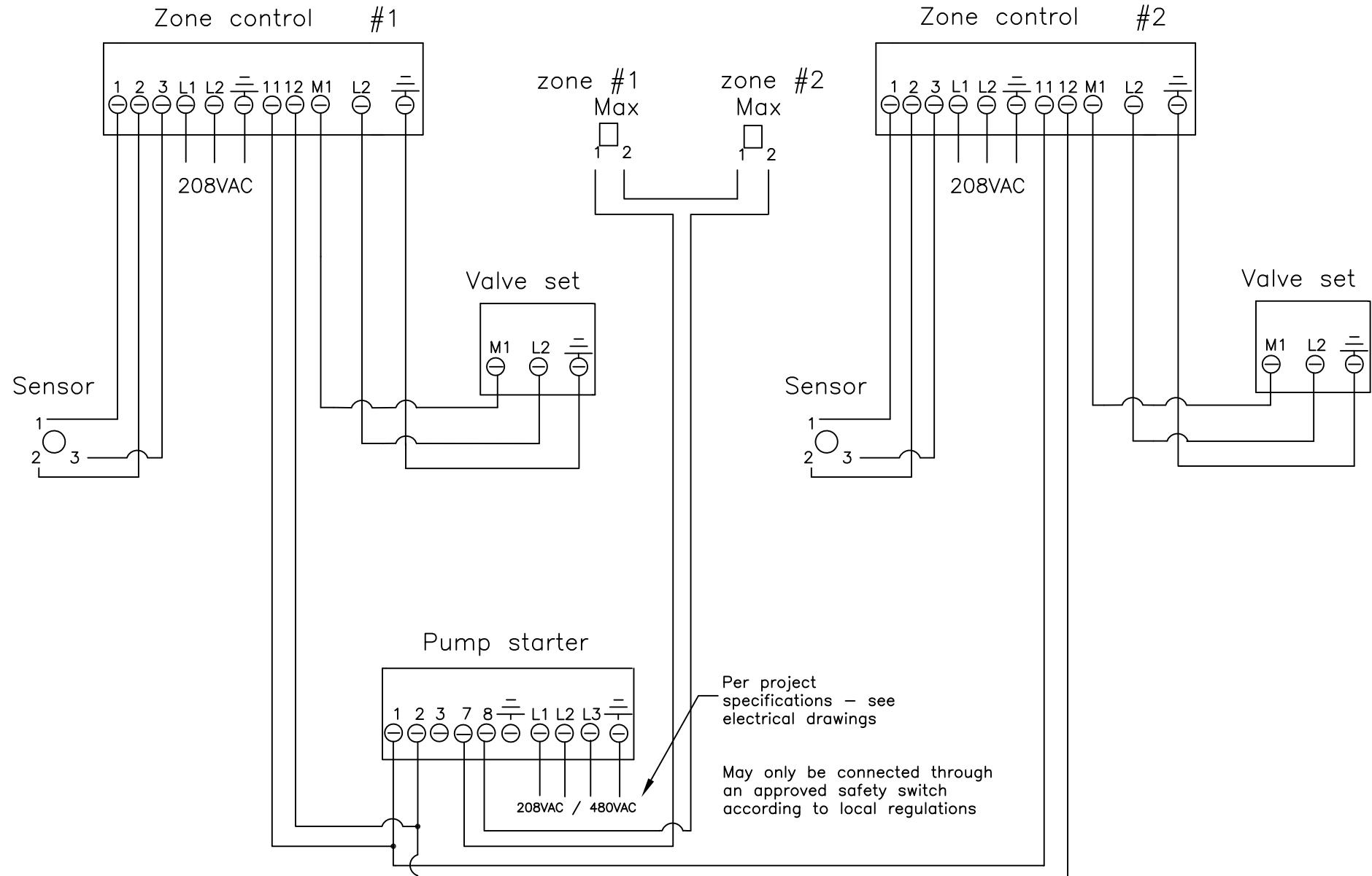
The max-hygrostats in the sections are to be inter-connected in series and connected to terminals 7 and 8 in the pump starter. If the humidity in one section reaches above the humidity level set on the hygrostat, the whole system will stop and can only operate again when the humidity has decreased, and after the reset button has been activated.

. Bypass

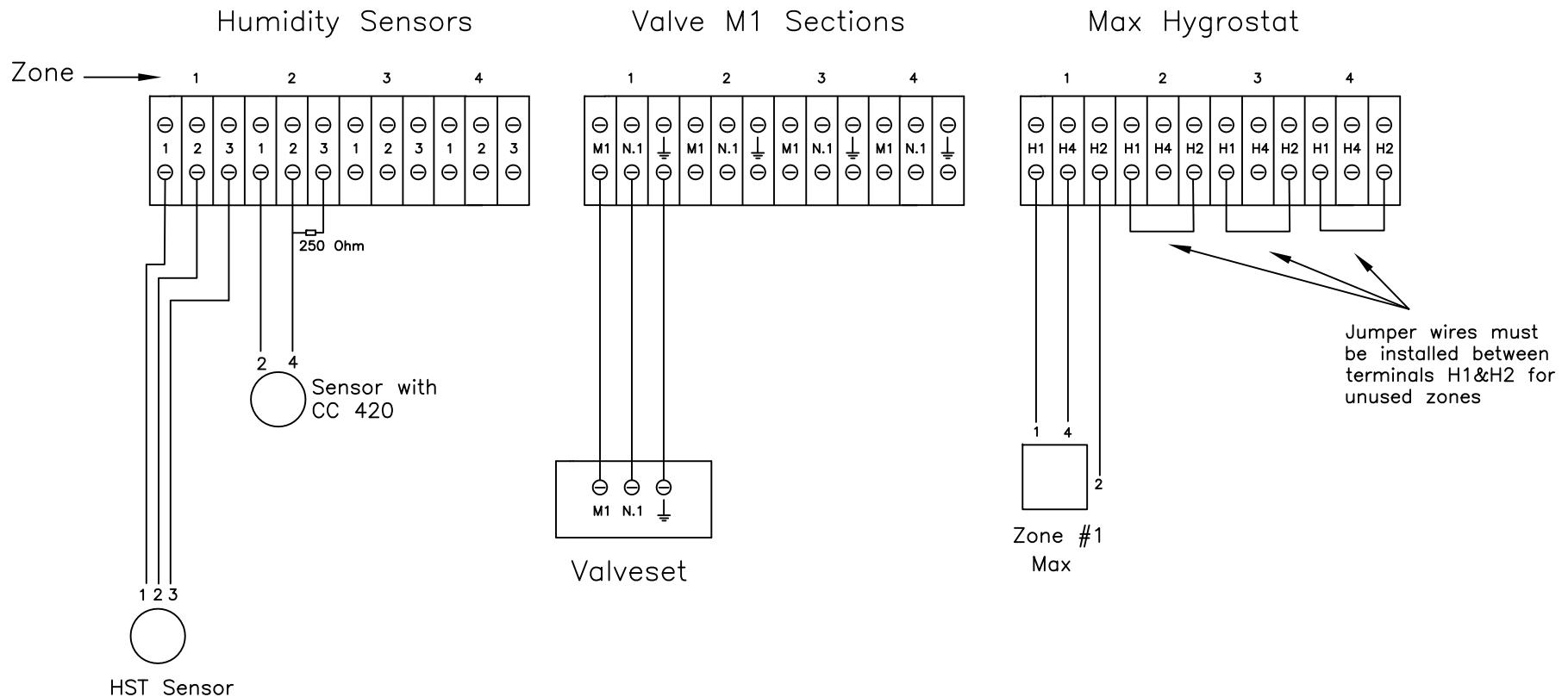
If the system is designed for humidity demand in one or more sections that is less than the pump's minimum capacity, a thermostatically operated bypass has been installed. If the water temperature exceeds 47°C / 116°F, open the bypass valve and the flow through the pump will increase. This will secure necessary cooling of the pump.

The bypass is led to drain or storage tank.

Typical electrical connections – Multi zone



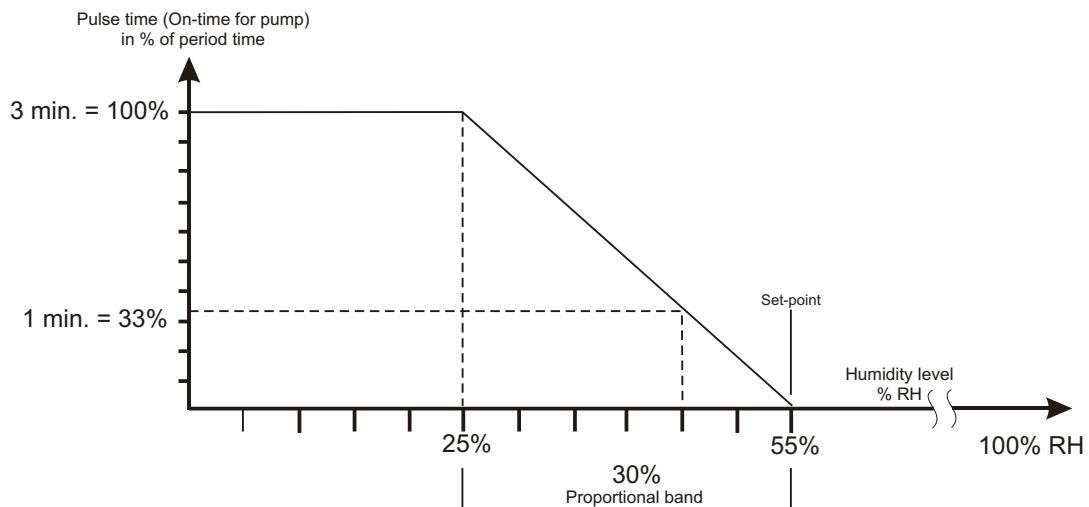
Typical Electrical Connections – PLC Controller





Example of settings and adjustment:

Set-point: 55% RH, Proportional band: 30%, Period time: 3 min.



Controlling:

If the humidity in the room drops under 25% RH, the system will run continuously - Minimum OFF-time (PAU) until the humidity level has reached 25% RH. (Set-point - proportional band = 55 - 30 = 25% RH.)

If the humidity in the room is between 25 and 55% RH, the running time for the system (the high pressure pump) depends on the distance to the setpoint.

The period time is divided into an ON-time and an OFF-time for the pump, as shown above.

If the humidity is 45% RH, the pump will be ON in 33% of the period time (1 min.) and be OFF in 66% of the period time (2 min.)

When the humidity is close to the set-point, the pump will run in the programmed minimum ON-time.

If the humidity exceeds the set-point, the system will remain stopped until the humidity level has dropped to a level below the set-point corresponding to the **minimum ON-time** for the pump.

When the humidity is between set-point and (set-point - proportional band) the exact ON-time for the pump can be calculated after the formula:

$$T(ON) = \text{period time} \times (1 - (\text{humidity level} - \text{set-point} + \text{pro. band}) / \text{pro. band}).$$



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

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

Example: Period time: 3 min., Set-point: 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:

$$T(on) = 3 \times (1 - (78 - 80 + 30)/30) = 3 \times (1 - 0.933) = 0.20 \text{ min.} = 12 \text{ sec.}$$

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

$$T(on) = 3 \times (1 - (70 - 80 + 30)/30) = 3 \times (1 - 0.667) = 1.00 \text{ min.}$$

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

$$T(on) = 3 \times (1 - (60 - 80 + 30)/30) = 3 \times (1 - 0.333) = 2.00 \text{ min.}$$

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:

$$T(on) = 3 \times (1 - (78 - 80 + 20)/20) = 3 \times (1 - 0.90) = 0.30 \text{ min.} = 18 \text{ sec.}$$

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

$$T(on) = 3 \times (1 - (70 - 80 + 20)/20) = 3 \times (1 - 0.50) = 1.50 \text{ min.}$$

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

$$T(on) = 3 \times (1 - (60 - 80 + 20)/20) = 3 \times (1 - 0.0) = 3.00 \text{ min. (100%).}$$

If the humidity level in the room drops under 60% RH, (set-point - 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.**, Set-point: 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:

$$T(on) = 5 \times (1 - (70 - 80 + 20)/20) = 5 \times (1 - 0.50) = 2.50 \text{ min.}$$

Electrical Control of the System

Mounting and Installation Instructions

Contents

Electrical Control of the System, One Section

Installation

Description

Overload protection

Wiring Diagrams

Electrical Control of the System, Several sections

Installation

Description

Overload protection

Wiring Diagrams

Safety equipment

Programming

Programming of humidity controller, Ver. 1.7

Programming of starting automatic

Electrical Control of the System, One Section

Mounting and Installation Instructions

The electrical control of the system is comprised of a humidity controller including an automatic starter for the pump and a humidity sensor type HST-010 placed in the respective section.

Installation

The control box is mounted on the pump frame.

The control box must be connected through a safety switch according to regulations.

Description

The humidity controller measures the humidity in the room and calculates the operation time of the pump based on humidity level and set point. (Please refer to Technical Data TD017GB).

Overload protection

All electric components must be additionally protected according to local regulations. The pump is overload protected by means of thermo-release placed in the automatic starter box.

Wiring Diagrams

Humidity regulator

The structure of the control unit is illustrated on page 1.

The following pages show

- how to connect supply, connection from the humidity controller and max-hygrostat, etc. to the automatic starter.
- how to connect to pressure switch, thermostat, etc. as well as bypass valve, if any.

Check the direction of rotation when connecting the motor.

The designation and position of each individual terminal is indicated on the last page of the drawing.

The cable for humidity sensor can be extended up to 50 m without problems. With cable lengths over 50 m the sensor must be provided with a U/I-converter type CC420. Please inquire for further details.

The humidity sensor should not be placed in a way that the moisture from one of the nozzles will hit it directly, but should be installed in a way that the measured air reflects the average humidity in the room. Please be aware of warm airflows and solar radiation.

Electrical Control of the System, Several sections

Mounting and Installation Instructions

The electrical control of the system is comprised of an automatic starter for the pump and a number of humidity controllers with humidity sensor type HST-010 placed in the respective sections.

Installation

The automatic starter is mounted on the pump frame, The humidity controllers should be mounted on a vibrationless base in each individual section or wherever the reading of humidity is desirable.

The control boxes must be connected electrically through a safety switch according to regulations.

Description

The automatic starter for the pump receives start signals from the humidity controllers in the sections (12 V DC). When one section is short of humidity, the pump will start and the section in question opens the on/off solenoid valve. The start signal in the humidity controller is a no-voltage close switch and it is possible to install a two-wire cable between the humidity controllers and back to the automatic starter (terminals 1 and 2).

Overload protection

All electric components must be additionally protected according to local regulations.
The pump is overload protected by means of thermo-trip placed in the starting automatic box.

Wiring Diagrams

☒ Automatic starter Ver. 2.1

Each individual component and its position as well as the structure of the control unit are shown on page 1.

The pages 2-5 illustrate

- how to connect supply, connection from the humidity controller and max-hygrostats, etc to the starting automatic,
- how to connect to pressure switch, thermostat, motor and bypass valve, if any.

The designation and position of each individual terminal is indicated on page 6 of the drawing.

☒ Humidity controller, 105.316

The diagrams illustrate how to link the connection to/from the automatic starter, solenoid

valve set for on/off and pressure relief for the section as well as humidity controller type HST010. The cable for humidity sensor can be extended up to 50 m without problems. With cable lengths over 50 m the sensor must be provided with a U/I-converter type CC420. Please inquire for further details.

The humidity sensor should not be placed in a way that the moisture from one of the nozzles will hit it directly, but should be installed in a way that the measured air reflects the average humidity in the room. Please be aware of warm airflows and solar radiation.

Safety equipment

Pressure switch

The automatic starter is provided with a blocking from the pressure switch placed on the intake of pump to ensure that the pump will stop if the water pressure disappears.

If the water pressure falls below the changeover pressure of the pressure switch (0.5 bar), the display will indicate **-Pr**

Restart is done by switching off the automatic starter and on again.

Thermostat

The pump is further protected by a thermostat that will stop the pump if the water temperature on the inlet side is higher than 47°C. The display will indicate **-Pr**

Restart is done by switching the automatic starter off and on again.

Max-hygrostats

The max-hygrostats in the sections are to be inter-connected in series and connected to terminals 7 and 8 in the automatic starter. If the humidity in one section is over the humidity level set on the hygrometer, the whole system will stop and can only be switched on again when the humidity has decreased and after the reset-button on the front has been activated.

Bypass

If the system is constructed with one or several sections with a capacity less than the minimum pump capacity, a thermostatically operated bypass has been installed. If the water temperature is higher than 47°C, open the bypass valve and the flow through the pump will increase. This is to insure necessary cooling of the pump.

The bypass is let to a drain or storage tank.

Programming

Programming of humidity controller, Ver. 1.7

Calibration of HST010

Setting of values in the humidity controller with HST010 or HST010 + CC420

	A	B	C	D	E
Step	Pressure	Display shows:	Followed by:	Adjust display to show:	Explanation:
1	↑ and ↓ at the same time	Pas	0	197	Password to get access to electric settings
				unchanged	Do NOT enter password Go directly to step 15
2	S	Pas	197	unchanged	(Change if new password is wanted)
3	S	dP	111,1	unchanged	Decimal-point (must not be changed)
4	S	HIE	8,00	unchanged	Highest electric input signal from humidity sensor (HST010)
			16,80	unchanged	Highest electric input signal from humidity sensor (HST010 + CC420)
5	S	LOE	2,00	unchanged	Lowest input signal from humidity sensor (HST010)
			7,20	unchanged	Lowest input signal from humidity sensor (HST010 + CC420)
6	S	HI	80	72-88 %RH	Highest readout in display. Here sensor's display can be changed .

If manual hygrostat shows **more** than the display, **increase HI** to suitable value.

If manual hygrostat shows **less** than the display, **decrease HI** to a suitable value.

7	S	LO	20	unchanged	Lowest reading in display
8	S	-Pr	10	10	Seconds: Delay for insufficient water pressure (only used when pressure switch is installed)
9	S	Aut	Off	unchanged	Allows automatic reset of -Pr (must not be changed)
10	S	SPH	60,0	wanted	[% RH]: Highest possible setpoint
11	S	Int	On	wanted	Integration (error compensation)
12	S	Int	25	wanted	[minutes] Integration time
13	S	FLu	0,2	wanted	[1/100 minutes] Flush time
14	S	FdE	30,0	wanted	[minutes] Maximum pause time
15	S	Pro	20,0	wanted	[%]: Proportional band
16	S	PEr	3,0	wanted	[minutes] Period time
17	S	On	0,3	wanted	[1/100 minutes] Minimum operating time for pump (0.3=18 sec.)
18	S	PAU	0,3	wanted	[1/100 minutes] Minimum pause time for pump
19	S	rEL	0,3	wanted	[1/100 minutes] Opening time for pressure relief valve
20	S	End	run		Programming is finished.

Column C indicates the standard settings.

Carefully study the instruction for humidity control before the system becomes operational.

Programming of automatic pump starter (version 2.1)

	A	B	C	D	E
Step	Pressure	Display shows:	Followed by:	Adjust display to show:	Explanation:
1	↑ and ↓ at the same time	Pas	0	197	Password to get access to electric settings
				unchanged	Do NOT enter Password Go directly to step 10
2	S	Pas	197	unchanged	(Change if new password is wanted)
3	S	dP	11,11	unchanged	Decimal-point (must not be changed)
4	S	HIE	19,99	unchanged	Highest electric input signal from humidity controllers
5	S	LOE	-19,99	unchanged	Lowest input signal from humidity controllers
6	S	HI	19,99	unchanged	Highest readout in display. Corresponds to "On"
7	S	LO	-19,99	unchanged	Lowest readout in display. Corresponds to "OFF"
8	S	-Pr	5	wanted	Seconds: Delay for insufficient water pressure (only used when pressure switch is installed)
9	S	Aut	Off	unchanged	Allows automatic reset of -Pr (must not be changed)
10	S	SP	5,00	unchanged	Start value
11	S	Hys	0,1	unchanged	Hysteresis
12	S	rel	0,3	unchanged	1/100 seconds: Opening time for pressure relief valve, if any
13	S	End	run		Programming is finished.

From the factory the pump starter is provided with a wire jumper between the "Prog Lock" terminals to prevent changes of program parameters.

ML pump controller MLDM35

Manual (For single, multi-zone and building management systems)

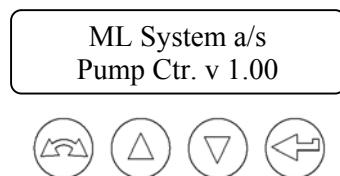
TECHNICAL DATA

TD112DK-00 | 19-03-07 | MLK/KK

The pump controller is an electronic controller, which is operated by means of a keyboard with 4 keys. The keys are: **↔ (MODE)**, **↑ (ARROW UP)**, **↓ (ARROW DOWN)** and **↙ (ENTER)**. Use **MODE** when changing between the different displays, use **ARROW UP** and **ARROW DOWN** when adjusting a parameter up and down, and use **ENTER** when saving a parameter value or proceeding to the next parameter.

Parameters and status are shown on the controller's 2 x 16 character display with back lighting.

When the controller is turned on, the following image will be shown on the display for about two seconds:



The controller's software version is shown in line 2 on the display.

The controller's software works on the basis of the data entry of variable parameters and the continuous measuring of the controller's analogue and digital inputs.

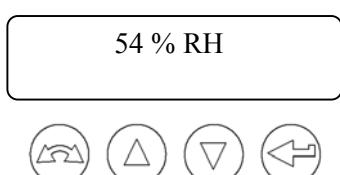
The controller's software is divided into the following sections:

- a) Normal operation (control logic) for the section controller.
- b) Alarm functions.
- c) Menu for data entry of the programmable parameter.
- d) Service routines (described in a separate document).

Normal operation

The pump controller works either as an independent 1 section controller with proportional integral regulation of one particular zone or as a pump controller for several zones, where a separate controller is used (ML product number 105.316.001, 105.316 or 105.319) for each zone. When a certain zone is to be humidified these section controllers signals to the pump controller through an isolated relay switch.

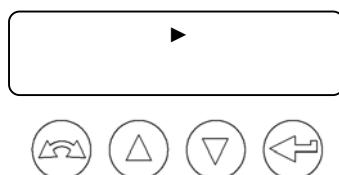
Display image at normal operation (1 section controller).



The top line shows the measured value from the connected humidity sensor and if the 'stop' input is activated.

The bottom line shows alarms and status of the pump and the pressure release.

Display image at normal operation (several sections).



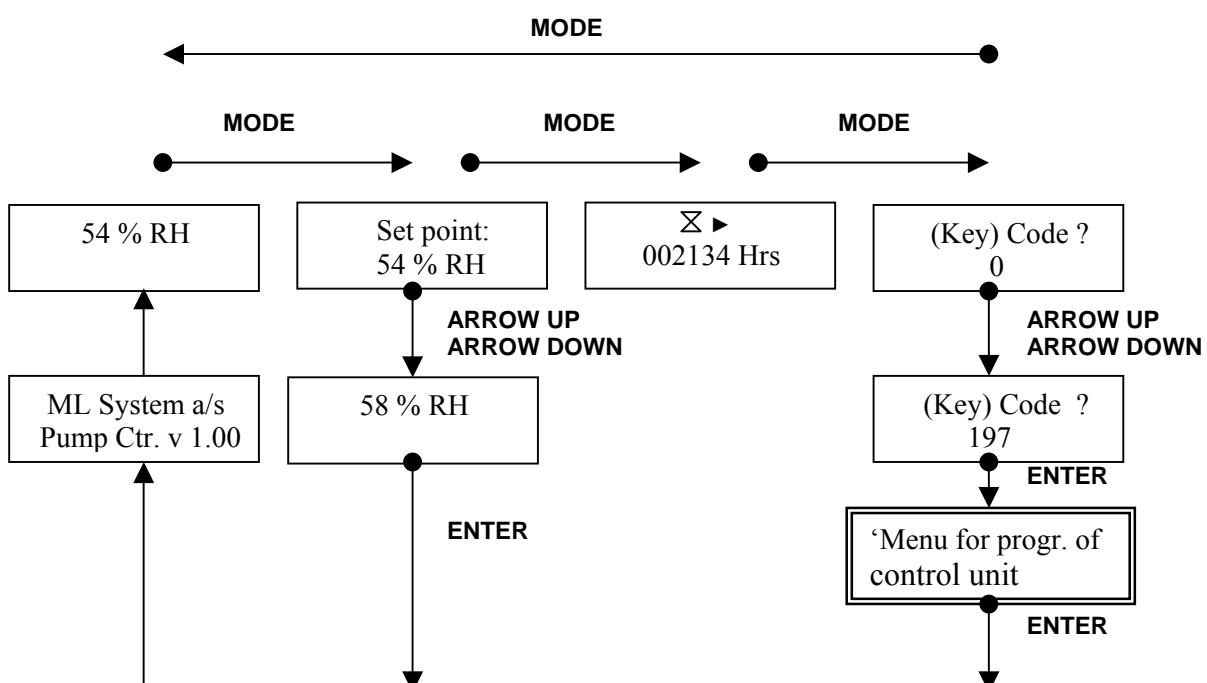
The top line shows if the 'stop' entry is activated and if the signal from the section controller is outside the acceptable voltage area. Otherwise this is not applied at normal operation, as there is no input from a humidity sensor.

The bottom line shows alarms and status for the pump and pressure release.

During normal operation the display image can be changed by activating the **MODE** key then the display images change:

- Top line shows input from the connected humidity sensor.
- Entered set point (only for the 1 section controller: set point for % RH).
- Readings of operation hours for the area or the high pressure pump. The working hour counter is updated automatically and the value is saved in case of power failure.
- Menu for programming of the controller parameter.

Layout diagram, display image at normal operation (1 section controller shown).



If either a change of the entered set point or the menu for programming of control parameters is chosen, then the normal humidification program will stop. The humidification program will resume when the changes are terminated.

In order to change the entered set point, the new set point must be entered by means of **ARROW UP** and **ARROW DOWN** and finish with **ENTER**.

In order to enter the menu for programming of the control parameters, then the correct key code (password) must be entered and finished with **ENTER**. Look for further description in: '*Menu for programming the control parameter*'

If no keys are activated for a period of time, or if the setting of the parameters are done, then the display will indicate normal operation again.

Alarm functions

If an alarm condition occurs the display will indicate this. These are the alarm conditions:

- Low water pressure (< 20 psi). Shows in the display with 'tap' symbol.
- High water temperature (> 47°C (117°F)). Shows in the display with '°C' symbol.
- Sensor signal or signal from section controller outside acceptable area. Shows in the display with '-EE' at too low signal, and with 'EE' at too high signal.
- Over humidification at the humidistat. Shows in the display with '^RH^' symbol.
- The system stopped by the signal at the digital 'stop' entry. Shows in the display with the text 'stop'. Notice: the signal at the digital 'stop' entry does not activate the alarm relay.

The audible alarm will be activated until the alarm disappears or the key **ENTER** is activated. If the system enters the alarm condition, then the humidification routines will stop and the alarm relay will be activated.

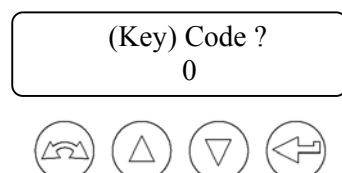
Menu for programming control parameters

As described in the section *Normal operation*, the **MODE** -key must be activated in order to get to the menu for programming of the control parameters, where the correct key code (password) must be programmed and finished with **ENTER**, which is used when accepting and saving a programmed value in general.

The display can be changed back to normal operation at any time by means of the **MODE** key. If no keys are activated for a period of time, the display will show normal operation again.

The programmable parameters are different for a controller for one zone and a controller for several zones. This is shown in the description of the parameter programming menu below.

Menu for programming of controller parameters is protected with a code. This is shown when the display shows the text:



The access to the programming of the control parameter is pin-code protected by a number between 0 and 999. The code is set to 197 by the manufacturer. With **ARROW UP** and **ARROW DOWN** the code can now be set at the correct value. Finish by pressing the **ENTER** key once. If the code is not correct the display will show:

(Key) Code Err.



Now the fundamental parameter settings will be skipped and you begin at the first unprotected parameter, which is the proportional band in the humidity regulator.
If the code is correct the display will show:

(Key) Code OK
197



If desired, the code can now be set to another value with **ARROW UP** and **ARROW DOWN**. This code is valid from the next time you try to get access to the programming of the control parameter. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters. It is always possible to exit without saving the parameter by pressing the **MODE** key. The other parameters can be set in the same way one- by-one.

Depending on whether the setting deals with one or several zones, the rest of the parameters will be described further here.

The next parameter is the maximum voltage on the controller's analog input from the humidity sensor. If the sensor signal is higher than this value, the display will show 'EE'.

HiE:
8,00



With **ARROW UP** and **ARROW DOWN** the maximum input voltage can be set. Finish by activating the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters. The display can be changed back to normal operation at any time by means of the **MODE** key.

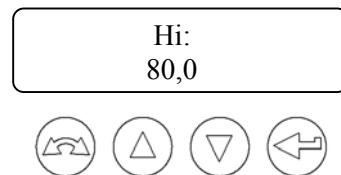
The next parameter is the minimum input voltage on the controller's analog input for the humidity sensor signal. If the signal is below this value, it will be indicated in the display by showing '-EE'.

LoE:
2,00



With **ARROW UP** and **ARROW DOWN** the minimum input voltage can be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

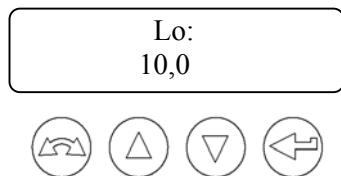
The next parameter is a scaling value, which is equivalent to the maximum input value HiE, displayed when the maximum input is present at the analog input of the humidity sensor signal. In this way it is possible to scale an input signal for the desired display value. HiE can be adjusted up to +/- 10 % in order to compensate for inaccurate humidity readings.



With **ARROW UP** and **ARROW DOWN** the maximum display value can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

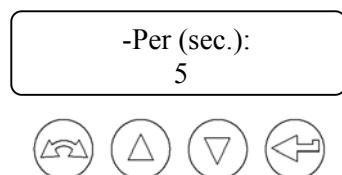
The next parameter is the scale value, which is equivalent to the minimum input value LoE shown in the display when the minimum input value is present at the analog input for the humidity sensor signal.

In this way it is possible to scale an incoming signal for the desired display.



With **ARROW UP** and **ARROW DOWN** the minimum display value can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the timer setting (delay) for activating the pressure switch set in seconds.



With **ARROW UP** and **ARROW DOWN** the timer value can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters. The next parameter is the timer setting (delay) for activating the temperature switch set in seconds.

-Temp (sec.):

5



With **ARROW UP** and **ARROW DOWN** the timer value can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the choice of automatic restart of the high pressure pump after pressure switch or temperature switch failure.

Aut:
Off



With **ARROW UP** and **ARROW DOWN** automatic restart on/off can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The parameters up to 'Aut' are common no matter the number of areas. After this the programming is followed by the specific parameters. First the rest of the parameters for 1 zone will be described, then the specific parameters for a controller for multiple zones will be described.

At 1 zone the next parameter is the maximum allowed set point value.

SPH (% RH):
60,0



With **ARROW UP** and **ARROW DOWN** the maximum set point value can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

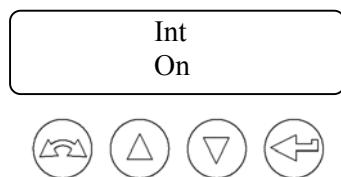
The next parameter is the proportional band in the humidity regulator.

Pro (%RH):
20,0



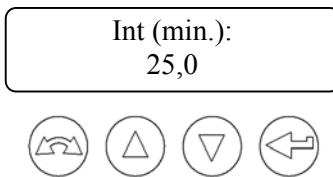
With **ARROW UP** and **ARROW DOWN** the proportional band can be set now. Finish by activating the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is a selection of whether the integration function in the humidity regulator is activated or not.



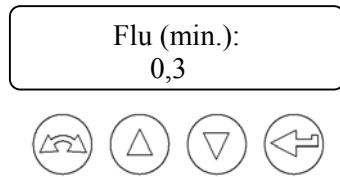
With **ARROW UP** and **ARROW DOWN** it now is possible to set the integration function on or off. Finished by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the integration time in the humidity regulator set in minutes.



With **ARROW UP** and **ARROW DOWN** the integration time can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the rinsing time set in minutes for the 'flush' function, which takes care of rinsing the system within fixed intervals.



With **ARROW UP** and **ARROW DOWN** the rinsing time can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the delay time in minutes for the 'flush' function, which rinses the system within fixed intervals. If no humidification has taken place during the fixed set minutes 'Fde', the system flushes in 'Flu' minutes.

Fde (min.):
30



With **ARROW UP** and **ARROW DOWN** the delay time can be set now. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the period time in the humidity regulator set in minutes.

Per (min.):
2,0



With **ARROW UP** and **ARROW DOWN** the time span can now be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the minimum 'on' time for the high pressure pump per period in the humidity regulator set in minutes.

On (min.):
0,1



With **ARROW UP** and **ARROW DOWN** the minimum 'on' time can now be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the minimum pause time for the high pressure pump per period in the humidity regulator set in minutes.

PAU (min.):
0,2



With **ARROW UP** and **ARROW DOWN** the minimum pause time can now be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when

proceeding to the programming of the next parameters. In case of On + Pau > Per (period time) error is reported in the display and you are returned to the programming procedure in order to correct the parameters.

The next parameter is the time for opening the pressure release valve, set in minutes.

REL (min.):
0,1



With **ARROW UP** and **ARROW DOWN** the time for the pressure release valve can be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value. This is the last parameter before returning to normal operation with the new control parameters.

The display image below will be shown in about two seconds until normal operation resumes:

ML System a/s
Pump Ctr. v 1.00



This is the end of the review of the specific parameters for 1 area.

Parameters for Multiple Zones

For several areas the next parameter is the set point value that is at which input voltage, the high pressure pump starts.

SP (VDC):
5,0



With **ARROW UP** and **ARROW DOWN** the set point value can now be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the hysteresis at the set point value. The set point value – hysteresis is the input voltage, where the high pressure pump stops and the pressure release begins.

HYS (VDC):
1,0



With **ARROW UP** and **ARROW DOWN** the hysteresis can now be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value and when proceeding to the programming of the next parameters.

The next parameter is the time for opening the pressure release valve, set in minutes.

REL (min.):
0,3



With **ARROW UP** and **ARROW DOWN** the time for the pressure release valve can be set. Finish by pressing the **ENTER** key, which is used when accepting and saving a programmed value. This is the last parameter before returning to normal operation with the new control parameter.

The display image below will be shown in about two seconds until normal operation resumes:

ML System a/s
Pump Ctr. v 1.00



List of parameters, 1 area/section controller:

Parameter	Factory settings	System specification settings	Minimum value	Maximum value	Unit
Key code	197		0	999	
Max. input value 'HiE'	8,00 (9,73 v. mA)		0,00	14,00	VDC
Min. input value 'LoE'	1,00 (3,24 v. mA)		0,00	14,00	VDC
Max. display value 'Hi'	80,0		0,0	140,0	
Min. display value 'Lo'	10,0		0,0	140,0	
Pressostat timer '-Pr'	5		0	99	Sek.
Thermostat timer '-Temp'	5		0	99	Sek.
Automatic restart 'Aut'	Off		On/Off	On/Off	
Max. set point 'SPH'	60,0		0,0	100,0	% RH
Proportional band 'Pro'	20,0		0,0	100,0	% RH
Integration 'Int'	On		On/Off	On/Off	
Integration time 'Int'	25,0		5,0	25,0	Min.
Flushing time 'Flu'	0,2		0,0	5,0	Min.
Flushing delay 'Fde'	30		10	250	Min.
Period time 'Per'	2,0		1,0	9,9	Min.
Min. on-time 'On'	0,1		0,1	4,9	Min.
Pause time 'PAU'	0,2		0,1	4,9	Min.
Pressure releases time 'REL'	0,1		0,0	1,0	Min.

List of parameters, several areas/sections controller:

Parameter	Factory settings	System specification settings	Minimum value	Maximum value	Unit
Key code	197		0	999	
Max. input value 'HiE'	14,00		0,00	14,00	VDC
Min. input value 'LoE'	0,00		0,00	14,00	VDC
Max. display value 'Hi'	14,0		0,0	140,0	
Min. display value 'Lo'	0,0		0,0	140,0	
Pressostat timer '-Pr'	5		0	99	Sek.
Thermostat timer '-Temp'	5		0	99	Sek.
Automatic restart 'Aut'	Off		On/Off	On/Off	
Set point 'SP'	5,0		0,0	100,0	VDC
Hysteresis 'HYS'	1,0		0,0	100,0	VDC
Pressure release 'REL'	0,3		0,0	1,0	Min.

***Electric control of the ML-pumpstation
With PLC-control for 1-4 zones***
Programming instructions

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Electric control of the ML-pump station With PLC-control for 1-4 zones

Description

The pump is coupled to a three-phase motor powered by magnet controlled protective motor switches.

The control consists of a PLC which regulates humidity of the zones. The regulation takes place by means of PI regulators to ensure a precise regulation of the humidity.

The PLC is programmed so that the number of active zones is selected during initial startup. For example, if three zones are selected, zone four is removed in safety circuits and display indication. When expanding, this selection can be repeated by using password 196.

In the control, five hour-meters are included. One hour-meter indicates the total operating time of the pump to be used when determining the service intervals, and one hour-meter for each of the four zones indicating the time during which humidification takes place.

The control system receives a signal from humidity sensors type HST-010/CC-420 placed in each zone where humidity is desired. For cable length limitations, see technical data.

Installation

The control cabinet is mounted on the pump frame and must be connected electrically through a disconnect switch.

The control is protected by a three-phase monitoring relay. When phase sequence and power supply are correct, both LED's on module E1 are illuminated.

With both LED's illuminated, the motor will have correct rotation.

Electric diagrams

On the electric diagram the individual terminals are shown, as well as a schematic of the control system. The diagrams show how power supply and humidity sensors must be connected to the control system.

Electric protection

All electric parts are to be protected according to local regulations.

The pump is overload protected by means of thermal relay placed in the control cabinet.

Electric control of the ML-pump station With PLC-control for 1-4 zones

Safety equipment

Pressure switch

The control is equipped with a locking device from the pressure switch placed on the inlet side of the pump, ensuring that the pump stops if the minimum water pressure is not available.

If the water pressure falls below set pressure of the pressure switch, the display will show alarm text. The pump can be started by pressing “Alarm reset”.

Max humidistat to protect against over-humidification

If the humidity rises to a value higher than the setting on the max humidistat, the pump is stopped and the alarm lamp will light. The display shows which zone the max humidistat is activated.

If automatic reset is chosen

If the pump has been running for a minimum of one hour (adjustable) with no max humidistat error, it will be restarted automatically when the humidity again is below the set value. If a new error arises before another hour has passed, it will not be restarted. You have to restart manually by pressing “Alarm reset”.

If manual reset is chosen

The pump only restarts after acknowledgement by pressing “Alarm reset”.

Thermostat

The control system is equipped with a thermostat placed on the inlet side of the pump so that the pump will stop if the inlet water is being overheated because of recirculation.

If the temperature rises above the setting of the thermostat (116°F), the display will show alarm text. Restart is done by pressing “Alarm reset” when the temperature has fallen below 95°F.

Electric control of the ML-pump station With PLC-control for 1-4 zones

The control panel

The control system consists of a Siemens PLC 200-S7 and a control panel Siemens TD200. The control panel is used to show actual values and to change the various parameters used in the calculations of the control system.

The display shows the messages in two lines. If there are more than two messages, a flashing arrow – up/down will show that there are more messages. By pressing the arrow keys up/down you can look through the messages.

If you want to change a value, the cursor is placed on the desired line and you press enter. If the value is protected by a password, the display asks for a password, and the values are changed by using the key arrows until you reach the desired value, and then press enter. When the password is entered, the control system shows the actual value, and you can change with the key arrows up/down. When the desired value is reached, press enter, and the desired value will be entered in the control system.

The display contains four “F” keys, which combined with the SHIFT key make eight areas for output and changing of values. The keys F4 and F8 are only used as reset keys. The F1-F2-F3 functions are reached by pressing the key directly. The F5-F6-F7 functions are reached by pressing SHIFT - now a flashing “S” appears in the lowest right corner. Now you can press the actual F key.

The display is in standard mode when none of the F-keys have been chosen. You press an F-key for example to read or change values. You return by pressing alarm reset or another F-key. The display will return to standard mode after five minutes.

Normal displays

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
SECT. 1 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 2 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 3 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 4 HUM. xx %RH	The humidity in % of the zone indicated		

Alarm displays

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
- ALARM -	Pumpstation in alarm - is always shown together with one of the following:		
- PUMP TOO HOT -	The temperature of the pump is too high. Wait for cooling, and restart with the reset-key.		
SENSOR ERROR xx	The signal from the sensor of the zone indicated is outside the range. The zone is shut down, but will start automatically when the signal is within the range again.		
WATER PRESSURE LOW	The inlet pressure of the pump is below the set pressure of the pressure switch. Correct the error and restart by pressing the reset-key.		
MAX.HYG SEC xx	The max-humidistat of the zone indicated has exceeded the set humidity. Restart by pressing the reset-key.		

Additional displays

F1 range - Humidity

Display	Explanation	Range	Standard
SP SECT 1 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 2 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 3 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 4 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50

Note: SETPT x = 0 describe that FLU (see description under F7 range) is cancelled.

F2 range - Hour-meters

Display	Explanation	Range	Standard
SEC. 1 x.x H	Total time humidified in the individual zone.		
SEC. 2 x.x H	Total time humidified in the individual zone.		
SEC. 3 x.x H	Total time humidified in the individual zone.		
SEC. 4 x.x H	Total time humidified in the individual zone.		
PUMP x.x H	Total operating time of the pump for all zones.		

Changing set values

F5-F6-F7

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
PASSWORD xxxx	Password for changing values.		197

The password for changing operating parameters in F5-F6-F7 is 197. If the password is set to 196, text is shown in the display where the number of active zones can be changed from 1-4.

The password is reset again by pressing the reset-key.

F5 range – Sensor calibration

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
1.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
1.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
2.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
2.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
3.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
3.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
4.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
4.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20

F6 range - Capacities of the zones and common parameters

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
MAX.SP xx %RH	The maximum limit for the humidity set points.	40-90	60
INTEGRATION xx MIN	Time indication before the integration regulation is 100%	0-100	25
PRESSOSTAT x.x SEC	Time delay of insufficient water pressure	0-10.0	2
BYPASS XX G/H	Setting for the limit to control the bypass valve in liters per hour	0-200	100.0
MAX.HYG.AUT 0/1	Choice of function for the reset of Max humidistat circuit (0) - Manual reset (1) - Automatic reset	0-1	0.0
MAX.HYG.TIM xx.x H	Security time for automatic reset of the Max humidistat	0.1-10.0	1.0

F7 range - Setting parameters for the humidity regulators

Display	Explanation	Range	Standard
1*PRO xx - PER xx.x	PRO - Proportional band for the humidity control of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
1*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	10.0 10.0
1*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	.2 50
2*PRO xx - PER xx.x	PRO - Proportional band for the humidity control of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
2*MON xx.x -PAU xx.x	MON- The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
2*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	.2 50
3*PRO xx - PER xx.x	PRO - Proportional band for the humidity control of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
3*MON xx.x -PAU xx.x	MON- The minimum on time during	0-50.0	5.0

	which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	1-200.0	10.0
3*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	.2 50
4*PRO xx - PER xx.x	PRO - Proportional band for the humidity control of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
4*MON xx.x -PAU xx.x	MON- The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
4*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	.2 50

Reset to standard values

All settings can be reset to standard settings by pressing emergency stop for at least 10 seconds. Then the emergency stop is released while the white reset key is pressed, after approximately 5 seconds, the display indicates *INITIALIZING*. Then you can release the reset key.

***Electric control of the ML-pump station
With PLC-control for 1-8 zones***
Programming instructions

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Reset to standard values

Electric control of the ML-pump station With PLC-control for 1-8 zones

Description

The pump is coupled to a three-phase motor powered by magnet controlled protective motor switches.

The control consists of a PLC, which regulates humidity of the zones. The regulation takes place by means of PI regulators to ensure a precise regulation of the humidity.

The PLC is programmed so that the number of active zones is selected during initial startup. For example, if three zones are selected, zone four is removed in safety circuits and display indication. When expanding, this selection can be repeated by using password 196.

In the control, nine hour-meters are included. One hour-meter indicates the total operating time of the pump to be used when determining the service intervals, and one hour-meter for each of the eight zones indicating the time during which humidification takes place.

The control system receives a signal from humidity sensors type HST-010/CC-420 placed in each zone where humidity is desired. For cable length limitations, see technical data.

Installation

The control cabinet is mounted on the pump frame and must be connected electrically through a disconnect switch.

The control is protected by a three-phase monitoring relay. When phase sequence and supply are correct, both LED's on module E1 are illuminated.

With both LED's illuminated, the motor will have correct rotation.

Electric diagrams

On the electric diagram the individual terminals are shown, as well as a schematic of the control system. The diagrams show how power supply and humidity sensors must be connected to the control system.

Electric protection

All electric parts are to be protected according to local regulations.

The pump is overload protected by means of a thermal relay placed in the control cabinet.

Electric control of the ML-pump station With PLC-control for 1-8 zones

Safety equipment

Pressure switch

The control is equipped with a locking device from the pressure switch placed on the inlet side of the pump, ensuring that the pump stops if the minimum water pressure is not available.

If the water pressure falls below set pressure of the pressure switch, the display will show alarm text. The pump can be started by pressing “Alarm reset”.

Max humidistat to protect against over-humidification

If the humidity rises to a value higher than the setting on the max humidistat, the pump is stopped and the alarm lamp will light. The display shows in which zone the max humidistat is activated.

If automatic reset is chosen

If the pump has been running for a minimum of one hour (adjustable) with no Max humidistat error, it will be restarted automatically when the humidity again is below the set value. If a new error arises before another hour has passed, it will not be restarted. You have to restart manually by pressing “Alarm reset”.

If manual reset is chosen

The pump only restarts after acknowledgement by pressing “Alarm reset”.

Thermostat

The control system is equipped with a thermostat placed on the inlet side of the pump so that the pump will stop if the inlet water is being overheated because of recirculation.

If the temperature rises above the setting of the thermostat (116°F), the display will show alarm text. Restart is done by pressing “Alarm reset”, when the temperature has fallen below 95°F.

Electric control of the ML-pump station With PLC-control for 1-8 zones

The control panel

The control system consists of a Siemens PLC 200-S7 and a control panel Siemens TD200. The control panel is used to show actual values and to change the various parameters used in the calculations of the control system.

The display shows the messages in two lines. If there are more than two messages, a flashing arrow - up or down - will show that there are more messages. By pressing the arrow keys up / down you can look through the messages.

If you want to change a value, the cursor is placed on the desired line and you press enter. If the value is protected by a password, the display asks for password, and the values are changed by using the key arrows until you reach the desired value, and then press enter. When the password is entered, the PLC shows the actual value, and you can change with the key arrows up/down. When the desired value is reached, press enter and the desired value will be entered in the PLC.

The display contains four "F"-keys, when combined with the SHIFT key make eight areas for output and changing of values. The keys F4 and F8 are only used as reset keys. The F1-F2-F3 functions are reached by pressing the key directly. The F5-F6-F7 functions are reached by pressing SHIFT - now a flashing "S" appears in the lower right corner. Now you can press the actual F key.

The display is in standard mode when none of the F-keys have been chosen. You press an F-key for example to read or change values. You return by pressing alarm reset or another F-key. The display will return to standard mode after five minutes.

Normal displays

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
SECT. 1 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 2 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 3 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 4 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 5 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 6 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 7 HUM. xx %RH	The humidity in % of the zone indicated		
SECT. 8 HUM. xx %RH	The humidity in % of the zone indicated		

Alarm displays

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
- ALARM -	Pumpstation in alarm - is always shown together with one of the following:		
- PUMP TOO HOT -	The temperature of the pump is too high. Wait for cooling, and restart with the reset-key.		
SENSOR ERROR xx	The signal from the sensor of the zone indicated is outside the range. The zone is shut down, but will start automatically when the signal is within the range again.		
WATER PRESSURE LOW	The inlet pressure of the pump is below the set pressure of the pressure switch. Correct the error and restart by pressing the reset-key.		
MAX.HYG SEC xx	The max humidistat of the zone indicated has exceeded the set humidity. Restart by pressing the reset-key.		

Additional displays

F1 range - Humidity

Display	Explanation	Range	Standard
SP SECT 1 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 2 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 3 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 4 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 5 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 6 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 7 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50
SP SECT 8 xx %RH	The desired humidity of the zone indicated.	0-MAX.SP	50

Note: SETPT x = 0 describe that FLU (see description under F7 range) is cancelled.

F2 range - Hour-meters

Display	Explanation	Range	Standard
SEC. 1 x.x H	Total time humidified in the individual zone.		
SEC. 2 x.x H	Total time humidified in the individual zone.		
SEC. 3 x.x H	Total time humidified in the individual zone.		
SEC. 4 x.x H	Total time humidified in the individual zone.		
SEC. 5 x.x H	Total time humidified in the individual zone.		
SEC. 6 x.x H	Total time humidified in the individual zone.		
SEC. 7 x.x H	Total time humidified in the individual zone.		
SEC. 8 x.x H	Total time humidified in the individual zone.		
PUMP x.x H	Total operating time of the pump for all zones.		

Changing set values

F5-F6-F7

Display	Explanation	Range	Standard
PASSWORD xxxx	Password for changing values.		197

The password for changing operating parameters in F5-F6-F7 is 197. If the password is set to 196, a text is shown in the display where the number of active zones can be changed from 1-8.

The password is reset again by pressing the reset-key.

In the F5 range – Sensor calibration

Display	Explanation	Range	Standard
1.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
1.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
2.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
2.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
3.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
3.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
4.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
4.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
5.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric	1.00 – 25.0	V - 8.00 mA - 4.20 80

	signal.		
5.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
6.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
6.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
7.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
7.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20
8.S HIE x.xx *HI xx	HIE - The highest electric signal from the humidity sensors. HI - Indication at the highest electric signal.	1.00 – 25.0	V - 8.00 mA - 4.20 80
8.S LOE x.xx *LO xx	LOE - The lowest electric signal from the humidity sensors. LO - Indication at the lowest electric signal.	10 - 200	V - 2.00 mA - 1.80 20

F6 range - Capacities of the zones and common parameters

<i>Display</i>	<i>Explanation</i>	<i>Range</i>	<i>Standard</i>
MAX.SP xx %RH	The maximum limit for the humidity set points.	40-90	60
INTEGRATION xx MIN	Time indication before the integration regulation is 100%	0-100	25
PRESSOSTAT x.x SEC	Time delay of insufficient water pressure	0-10.0	2
BYPASS XX G/H	Setting for the limit to control the bypass valve in liters per hour	0-200	100.0
MAX.HYG.AUT 0/1	Choice of function for the reset of Max humidistat circuit (0) - Manual reset (1) - Automatic reset	0-1	0.0

F7 range - Setting parameters for the humidity regulators

Indication in display	Explanation	Range	Standard
1*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
1*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
1*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
2*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
2*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
2*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
3*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60,0
3*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause	0-50.0	5.0

	that minimum is held in each period. The time is indicated in seconds.	1-200.0	10.0
3*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
4*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
4*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
4*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
5*PRO xx - PER xx.xs	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
5*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
5*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
6*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
6*MON xx.x -PAU xx.x	MON - The minimum on time during	0-50.0	5.0

	which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	1-200.0	10.0
6*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
7*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
7*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
7*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50
8*PRO xx - PER xx.x	PRO - Proportional band for humidity regulation of the zone PER -The period (a pulse & and a pause) in the zone indicated in seconds.	0-50 10-100	20 60.0
8*MON xx.x -PAU xx.x	MON - The minimum on time during which the zone can be humidified. (If the calculated time is less, the time is added to the calculation for the next period). Time is indicated in seconds. PAU -The time of the forced pause that minimum is held in each period. The time is indicated in seconds.	0-50.0 1-200.0	5.0 10.0
8*FLU xx.x - FLOW xx	FLU -The minimum time during which the zone flushes, if no activity, to ensure circulation of water in the hoses. The operation time is set in minutes per 30 minutes. FLOW - The capacity in the section - in liters per hour	0-2.0 0-1000	0.20 50

Reset to standard values

All settings can be reset to standard settings by pressing emergency stop for at least 10 seconds. Then the emergency stop is released while the white reset key is pressed, after approximately 5 seconds, the display indicates *INITIALIZING*. Then you can release the reset key.

Water Treatment



ML AQA Total

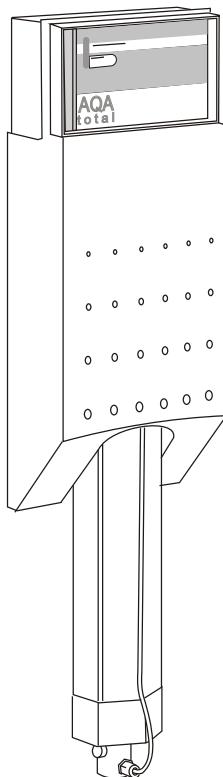
Technical Information

TI064US | 20.08.02 | HR

MLAQA Total will work well with the ML humidification system, preventing clogging of the nozzles, without changing the composition of the water. No sodium is added.

MLAQA Total is applicable for water with a hardness of up to 15°dH and in spaces not sensitive to dust.

Type 1500



Ordinary tap water is led through the AQA Total system. The active part of the system consists of a three-dimensional electrode, formed by conductive and non-conductive particles. By sending directional impulses towards these non-conductive particles, an accumulation of limestone on the particles will take place. When the direction of the power impulses is reversed, the limestone that just settled on the particles will be knocked off again as tiny nanocrystal units with an overdimensioned surface. Because the nanocrystal units consist of deposited limestone, they cannot deposit again. This will prevent the limestone from depositing in nozzles, etc.

Model	1500	2500
Flow max.*	6.5 GPM	10.7 GPM
Pressure loss at max. flow	7.5 Psi	7.5 Psi
Nominal pressure/operating pressure	150 Psi	150 Psi
Water temperature max.	86° F	86°F
Surrounding temperature	104°F	104°F
Height x Width x Depth	37" x 10" x 5"	42" x 18" x 13"
Network connecting	110V/ 60Hz	110V/ 60Hz
Connected power	40 W	60 W
Energy consumption	0,033 kWh/m ³	0,055 kWh/m ³
Energy consumption at standby	0,006 kWh	0,008 kWh
Protection degree	IP 54	IP 54
Number of modules	1	1
Connection dimension	3/4"	1"
Weight	26 Lbs	43 Lbs

* The units are always to be dimensioned according to the probable water flow GPM



Models Available

- LP-ES 50 GPD
- LP-ES 100 GPD
- LP-ES 200 GPD
- LP-ES 225 GPD
- LP-ES 500 GPD
- LP-ES 900 GPD
- LP-ES 1750 GPD

Reo-Pure™ RO Systems are easy to install and inexpensive to maintain. Regular maintenance and filter changes will extend the life of your membrane element, and keep your system providing quality water for years.

Your Reo-Pure™ sales representative will take the guesswork out, by recommending the R.O. system that is best suited for your home or business.



Reo-Pure™ R.O. Systems
are ideal for:

- Drinking Water
- Beverage/Coffee Dispensers
- Restaurants & Hotels
- Ice Making Machines
- Solution Mixing Systems
- Plant Nurseries
- Car Washes
- Bottled Water Dispensers
- Nursing Homes
- Hospitals/Pharmacies
- ... and many more!

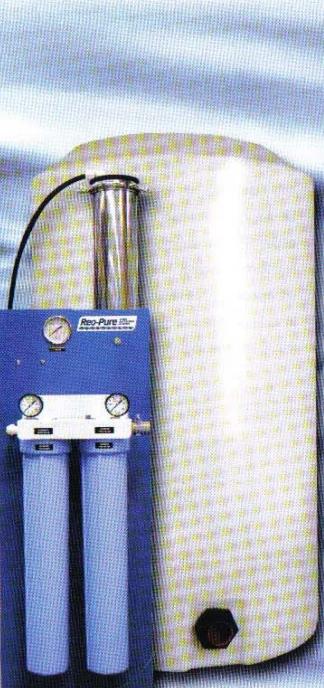


HUSSON INC.
1860 Renaissance Blvd.
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Tel. (262) 884-4669, Fax (262) 884-4670
www.hussoninc.com

All Reo-Pure™ systems are covered by a one year limited warranty.



Today's
Most
Popular
Reo-Pure
System



LP-ES SERIES
Light Commercial RO Systems

Originally introduced Over 20 Years Ago
It Has Earned Its Nickname 'The Workhorse'!

Light Commercial RO Systems

The original Reo-Pure™ LP System was introduced over twenty years ago. As membrane technology and materials have improved with time, so has the design and appearance of the LP Series. What has remained the same, however, is its exceptional performance, reliability, and ease of operation. The LP Series has definitely earned its nickname as "The Workhorse".

Once you realize the standard features every Reo-Pure™ LP-ES System has to offer, you will be convinced that you are getting a top-of-the-line reverse osmosis system. LP-ES systems are equipped with standard features found only offered as options on other systems. The design and features have been carefully selected to provide accurate system monitoring, minimal operator involvement, simple routine maintenance, and years of trouble-free operation.



Compare The Standard Features Built Into Every Unit

Dual Design For Pressurized or Atmospheric Storage Tank Applications

All LP-ES Systems are equipped with a storage tank pressure switch and tank level float control connection to accommodate either application.

Reliable and Knowledgeable Technical Support

Whether it is sizing an application, starting up a new system, or trouble-shooting the most difficult water problem, we're here to help you!

Standard Features On Every Unit:

- Low Energy Membrane Elements
- PVC Membrane Vessels
- SS Membrane Vessel (1750 model)
- 5-Micron Sediment Pre-Filter
- 10-Micron Carbon Pre-Filter
- Powder Coated Aluminum Frame
- Inlet & Outlet Pre-Filter Gauges
- System Operating Pressure Gauge
- Manual Membrane Flush Valve
- Reject Water Recirculation Loop
- Brass Rotary Vane Pump
- Product Water Check Valve
- Inlet Water Shut-Off Valve
- 115V, 60Hz, 1-Phase
- Salt Rejection: 95% to 99%
- Product Water Pressure Relief Valve
- Product Water Storage Tank Pressure Switch
- Low Pressure Switch/Automatic Feed Water Shut-Off
- Atmospheric Storage Tank Float Control Connection
- Fixed Reject Water Control (50% Recovery)
- 12 Month (One Year) Limited Warranty

Optional Features:

- 220V, 50Hz, 1-Phase
- Stainless Steel Pump
- In-Line TDS Monitor
- Timed Automatic Flush (225-1750 models)



LP-ES Systems are designed using energy saving, high flow membrane elements to conserve energy and offer a system high in production, but compact in size.



BLS-9,000 GPD

The **Reo-Pure BLS Series** R.O. Systems were designed to give you the flexibility to choose a combination of system features to satisfy your application specifications. There are times when extensive system monitoring is necessary, requiring all "the bells and whistles." Other times, a simple base unit may meet your needs. The BLS Series lets you select a system with as many options as you need!

BLS Systems are equipped with energy-saving, high flow membrane elements to reduce energy consumption and produce high quality, low TDS product water. System components are carefully selected and tested to meet our stringent quality and performance requirements. Systems are assembled on a heavy-duty, epoxy coated steel frame to resist corrosion. Every BLS System is shipped fully assembled and pre-tested, insuring a hassle-free installation, smooth system start-up, and years of trouble-free operation.

BLS Systems from 400 GPD to 18,000 GPD, cover a broad range of applications such as:

- POE Whole House Treatment
- Beverage & Food Processing
- Ice Production
- D.I. Pre-treatment
- Bottled Water Production
- Car Wash Spot Free Rinse
- Boiler Feed Water
- Restaurants
- Grocery Stores / Hotels / Motels
- Hospitals / Clinics / Pharmacies
- Humidification
- Electronic Manufacturing

Quality • Dependability • Service

BLS-12,000 GPD
With Storage Tank

Reo-Pure Systems Are Distributed By:
HUSSON, Inc.

1860 Renaissance Blvd., Sturtevant, WI 53177 U.S.A.

PHONE: 262-884-4669 FAX: 262-884-4670 HUSSON@HUSSONINC.COM



REO-PURE BLS SERIES

400 To 18000 GPD Commercial R.O. Systems

BLS System Operating Specifications

Production Rates:	BLS-400	400 GPD / 0.28 GPM	BLS-6000	6000 GPD / 4.1 GPM
	BLS-800	800 GPD / 0.56 GPM	BLS-9000	9000 GPD / 6.25 GPM
	BLS-950	950 GPD / 0.66 GPM	BLS-12000	12000 GPD / 8.0 GPM
	BLS-1900	1900 GPD / 1.32 GPM	BLS-15000	15000 GPD / 10.0 GPM
	BLS-2400	2400 GPD / 1.67 GPM	BLS-18000	18000 GPD / 12.5 GPM
	BLS-3000	3000 GPD / 2.0 GPM		

System production may vary depending upon incoming water temperature & chemistry.

Based on feed water with 500 mg/L NaCl and temperature of 25°C. (77°F). Minimum membrane salt rejection is 95-99%.

Low Feed Water Pressure Switch:

System Shuts Down At 15 PSI Decreasing Pressure.

Product Water Pressure Switch:

System Shuts Down At 45 PSI. System Starts At 25 PSI.

BLS Feed Water Parameters

Hardness:	Maximum 10 GPG (Over 10 GPG Should Be Softened)
Iron:	Maximum 0.5 PPM (Dissolved Only)
Turbidity:	Maximum 1 NTU
Hydrogen Sulfide:	Must Be Removed.
Inlet Water Pressure:	Minimum 35 PSI Maximum 85 PSI
pH Range:	4 to 10
Feed Water TDS	Maximum 2,000 PPM. If Higher, Consult Reo-Pure Manufacturer.
Temperature:	Minimum 40°F. Maximum 90°F.

BLS Test Conditions

Operating Pressure: All BLS Models 165 PSI (Except BLS-2400 100 PSI)

Feed Water TDS: 500 PPM as NaCl

Design Temperature: 77°F (25°C)

Membrane: Energy Saving High Flow Composite Polyamide

Design Recovery: 50 - 60% (BLS 400 to 2400), 70% (BLS 3000 to 9000), 75% (BLS 12000-18000)

BLS Design Specifications

Model	Production GPD/LPD*	Oper. Press.	Inlet Conn.	Prod. Conn.	Reject Conn.	Filter Housing	Membrane Element	Motor 60 Hz	Motor 50Hz
BLS-400	400 / 1513	165 PSI	3/8" FPT	3/8" Tube	3/8" Tube	20" SL	2.5X21 (1)	1/3 HP, 1Ph *	1/3 HP, 1Ph *
BLS-800	800 / 3026	165 PSI	3/8" FPT	3/8" Tube	3/8" Tube	20" SL	2.5X21 (2)	1/3 HP, 1Ph *	1/3 HP, 1Ph *
BLS-950	950 / 3594	165 PSI	1/2" FPT	1/2" FPT	1/2" FPT	20" SL	2.5X40 (1)	3/4 HP, 1Ph *	3/4 HP, 1Ph *
BLS-1900	1900 / 7188	165 PSI	1/2" FPT	1/2" FPT	1/2" FPT	20" SL	2.5X40 (2)	3/4 HP, 1Ph *	3/4 HP, 1Ph *
BLS-2400	2400 / 9072	100 PSI	1/2" FPT	1/2" FPT	1/2" FPT	20" SL	4X40 (1)	3/4 HP, 1Ph *	N/A
BLS-3000	3000 / 11349	165 PSI	3/4" FPT	3/4" FPT	1/2" FPT	20" BB	4X40 (1)	3/4 HP, 1Ph **	2 HP, 1Ph **
BLS-6000	6000 / 22698	165 PSI	3/4" FPT	3/4" FPT	1/2" FPT	20" BB	4X40 (2)	1 HP, 1Ph **	2 HP, 1Ph **
BLS-9000	9000 / 34047	165 PSI	3/4" FPT	3/4" FPT	1/2" FPT	20" BB	4X40 (3)	1-1/2 HP, 1Ph **	2 HP, 1Ph **
BLS-12000	12000 / 45396	165 PSI	1" FPT	3/4" FPT	3/4" FPT	20" BB	4X40 (4)	3 HP, 3Ph ***	3 HP, 3Ph ***
BLS-15000	15000 / 56745	165 PSI	1" FPT	3/4" FPT	3/4" FPT	20" BB	4X40 (5)	3 HP, 3Ph ***	4 HP, 3Ph ***
BLS-18000	18000 / 68040	165 PSI	1" FPT	3/4" FPT	3/4" FPT	20" BB	4X40 (6)	3 HP, 3Ph ***	4 HP, 3Ph ***

* = Rotary Pump ** = High Pressure Booster Pump *** = Vertical Multi-Stage Centrifugal Pump

Starting up the system

System start-up procedures

Multiple zones

It is very important that the start-up instructions are followed carefully. If the system is not thoroughly flushed, you may risk failures of solenoid valves and nozzles. In order to insure trouble-free operation without dripping, the system must be carefully bled. Follow the procedure described below and the risk of failure is eliminated.

1. Slowly turn on the water to the system.
The filter unit before the pump must be bled, using the air escape button which is on top of the filter housing.
Check the filter set for leaks, and check that all hoses to the pump are properly tightened.

Turn on power to the system. Check motor rotation direction visually on the phase relay E-1, both LED's should be lit.

If the direction of rotation is not correct, "L1" and "L2" in the pump starter have to be interchanged.
2. Flushing of pump: The pump should be flushed before the system is started. First, remove the hydraulic hose from the high-pressure block and drain it to a bucket.
Start the pump by increasing the setpoint in the humidity controller. Bleed/flush the pump for at least 1 minute.
4. Check that all ball valves are closed before flushing.
5. Beginning in the zone furthest from the pump:
Remove hose and ball valve on the solenoid valve set. Open the ball valve and drain the water into a bucket.
6. Adjust setpoint in the humidity controller in this section. To produce a start signal to the pump, set it 5-10% higher than the actual humidity level in the room
7. Check that the pump starts.
8. Let the pump run for 3-5 minutes to get air out of the main line to the solenoid valve set.
9. Stop the pump. Reconnect the ball valve on the solenoid valve set.
Remove hose and ball valve on the humidification unit furthest from the solenoid valve and lead it into a bucket. Start the pump via the humidity controller to flush the hose thoroughly before it is installed on the nozzle ring.

10. Bleeding the system:
To avoid dripping from the nozzles when the pump starts and stops, it is important that there is no air in the system.
On the last humidification unit on the line, place a hose over the threaded fitting at the last nozzle on the ring. Drain the hose into a bucket. Be careful to secure the hose during bleeding.

Warning: Do not try to block the air escape nozzle with your hand. The water is coming out at 1000 PSI!

11. Start up the system and slowly open the ball valve. Let the system run for 2-3 minutes. Stop the pump when no more air is coming out, close the ball valve and install the last nozzle.

Repeat this procedure with all units in this section.
After bleeding all the humidification units, open all ball valves and check that all nozzles are working properly.
12. Repeat steps 4 to 11 for all remaining zones.
13. When finished, adjust the humidity controller to the desired humidity level.
14. Programming of Period Time and Proportional Band:

Period Time: By increasing the period time, the variations in humidity will be greater. However, a longer period time will prolong the life of the pump as it will have fewer start/stop cycles.

Proportional Band: If the proportional band is reduced, the system will react quicker to changes in the humidity level in the room. The size of the proportional band depends on the air exchange in the room. When the air exchange is high, the proportional band should be reduced; when the air exchange is low, it can be increased.

15. When the system has been adjusted, check all connections for leaks: T-pieces, ferrules/stems, ball valves/filter unions, etc.

Maintenance

Maintenance of the System

It is very important that the maintenance instructions are closely followed. When correctly maintained, the system will operate without any problems and the life of the system be considerably prolonged.

Pump unit:

Operating hours	Change water filter. Particle filter only	Check function of ON/OFF valve	Check function of thermostat and pressure switch	Renovation of pump
1000	x			
2000	x			
3000				
4000	x	x	x	
5000				x
6000	x			
7000				
8000	x	x	x	
9000				
10000	x			x

The above schedule applies only to MLP pumps.

After every 4000 operating hours, or after every 12 months of operation, the following has to be done:

- . **Solenoid valve set (systems with more than one section)**
Check solenoid valves, replace wearing parts if necessary.
Replace pre-filter at solenoid valves.
- . **Humidification units**
Check operation and bleeding according to "Starting up the system".
Check and/or replace pre-filter in filter union.
- . **Humidity sensors/control units:**
Calibration of humidity sensor.
Go through programming.

Please note:

If the system is out of operation for longer periods of time, you should start up the system at least once a week to avoid any particles settle in pump and nozzles.

Alternatively, the system should be disinfected when stopped and restarted.

We recommend preventive maintenance of the system after 2000 hours of operation. Please inquire about our preventive maintenance service.

Filter Unit

Depending on the water quality, it is necessary to regularly check the filter unit at the pump and replace filters according to the maintenance schedule, or at least every 6 months. Check the condition of the filters by regularly making a note of the water pressure when the pump is running. If the pump pressure becomes unstable, replace filters.

Pump

To maintain the effect of air cooling, keep the pump motor free of dust.

The pump is oil-free and requires no further maintenance in the period between renovations.

UV light

The UV light must be changed after 8000 hours (approx. one year) otherwise the light intensity will not sufficiently keep the sterilizing effect.

Fans

The fans should be kept clean and free of dust. Clean the fans as necessary.

Nozzles

On a regular basis, do a visual check that all nozzles are working correctly. If a nozzle becomes clogged, it should be cleaned or replaced.

Cleaning of Nozzles

Depending on the water quality, it may be necessary to clean the nozzles at regular intervals.

Place the nozzles in a mild solvent until any calcareous deposits are dissolved.

Alternatively, the nozzles can be sent to the factory for cleaning in ultrasonic bath.

Humidity Sensor

Disassemble the filter of the humidity sensor at regular intervals, or when necessary, and clean it with compressed air. A dirty filter will reduce the sensor's reaction time.

Dust from water used for humidification

When water is atomized through nozzles and evaporates, there will be residue of dry solids which settle as dust. The content of minerals and salts in raw water will determine the amount of dust that settles after evaporation. The amount will depend on the hardness and composition of the water. Information about water quality is available at local water works.

The largest amount of dry solids normally comes from Calcium and Magnesium. This is what constitutes the lime and gives the hardness of the water.

Please note that the amount of dry solids is not less in softened water, only the Calcium and Magnesium is exchanged for Natrium which is soluble in water.

It is recommended, that the normal cleaning program for the production facility includes a regular check and possibly cleaning of sensitive, electronic equipment and other parts that may be vulnerable to dust deposits.

This applies to all types of humidification systems that use softened water.

If dust deposits of the dry solids contained in water is not acceptable, we recommend the installation of a Reverse Osmosis system.

Nortec Systems

Weekly checkpoints must be performed to ensure the system is running according to specifications.

Installation Date: _____ Customer: _____

	Date	Initials	Check Salt Level in Tank	Softener/ Carbon Test	Incoming Pressure 30-60 PSI	Water Filter Replaced Quarterly	UV light OK	System Pressure 1000PSI
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13						Replace		
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26						Replace		

27-52 on back

	Date	Initials	Check Salt Level in Tank	Softener/ Carbon Test	Incoming Pressure 30-60 PSI	Water Filter Replaced Quarterly	UV light OK	System Pressure 1000PSI
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39						Replace		
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52						Replace		



Pump unit:

Operating hours	Change water filter	Function control of ON/OFF valve	Function control of thermostat and pressure switch	Renovation of high-pressure pump	Solenoid valve set	Humidification units	Humidity sensors/ control units
1.000							
2.000							
3.000							
4.000							
5.000							
6.000							
7.000							
8.000							
9.000							
10.000							
11.000							
12.000							
13.000							
14.000							
15.000							
16.000							

After every 4000 operating hours, or after every 12 months' operation, the following must be done:

- **Solenoid valve set (only in case of several sections)**
Check solenoid valves, replace wearing parts if necessary.
Replace pre-filter at solenoid valves.

- **Humidification units**
Check operation and bleeding according to Installation of **ML System®**
Check and/or replace pre-filter in filterunion

-
- **Humidity sensors/control units:**
Calibration of humidity sensor.
Review programming.

ML System a/s recommends that the customer order a service visit after 2000 operating hours.
On request, HUSSON INC. Will provide an offer for service contracts. Please inquire for further details.

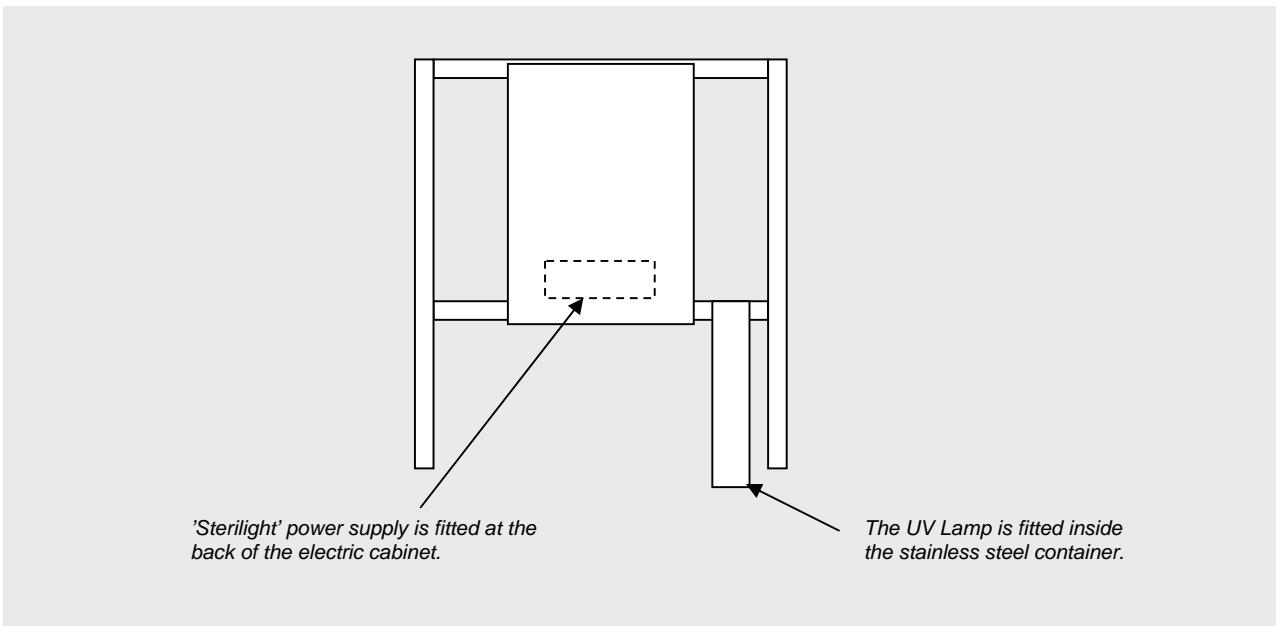
Replacement of UV Lamps, Sterilight Silver Basic

MLP Pump stations are equipped with an ultraviolet disinfecting system to destroy any bacteria and virus in the humidification water. The UV lamp in the disinfecting system has an expected lifetime of approx. 9000 hours. In order to ensure optimal effect, the lamp should be replaced annually. When replacing the UV lamp, the glass inside the stainless steel container should be cleaned.

MLP Pump stations produced from ultimo 2005 are equipped with the 'Sterilight Silver Basic' UV system with BA-ICE-S power supply.

Replacement lamps for 'Sterilight' UV systems:

Pump station type	UV Lamp type	ML System spare part number
MLP 100	S212RL	104.594
MLP 300	S330RL	104.595
MLP 500	S330RL	104.595
MLP 800	S463RL	104.596
MLP 1000	S463RL	104.596
MLP 2 x 800	S810RL	104.597
MLP 2 x 1000	S810RL	104.597
MLP RO 100	S330RL	104.595
MLP RO 300	S330RL	104.595
MLP HRO 100	S212RL	104.594



Operation

The power supply has an information display. Normally, this display shows the remaining life of the UV lamp in number of days. When the life of the UV lamp expires, the display shows 'A3' and the power supply beeps every five seconds. The beeping sound may be delayed for 7 days by pushing the button at the side of the power supply. The beeping can be delayed four times in total.

The total number of operational days for the power supply can also be read. During normal operation, press the button at the side of the power supply once and the display will show the number of operational days for 10 seconds.

This value cannot be reset.

When the information display is empty, it is an indication that the UV lamp is defective. Also, the power supply will beep at shorter intervals than in the case of the expiry of the life of the lamp after 365 days.

Replacement of UV lamp, instructions

Once a year, or when the UV lamp is defective, a new UV lamp is to be fitted.

- a) Cut off the power and water supplies.
- b) Empty the stainless steel container for water.
- c) Pull the clip that fixes the lamp socket to the container
and remove the old UV lamp.
Note: The UV lamp contains mercury and must be disposed of according to local regulations.
- d) The quartz inner tube is kept in place by the two aluminium nuts.
Dismantle the quartz inner tube, clean it and reinstall it.
It may be necessary to replace the two o-rings that are fitted
on the quartz inner tube.
- e) Install new UV lamp and the lamp socket.
- f) Reset the alarm after installing new UV lamp:
When a new UV lamp has been installed, turn on the power to the pumping station.
Press the button on the side of the power supply and keep it in for approx.
five seconds. Do not release the button until a 'beep' is heard.

Note:
Do not touch the glass of the UV lamp

Warning
Never look directly into a lit UV lamp

The UV light from the UV lamp may cause serious burns to the eyes and unprotected skin.
During servicing of UV systems, the power supply must always be turned off.



Warning!

The humidification system is being disinfected

The humidification system must not be started while people are staying in the room and not before date _____ time _____

**The humidification system must be started minimum
4 hours before working day starts.**

**If there are any problems please contact
HUSSON INC. 262-884-4669**

SV015GB-01/25.06.07/ DL



Warning!

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**If there are any problems please contact
NORTEC SYSTEMS 262-884-4669**

SV015GB-01/25.06.07/ DL

Troubleshooting

Troubleshooting and Remedy

If the system is correctly maintained, there is only a minimum risk of failure in the system. In this chapter is a list of typical failures and the way to correct them.

Electrical failure

Indication	Cause	Correction
Start automatics:		
The system does not run	Humidity is over setpoint	<ul style="list-style-type: none"> • Increase setpoint
	Power to the system is switched off	<ul style="list-style-type: none"> • Check power supply
Display shows "On" but pump does not run	Main power for pump from starter has failed.	<ul style="list-style-type: none"> • Activate reset button in control box • Check that relay "K1" and contactor "Q" work correctly • Contact HUSSON INC.
Display shows "-Pr" or a tap symbol	Insufficient water pressure before pump	<ul style="list-style-type: none"> • Replace filter in front pump • Check if the supply pressure is below 0.5 bar.
Display shows "-PR" or a "C" symbol	Inlet temperature is over 47°C/116°F	<ul style="list-style-type: none"> • Pump is overheated because of too little, or failing flow. • Check solenoid valve set and ball valves.
Alarm lamp lights up	Power has been switched off	<ul style="list-style-type: none"> • Activate "start button" on front of panel
	Max humidistat has disconnected the system due to high humidity in the room	<ul style="list-style-type: none"> • Check if system runs correctly. The reason may be that the natural humidity is higher than the setpoint on the humidistat, due to cold and damp weather. • The setpoint of the max. humidistat may be increased.
EDM35 Humidity sensor:		
-EE	Sensor signal is too low, < 20 % RH	<ul style="list-style-type: none"> • Humidity in the room is lower than 20% RH. Start the system by turning control unit off and on, thereby lowering the regulator's lower limit from 20% to 5% RH for about 10 minutes. • Sensor defective, replace sensor • Sensor wire defective, measure conductivity resistance. • Input module in display defective, contact HUSSON INC.
EE	Sensor signal is too high, > 80 % RH	<ul style="list-style-type: none"> • The humidity in the room is higher than 80% RH • Sensor defective, replace sensor

Notice:

The section "electrical failure" is only valid for controllers based on EDM35 and MLDM35. PLC based controllers are described separately.

Mechanical failure

Failure	Reason	Remedy
Dripping from one or more nozzles:		
Immediately when the system stops	Pressure release valve defective, does not open.	<ul style="list-style-type: none"> • Coil defective, replace coil. • Check power to coil. • Valve defective, replace valve
	Air pocket in hoses	<ul style="list-style-type: none"> • Bleed the system
Approx. 30 seconds after stopping	ON/OFF valve defective, does not shut tightly	<ul style="list-style-type: none"> • Replace ON/OFF valve on pump (one section) or in the solenoid valve set (several sections).
“Rain” is coming down from humidity unit when the system runs	Not enough conveying air	<ul style="list-style-type: none"> • Dust filter in fan needs cleaning or replacing. • Fan is blocked, check wiring • Fan is defective, replace fan
Outlet pressure from pump is unstable, or the noise level has increased.	Air pocket in pump.	<ul style="list-style-type: none"> • Dismantle outlet hose and flush the pump with clean water • Contact HUSSON INC.

We are of course available, with further assistance and advice if any problems should occur.

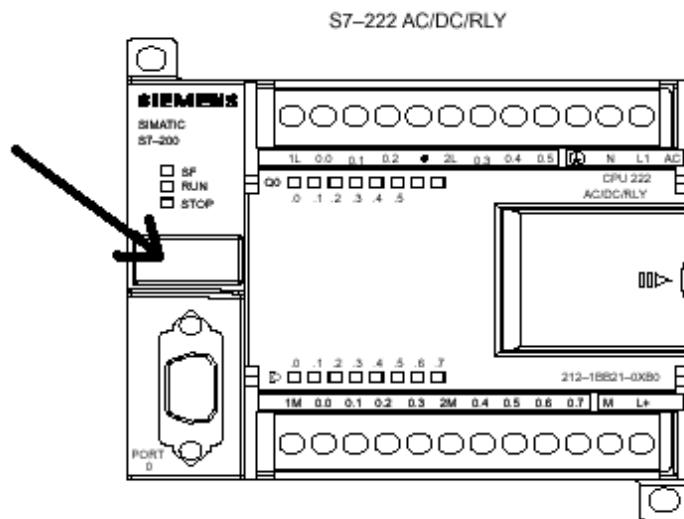
NORTEC SYSTEMS
1860 Renaissance Blvd., Sturtevant, WI 53177
Phone: 262-884-4669 Fax: 262-884-4670

Updating of PLC control to the newest program version

By using an EPROM with the newest program version, you can quickly update to the newest version.

Before starting, it is important to go through all parameters - and to write down the parameters differing from the standard. At the same time the hour counters must be read.

The actual update is done by pressing the emergency stop button and to remove the black covering at the arrow, as shown on the draft. Normally there is only an empty covering inside.

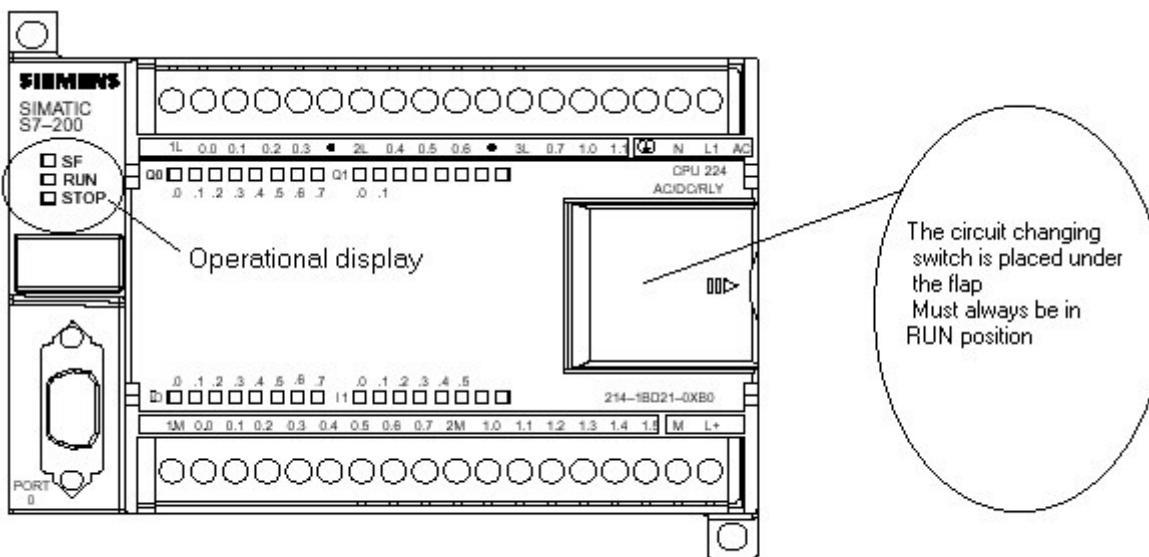


Now carefully place the light blue EPROM in the socket. When the emergency stop is released, the PLC will in the first pass-through copy the program of the EPROM to the program memory.

After 10 seconds, the emergency stop button can be pressed again, and the light blue EPROM is removed. The program is now updated. All parameters are to be controlled - also the hour counters. (In a few cases the hour counters are reset to 000 during the updating). The hour counters can only be set by ML system.

Control and troubleshooting of PLC control for 1-4 departments

First of all, check that the PLC control is running in normal operation.



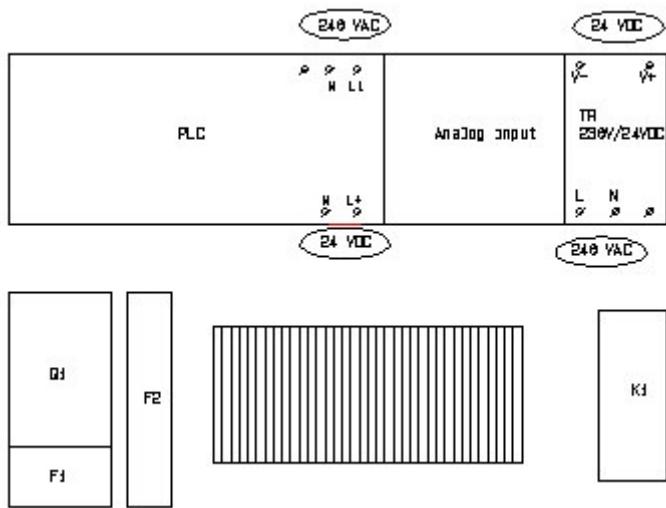
Control operating status of PLC. Find the light-emitting diodes (LED's) in the left side of the PLC main unit.

<i>Control of</i>	<i>Result</i>	<i>Correction</i>
LED marked RUN is lighting green.	PLC control runs in normal operation	
LED marked STOP is lighting yellow.	PLC control is in stop mode	Press emergency stop, and wait for 10-15 seconds. Pull out emergency stop - the STOP lamp lights up and after a few seconds it lights up the RUN lamp, and the plant is in normal operation.
		Control that circuit changing switch under the left flap is in run position.
LED marked SF is lighting red.	PLC control is in error mode. E.g. because the PLC program has received an "illegal" signal - due to noise.	Press emergency stop, and wait for 10-15 seconds. Pull out emergency stop - the STOP lamp lights up and after a few seconds it lights up the RUN lamp and the plant is in normal operation If the plant goes into error position again, the PLC should be changed.

Control electrical voltage

Control that the main voltage of the connecting block is ok. Check that the fuse F2 has been on.

The emergency stop is released.



By using a voltmeter in the AC area meter, control if there is app. 240VAC between the electric terminals L and N at the bottom of the power supply TR.

Also measure if there is 240VAC between PLC source terminals L1 and N.

If no voltage can be measured here, control fuse F2 once again, and measure contacts of emergency stop.

In case of voltage on the two supplies, measure internal working voltage of PLC. This is done in the lowest right corner of the actual PLC unit. Between the terminals M and L+ there must be 24VDC. - If 24 VDC cannot be measured, the PLC unit is defective and has to be changed.

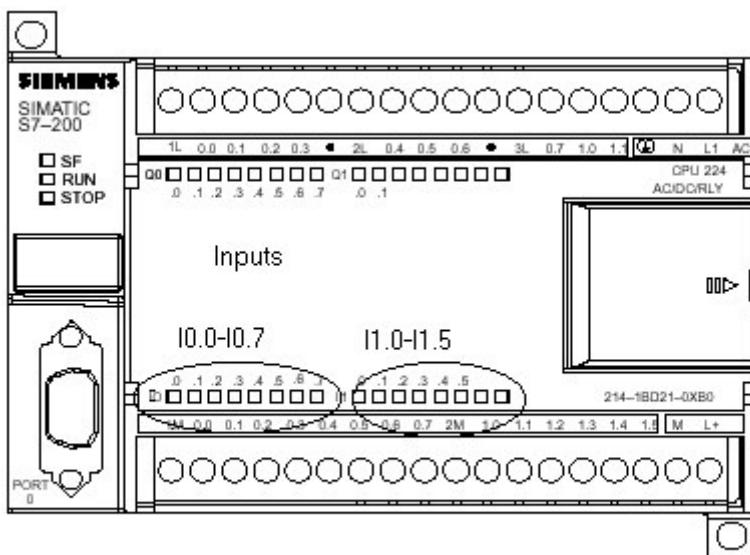
Meter then the external supply TR on the upper terminals. Here 24VDC between the terminals V+ and V- must be measured.

If there is not 24 VDC, there exist two error possibilities: - The power supply is made of a current-limiting circuit taking care to lower or to disconnect completely the voltage at an external short circuit. The easiest way to check this is to demount V+ and repeat the measuring.

- γ If 24VDC is measured now, there is a short circuit in the external circuits, perhaps at the sensing devices.
- γ If 24VDC is still not measured, the supply is defective and has to be changed.

Control PLC input's

The PLC input's is 24 VDC. The easiest way to control the input is to check the LEDs at the bottom of the PLC control.



The input terminals are marked so that the first eight are named I0.0-I0.7. The remaining six are marked I1.0-I1.5.

If none of the LEDs are lighting as expected, it is probably due to the fact that the voltage supply in the upper right corner of the control box does not give 24 VDC - the green LED in the marked DC ON must light continuously. Check voltage by a voltmeter positioned on VDC between V+ and V-. The voltage must be 24 VDC +-2V

<i>Input terminal</i>	<i>Name</i>	<i>Description</i>
I0.0	ON/OFF switch - at the front of control box	The LED must light when the switch is in ON position.
I0.1	Pressure switch	The LED lights when water pressure is OK*
I0.2	Max hygrostat - main circuit	The LED lights when the main circuit of the max hygrostat is ok. Do not forget: The controller is made to four departments. If not all departments are in service, the remaining connecting blocks for the max hygrostat are to be connected by a bridge
I0.3	Thermal relay - Overcurrent protection.	The LED light when the thermal relay is released. After cooling the relay is resetted by pressing the read reset button directly on the termal relay TH1

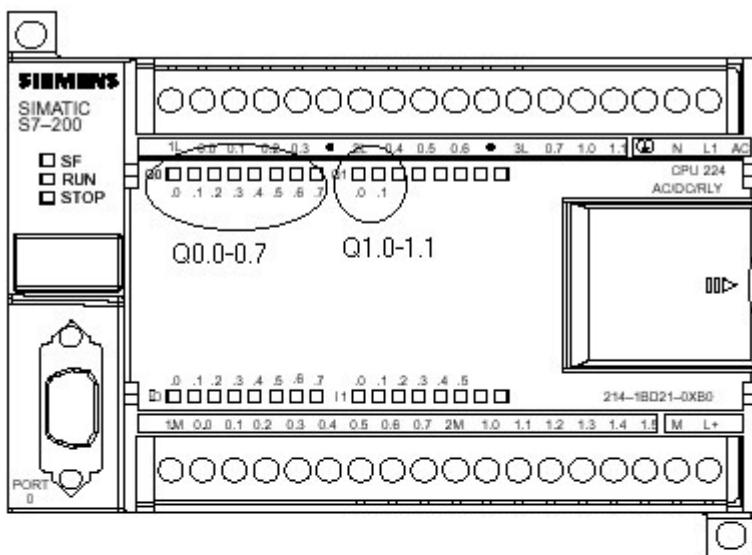
I0.4	Reset pressing - at the front of the control box	The LED lights when reset pressing is affected.
I0.5	Thermostat	The LED lights when water temperature is less than 47 degrees. If temperature has been over 47 degrees, thermostat can first be re-connected when temperature has fallen under approx. 37 degrees. *
I0.6	Max hygrostat from department 1	The LED lights if the max hygrostat of the department is switched off. **
I0.7	Max hygrostat from department 2	The LED lights if the max hygrostat of the department is switched off. **
I1.0	Max hygrostat from department 3	The LED lights if the max hygrostat of the department is switched off. **
I1.1	Max hygrostat from department 4	The LED lights if the max hygrostat of the department is switched off. **
I1.2	Not used	
I1.3	Not used	
I1.4	Not used	
I1.5	Not used	

* The LED turns off when Pressure Switch/Termostat is again in normal position.
But the control has to be reset by pressing RESET

** The LED turns off again when humidity has fallen under the shift pressure. But the control has to be reset by pressing RESET

Control output's from PLC

The PLC controller has 10 output terminals which are controlled easiest at the LEDs on top of the PLC

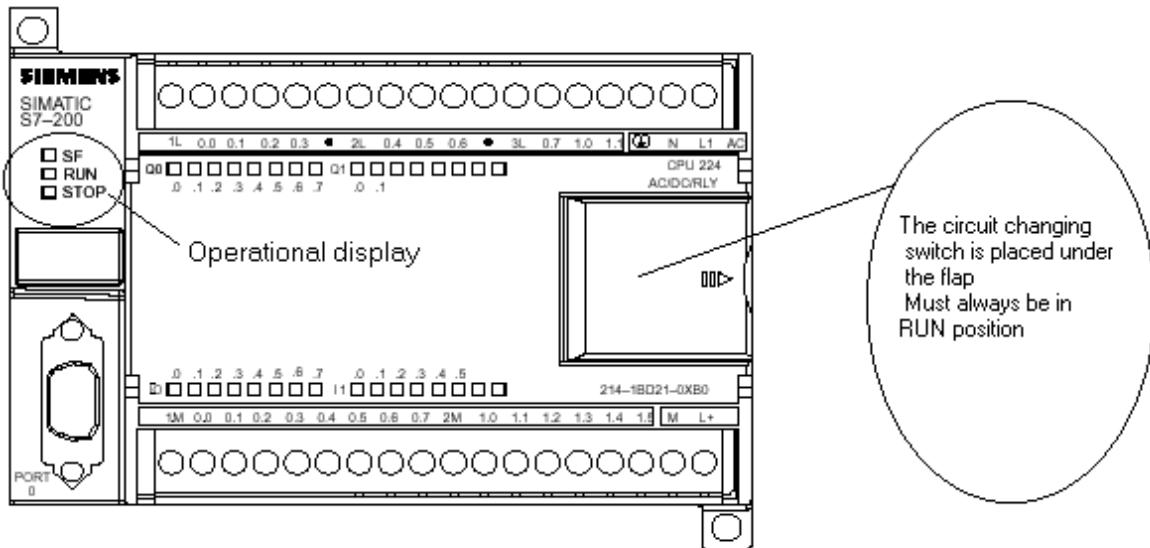


The output terminals on the main unit are marked so that the first eight are called Q0.0-Q0.7 and the next two Q1.0-Q1.1.

<i>Output terminal</i>	<i>Name</i>	<i>Description</i>
Q0.0	Pump	240 VAC for operation of pump and opening of ON/OFF valve
Q0.1	M1.1	240 VAC - Valve for department 1
Q0.2	M1.2	240 VAC - Valve for department 2
Q0.3	M1.3	240 VAC - Valve for department 3
Q0.4	M1.4	240 VAC - Valve for department 4
Q0.5	M2	240 VAC - Bypass valve (option)
Q0.6		
Q0.7	Alarm lamp	24 VDC for alarm lamp on the front of the control box
Q1.0		
Q1.1		

Control and troubleshooting of PLC controller for 1-8 departments

First of all, check that the PLC control is running in normal operation.



Check operating status of PLC. Find the light-emitting diodes (LED's) in the left side of the PLC main unit.

<i>Control of</i>	<i>Result</i>	<i>Correction</i>
LED marked RUN is lighting green.	PLC control runs in normal operation	
LED marked STOP is lighting yellow.	PLC control is in stop mode	Press emergency stop, and wait for 10-15 seconds. Pull out emergency stop - the STOP lamp lights up and after a few seconds it lights up the RUN lamp, and the plant is in normal operation.
		Check that circuit changing switch under the left flap is in run position.
LED marked SF is lighting red.	PLC control is in error mode. E.g. because the PLC program has received an "illegal" signal - due to noise.	Press emergency stop, and wait for 10-15 seconds. Pull out emergency stop - the STOP lamp lights up and after a few seconds it lights up the RUN lamp and the plant is in normal operation If the plant goes into error position again, the PLC should be changed.

Control electrical voltage

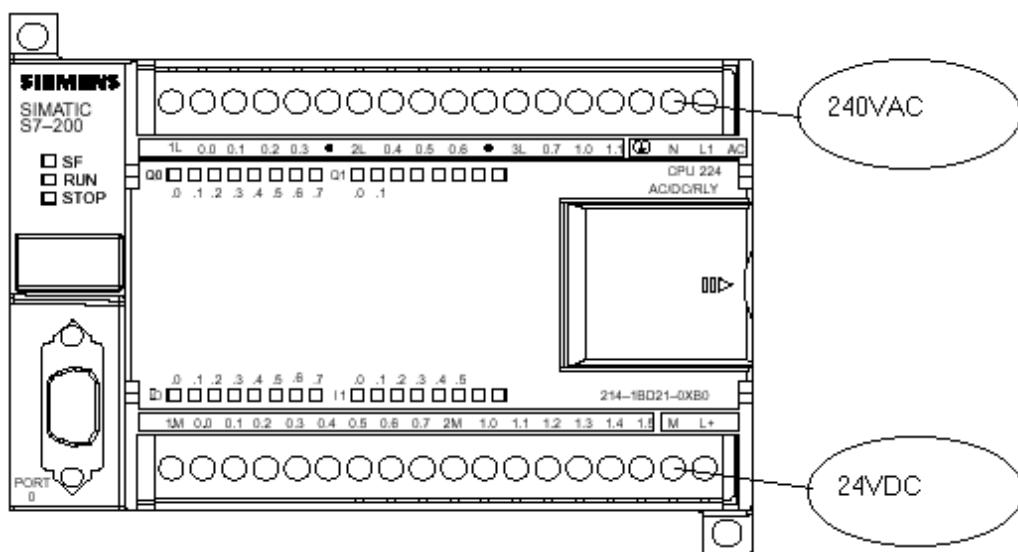
Control that the mains voltage of the connecting block is ok. Control that the fuse F2 is on. (Is placed in the power box at the backside of the pump).

The emergency stop is released.

By using a voltmeter in the AC area measure if there is approx. 240VAC between the terminals L and N at the bottom of the power supply TR.

Also measure if there is 240VAC between PLC source terminals L1 and N. (Positioned in the control box.)

If no voltage are measured here, control fuse F2 once again, and measure the contact of the emergency stop.



In case of voltage on the two supplies, measure first the internal working voltage of the PLC. This is done in the lowest right corner of the actual PLC unit. Between the terminals M and L+ there must be 24VDC. - If 24 VDC cannot be measured, the PLC unit is defective and has to be changed.

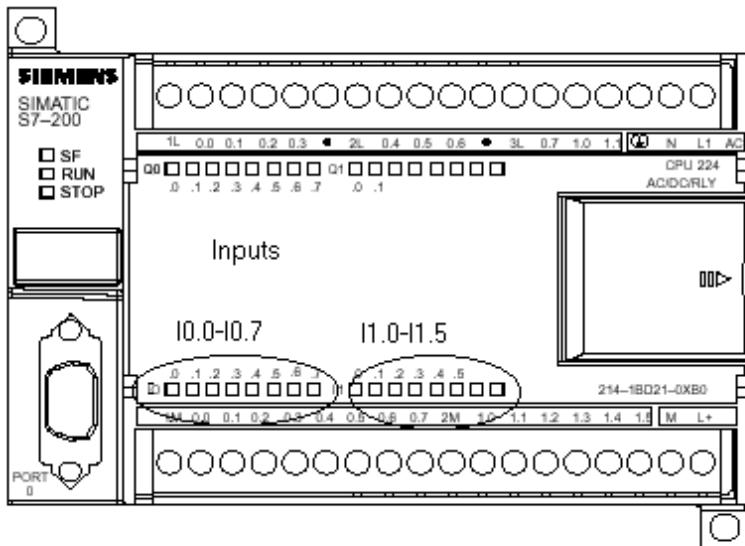
Measure then the external supply TR on the upper terminals (placed in the power box at the back). Here must be measured 24VDC between the terminals V+ and V-.

If there is not 24 VDC, there are two error possibilities: - The power supply is made of a current-limiting circuit taking care to lower or to disconnect completely the voltage at an external short circuit. The easiest way to check this is to demount V+ and repeat the measuring.

- If 24VDC is metered now, there is a short circuit in the external circuits, perhaps at the sensing devices.
- If 24VDC is not measured, the supply is defective and has to be changed.

Control PLC input's

The input signals are 24 VDC. The easiest way to control the input terminals is to control the LEDs at the bottom of the PLC control.



The input are marked so that the first eight are named I0.0-I0.7. The remaining six are marked I1.0-I1.5.

If none of the LEDs are lighting as expected, it is probably due to the fact that the voltage supply in the upper right corner of the control box does not give 24 VDC - the green LED in the marked DC ON must light continuously. Check voltage by a voltmeter positioned on VDC between V+ and V-. The voltage must be 24 VDC +-2V

<i>Input terminal</i>	<i>Name</i>	<i>Description</i>
I0.0	ON/OFF switch - at the front of control box	The LED must light when the switch is in ON position.
I0.1	Pressure switch	The LED lights when water pressure is OK*
I0.2	Thermostat	The LED lights when water temperature is less than 47 degrees. If temperature has been over 47 degrees, thermostat can first be re-connected when temperature has fallen under approx. 37 degrees. *
I0.3	Max hygrostat from department 1	The LED lights if the max hygrostat of the department is switched off. **
I0.4	Max hygrostat from department 2	The LED lights if the max hygrostat of the department is switched off. **
I0.5	Max hygrostat from department 3	The LED lights if the max hygrostat of the department is switched off. **
I0.6	Max hygrostat from department 4	The LED lights if the max hygrostat of the

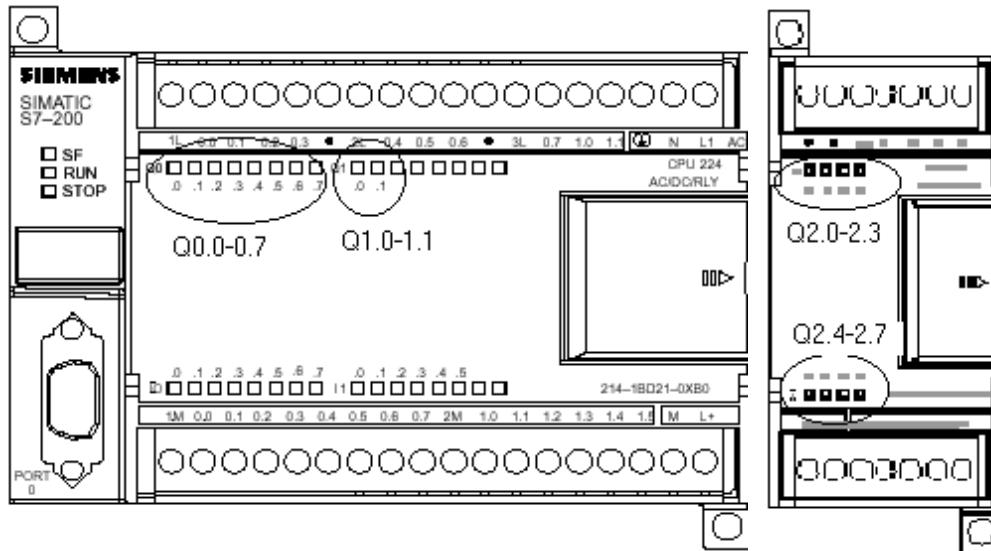
		department is switched off. **
I0.7	Max hygrostat from department 5	The LED lights if the max hygrostat of the department is switched off. **
I1.0	Max hygrostat from department 6	The LED lights if the max hygrostat of the department is switched off. **
I1.1	Max hygrostat from department 7	The LED lights if the max hygrostat of the department is switched off. **
I1.2	Max hygrostat from department 8	The LED lights if the max hygrostat of the department is switched off. **
I1.3	Max hygrostat - main circuit	<p>The LED lights when the main circuit of the max hygrostat is working.</p> <p>Do not forget: The control is led to four departments.</p> <p>If not all departments are in service, the remaining connecting blocks for the max hygrostat are to be connected by a bridge.</p>
I1.4	Reset pressing - at the front of the control box	The LED lights when reset pressing is affected.
I1.5	Not used	

* The LED turns off when Pressure Switch/THERMOSTAT is again in normal position.
But the control has to be recoupled by pressing RESET

** The LED turns off again when humidity has fallen under the shift pressure. But the control has to be recoupled by pressing RESET

Control outputs from PLC

The PLC control has 18 output which are controlled easiest at the LEDs on top of the PLC.



The output on the main unit are marked so that the first eight are called Q0.0-Q0.7 and the next two Q1.0-Q1.1 - the extension block is Q2.0-Q2.3 in the upper block and Q2.4 and Q2.7 in the lower block.

<i>Output terminal</i>	<i>Name</i>	<i>Description</i>
Q0.0	Pump	To main switch box 24 VDC - for operation of pump and opening of ON/OFF valve
Q0.1	M2	To main switch box 24 VDC - Bypass valve (option)
Q0.2	M1.1	To main switch box 24 VDC - Valve for department 1
Q0.3	M2.1	To main switch box 24 VDC - Valve for department 2
Q0.4	M3.1	To main switch box 24 VDC - Valve for department 3
Q0.5	M4.1	To main switch box 24 VDC - Valve for department 4
Q0.6	M5.1	To main switch box 24 VDC - Valve for department 5
Q0.7	M6.1	To main switch box 24 VDC - Valve for department 6
Q1.0	M7.1	To main switch box 24 VDC - Valve for department 7
Q1.1	M8.1	To main switch box 24 VDC - Valve for department 8
Q2.0	Not used	
Q2.1	Not used	
Q2.2	Alarm lamp	24 VDC for alarm lamp on the front of the control box
Q2.3	A1	4 poled relay for multiplexing of the analog signals. Must run in a regular pulse/pause sequence of 5 seconds.
Q2.4	Not used	
Q2.5	Not used	
Q2.6	Not used	
Q2.7	Not used	

Spare Parts List

Nortec Humidity Inc.
ML Humidification - Parts Price List

New item #	Old item #	Description
2300006	AQA 15/35	AQA Cartridge (100,000 gallons) for AQA35 housing
2300010	AQA35	AQA Housing and Cartridge (Brass bottom add refundable \$300 core charge)
22322	022322	Nozzle Filter Type 2
22379	022379	Nozzle ES G 1/4" 2.5 L (TF 4/8)
22380	022380	Nozzle ESG 1/8" 1.6M (Nano)
22382	022382	Nozzle ESG 1/8" 2.5L (TF 32)
100216002	100.216.002	ML Princess 2 - 8 x 4.5 l/h, 115 VAC, including UL- cable
100216103	100.216.103	ML Princess 3 - 12 x 4.5 l/h 115 VAC, including UL-cable
100400000	100.400.000	Dust Filter for Air-Princess
100406000	100.406.000	120 VAC Motor for ML Princess 2
100411000	100.411.000	120-volt Motor for Princess 3
102400000	102.400.000	Prefilter for nozzle ring
103140000	103.140.000	SS Blind nozzle
103150000	103.150.000	SS Nozzle .2mm (4.5 L/hr)
103160000	103.160.000	SS Nozzle .15mm (2.5 L/hr)
104415000	104.415.000	Pressure control for NP10 pumps
104416000	104.416.000	Pressure control for NP16 pumps
104430000	104.430.000	High Pressure Gauge
104466000	104.466.000	PAH-2 Danfoss MLP100 Pump (180B0031)
104467000	104.467.000	PAH-4 Danfoss MLP300 pump (180B0030)
104467000	104.468.000	PAH-6.3 Danfoss MLP500 pump (180B0029)
104469000	104.469.000	PAH-10 Danfoss MLP800 pump (180B0032)
104470000	104.470.000	PAH-12.5 Danfoss MLP1000 pump (180B0033)
104478000	104.478.000	MLP Pressure Regulator for MLP 100, 300, 500
104479000	104.479.000	Pressure regulator for MLP 800, 1000 & 2000 pump station
104481000	104.481.000	Rebuild kit for pressure regulator
105501002	105.501.002	HST-010 Humidity sensor 0-10V PT 1000 inc. 2m PVC cable
105510000	105.510.000	Filter for humidity sensor HST 010
106208005	106.208.005	3/2 valveset 0-76 l/h complete, 1/4"-1/4", 200-240VAC 50/60hz
106211000	106.211.000	3/2 Valveset 60-360 L/Hr 1/4"x1/4" 200-240VAC
106216000	106.216.000	3/2 Valveset 120-1800 L/Hr 1/4"x1/4" 200-240VAC
106221000	106.221.000	3/2 Valveset 120-1800 L/Hr 3/8"x3/8" 200-240VAC
106500000	106.500.000	Filter for prefilter at On Off valves
107101000	107.101.000	1/8" high pressure hose (in feet)
107102000	107.102.000	1/4" high pressure hose (in feet)
107103000	107.103.000	3/8" high pressure hose (in feet)
108101000	108.101.000	1/8" SS ferrule and stem
108102000	108.102.000	1/4" SS ferrule and stem
108103000	108.103.000	3/8" SS ferrule and stem
108201001	108.201.001	SS 1/8" Tee
108301000	108.301.000	1/4" or 1/8" hose extension fitting
108303000	108.303.000	3/8" hose extension fitting
132200000	132.200.000	ML Solo - white
132220001	132.220.001	ML Solo2 - White 24VAC
132400001	132.400.001	Wall Mounting Fitting for ML Solo - Color White
349010001	349.010.001	PLC Battery 200 days
680010177	680.010.177	K-20 & K-21 relay
835020003	835.020.003	Low Pressure Gauge
2300200	7030254002	Membrane XLE-2540 (BLS 950-1900)
2300201	7030404002	Membrane 4"x40" (BLS 2400-15000)
2300207	8400920	UV ballast for all basic models
2300213	F10-1S	10" 1-Micron sediment filter
2300214	F10-20S	10" 20-Micron sediment filter
2300215	F10-5C	10" 5m carbon filter - Draabe
2300217	F20-10C	20" 10-Micron Carbon Filter
2300218	F20-1S	20" 1-Micron sediment filter
2300219	F20-20S	20" 20-Micron sediment filter
2300220	F20-5-4.5S	20" x 4.5" 5-Micron sediment filter
2300221	F20-5S	20" 5-Micron sediment filter
2300241	S330RL	8400902 UV lamp for 2GPM Unit - S2Q-PA
2300242	S36RL	8400905 UV lamp for 12 GPM unit - S12Q-PA
2300243	S463RL	8400903 UV lamp for 5GPM - S5Q-PA
2300244	S810RL	8400904 UV lamp for 8GPM unit - S8Q-PA



MLP 100 -1000 High Pressure Pump

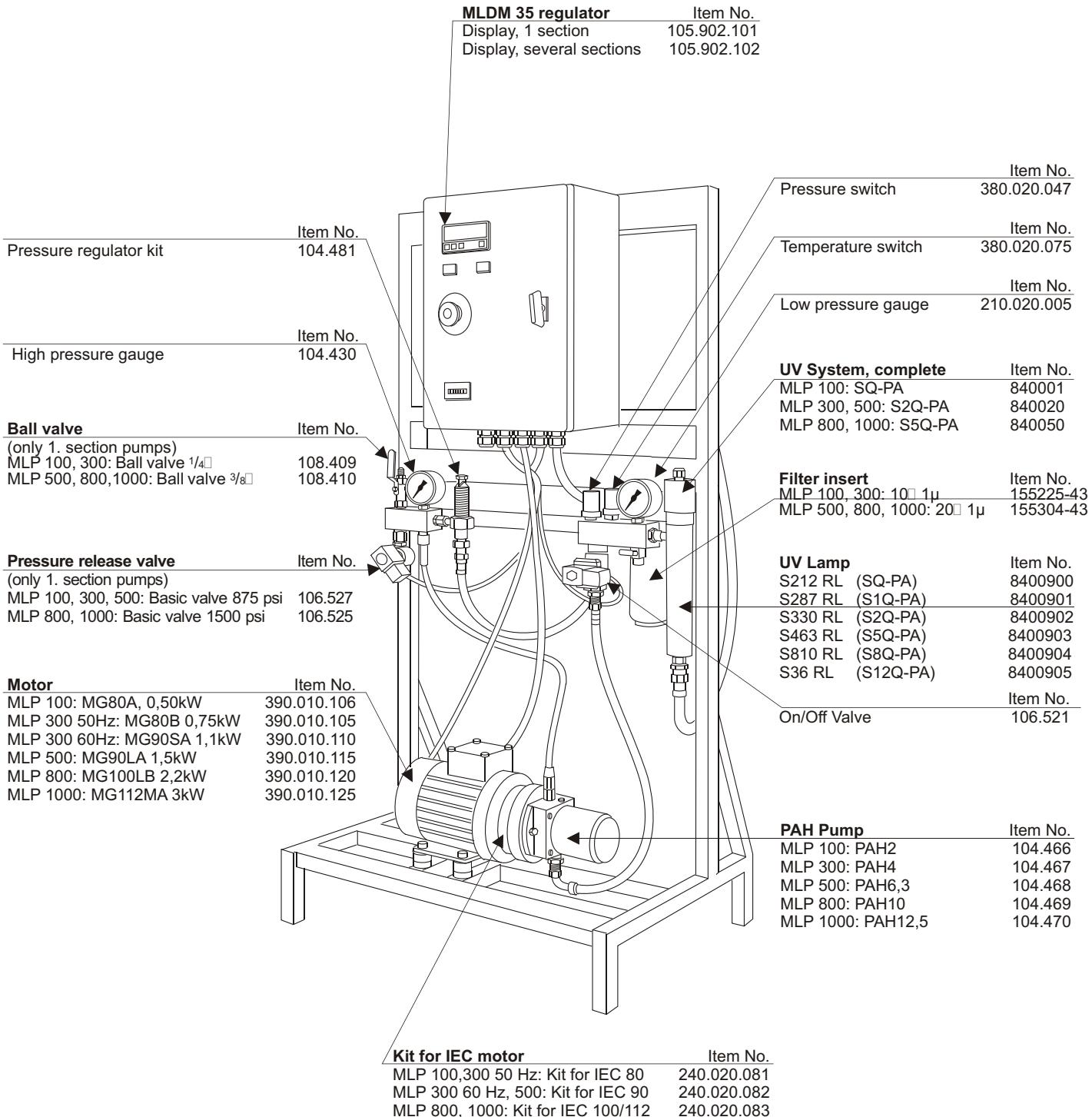
Parts list MLDM35 Controlled Pumps

TECHNICAL DATA

TD091US-00

10.03.05

VM/MLK

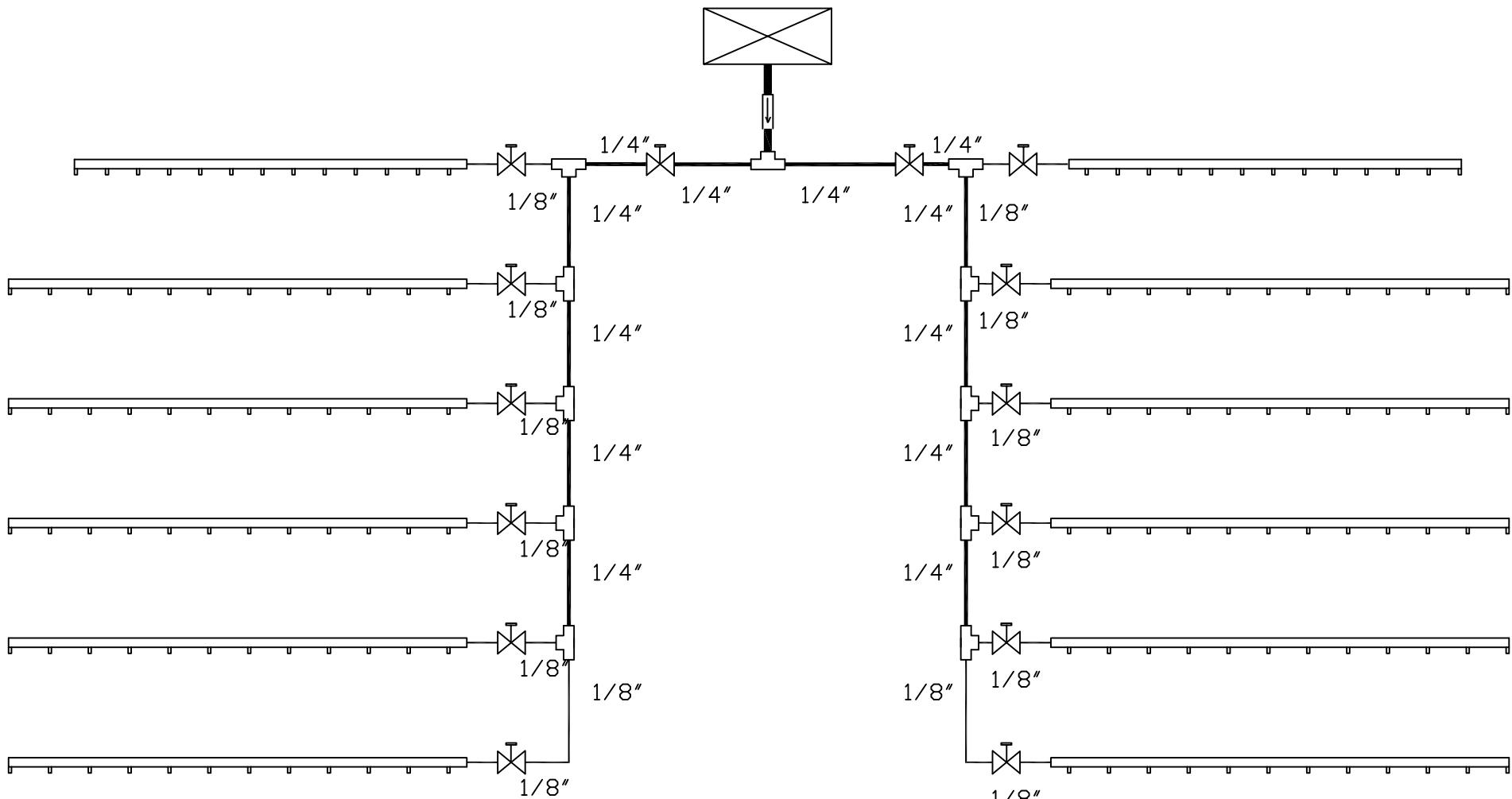


Reo-Pue RO System - Parts Price List

		GL Part #	Quantity	Total
UV Lamp 1/2 gpm (SQ-PA)		8400900		
UV Lamp 1 gpm (S1Q-PA)		8400901		
UV Lamp 2 gpm (S2Q-PA)		8400902		
UV Lamp 5 gpm (S5Q-PA)		8400903		
UV Lamp 8 gpm (S8Q-PA)		8400904		
UV Lamp 12 gpm (S12Q-PA)		8400905		
UV Quartz sleeve 1/2 gpm (SQ-PA)		8400912		
UV Quartz sleeve 1 gpm (S1Q-PA)		8400913		
UV Quartz sleeve 2 gpm (SQ2-PA)		8400914		
UV Quartz sleeve 5 gpm (SQ5-PA)		8400915		
UV Quartz sleeve 8 gpm (SQ8-PA)		8400916		
UV Quartz sleeve 12 gpm (SQ12-PA)		8400917		
Carbon Filter 2.5" x 20" 10-micron (LPES) &(BLS400-2400)		149252010		
Sediment Filter 2.5" x 20" 5-micron (LPES) & (BLS400-2400)		14815508		
Sediment Filter 4.5"BB x 20" 25/5-micron (BLS 3000/18000)		14815564		
HCH test strips 5-in-1 bottle of 50 strips		2755250		
Membrane XLE 2" x 26" (LPES 500-1) (LPES 900-2)		7030202601		
External O-ring		1300224		
Membrane KF ESPA 2.5" x 21" (BLS400-800)		7030252101		
External O-ring		1300329		
Internal O-ring		1300209		
Membrane KF ESPA 2.5" x 40" (BLS 950-1900)		7030254002		
External O-ring		1300329		
Internal O-ring		1300209		
Membrane ESPA 4" x 40" (BLS 2400-15000)		7030404002		
External O-ring		1300342		
Internal O-ring		1300210		

Project Specific Documents

PUMPSTATION

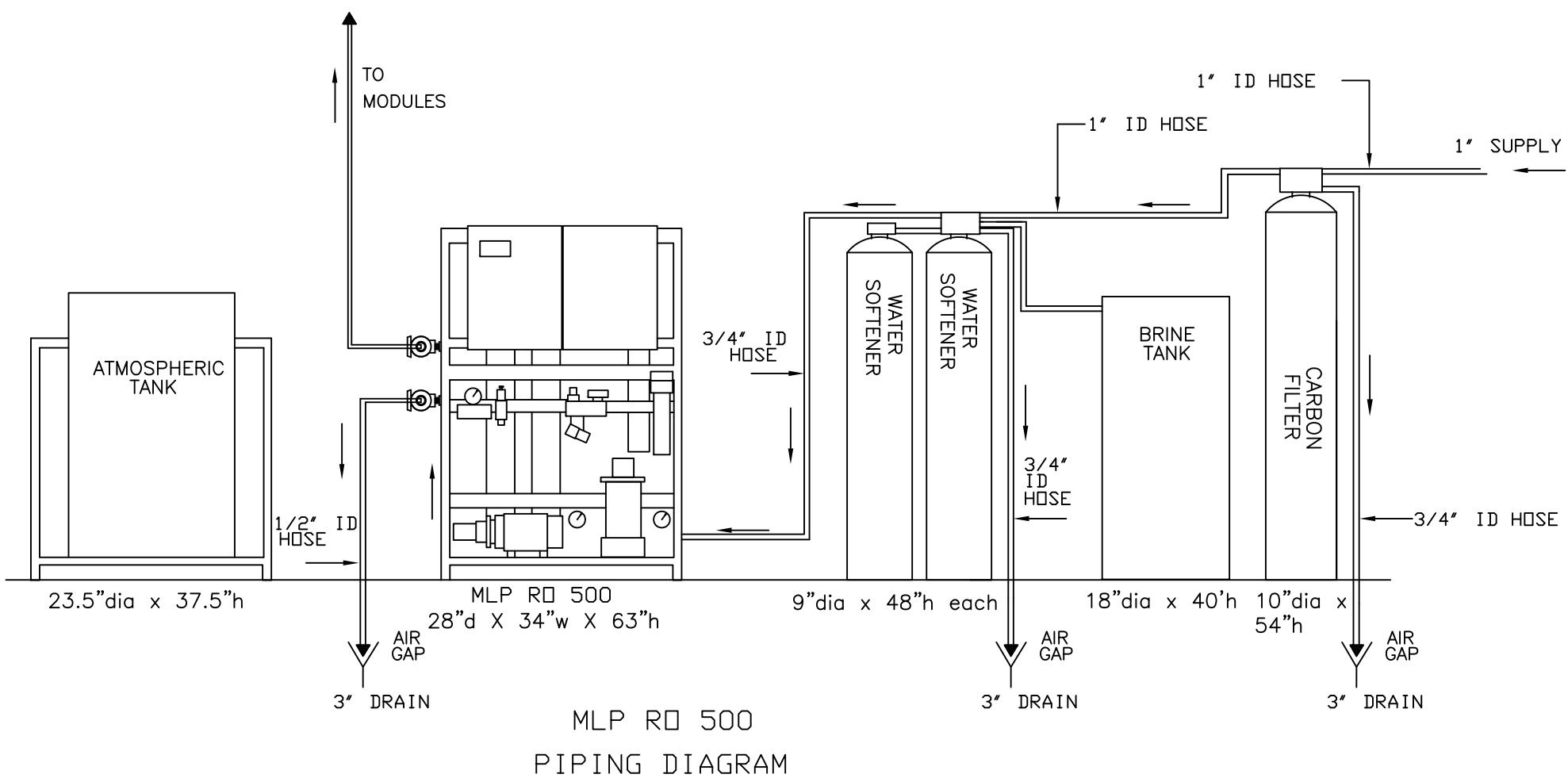


Zone 1
50 #2 nozzles, 60 - 1m flex, 13 - .5m flex

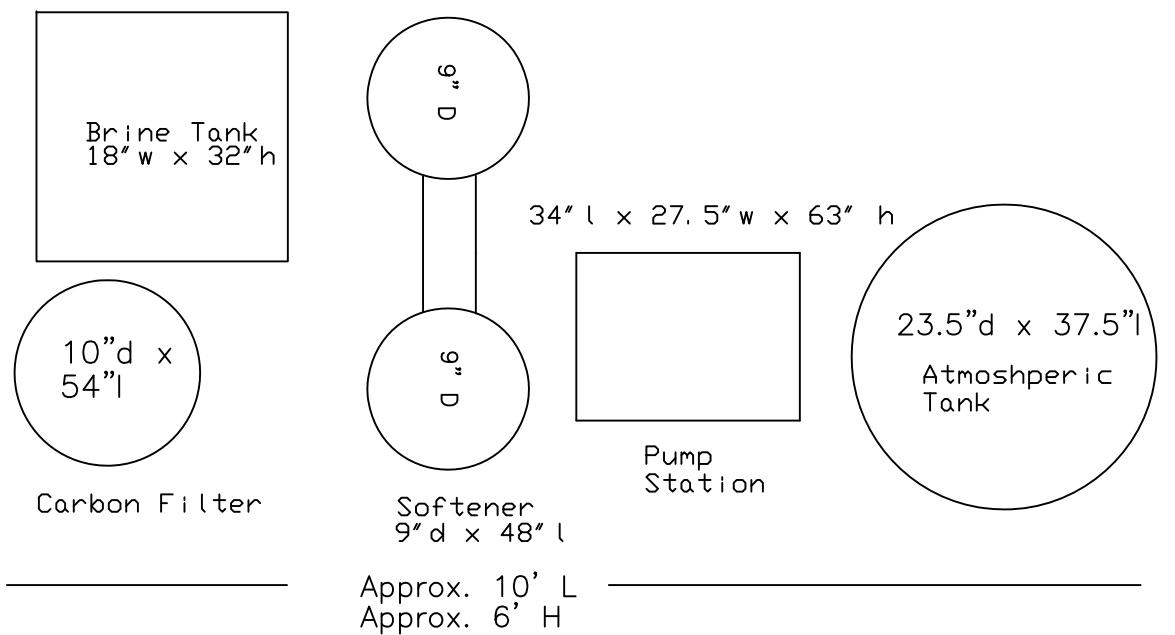
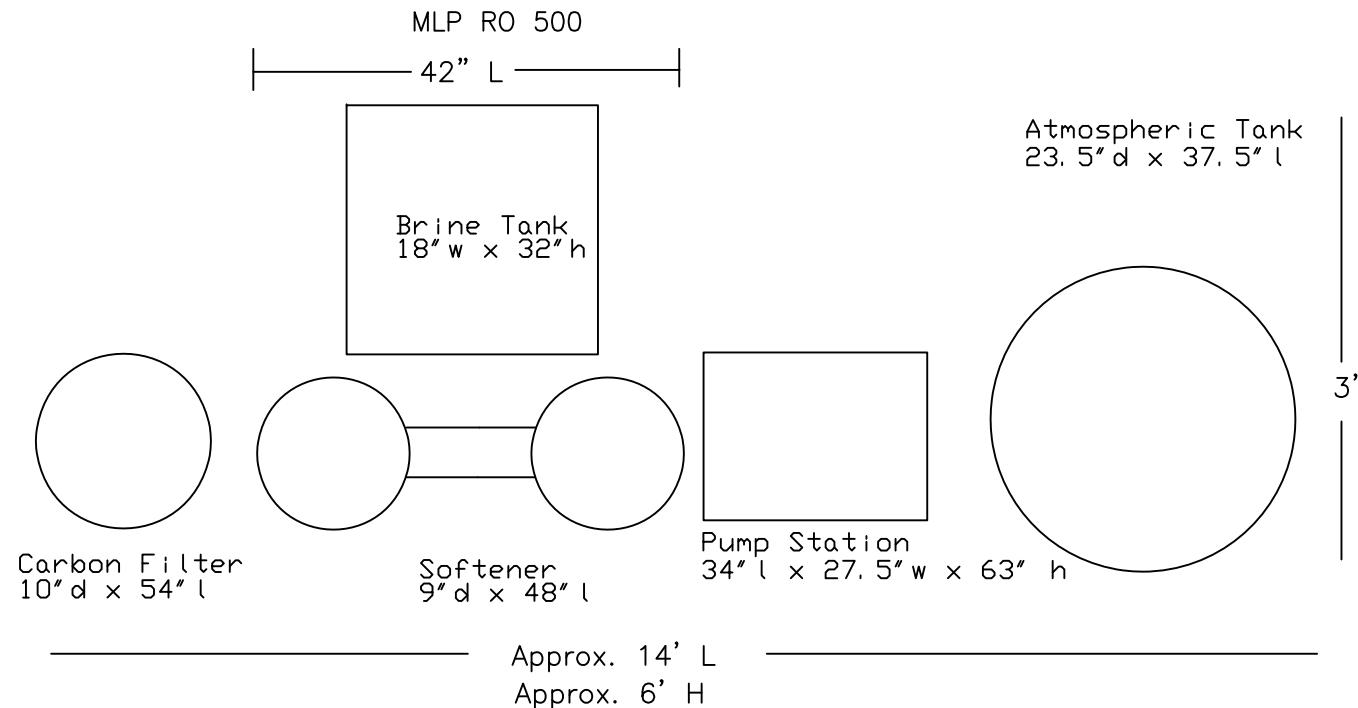
Zone 2
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Letterhead Press - Hose Layout

NORTEC HUMIDITY	
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FILE NAME:	letterhead press hose layout
DRAWN BY:	DJM CHKD:
DATE:	9-22-14 SCALE: NONE



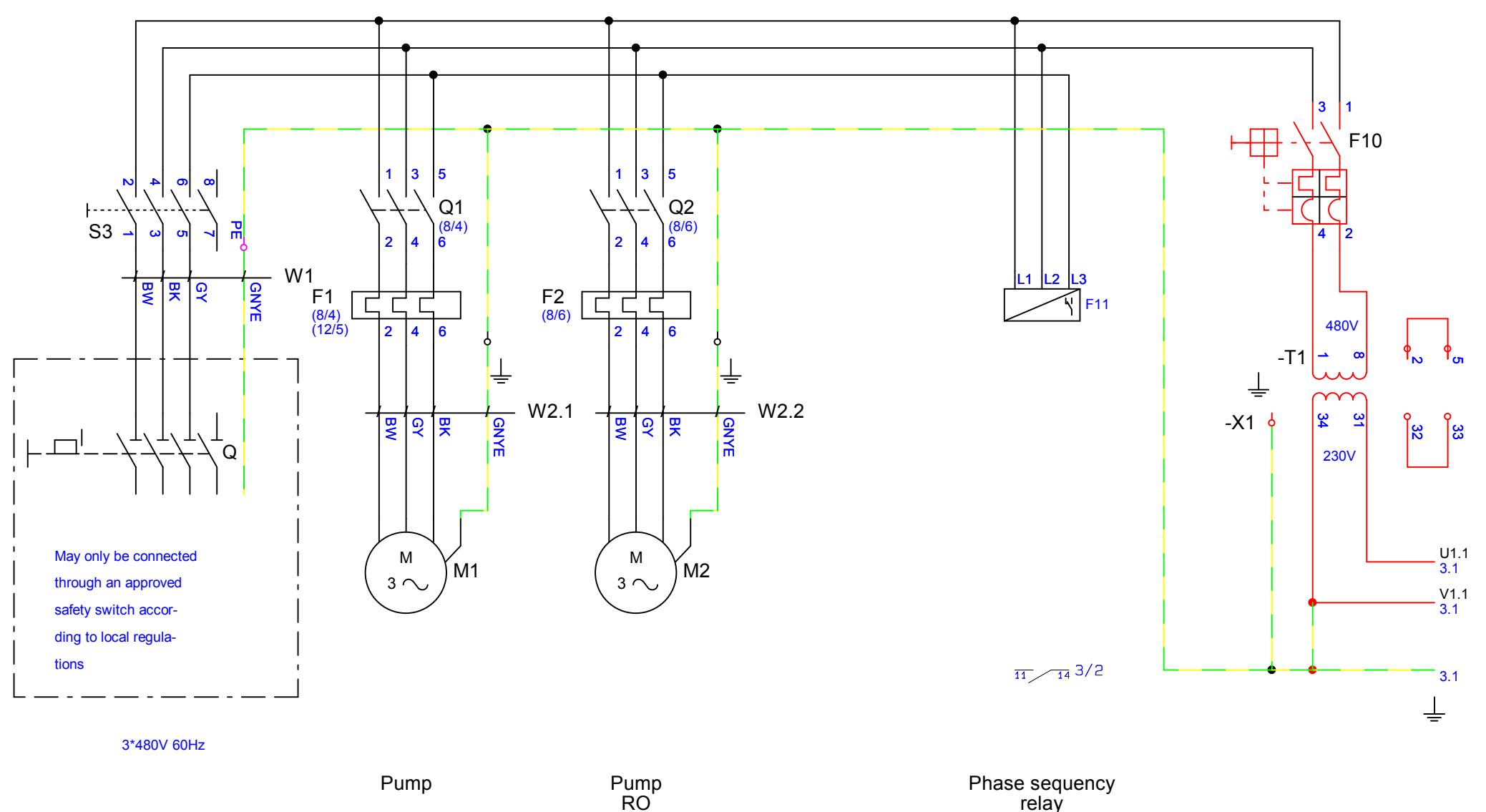
NORTEC SYSTEMS	
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FILE NAME:	MLP RO 500 layout
DRAWN BY:	CHKD:
DATE:	7-29-12
SCALE:	NONE

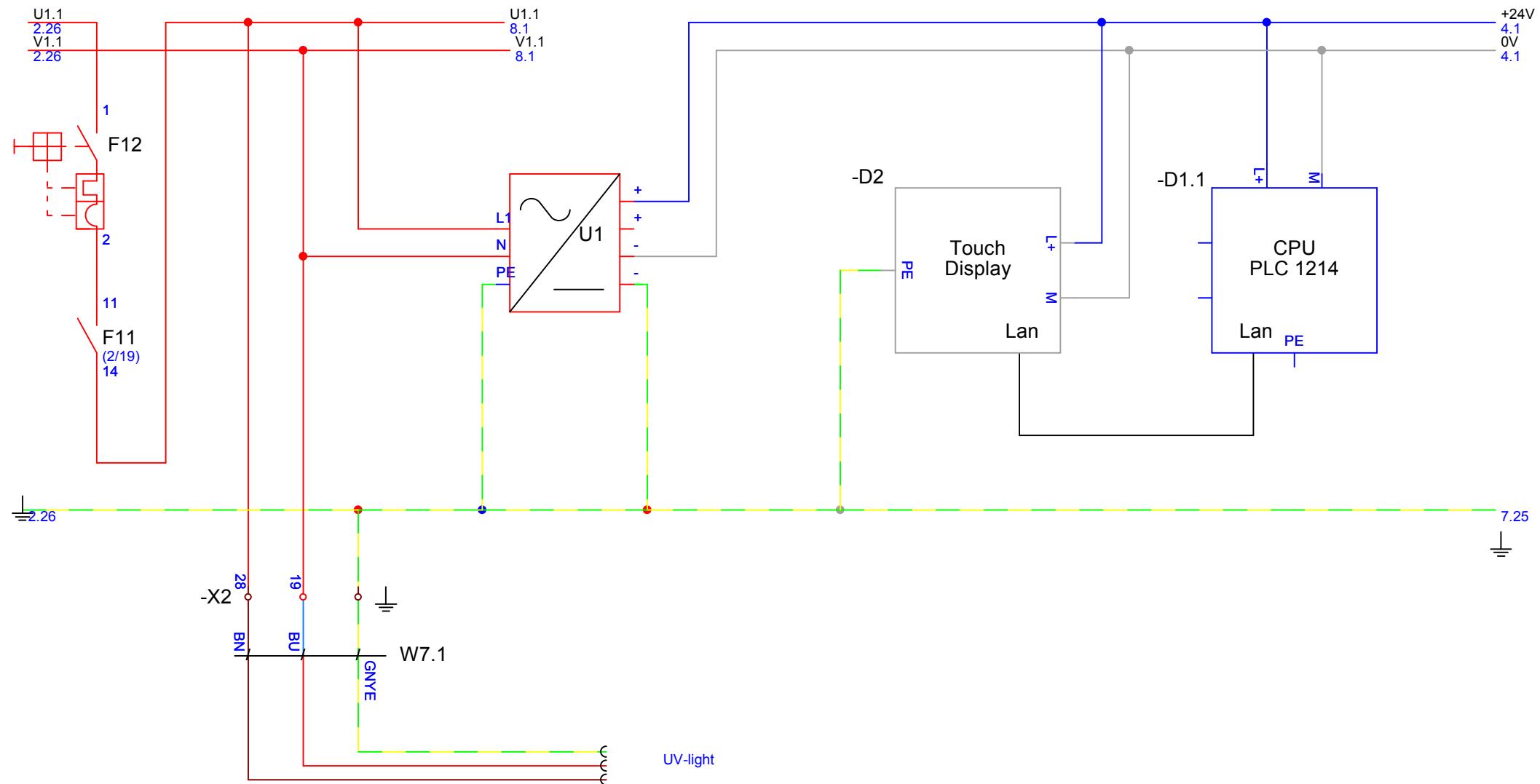


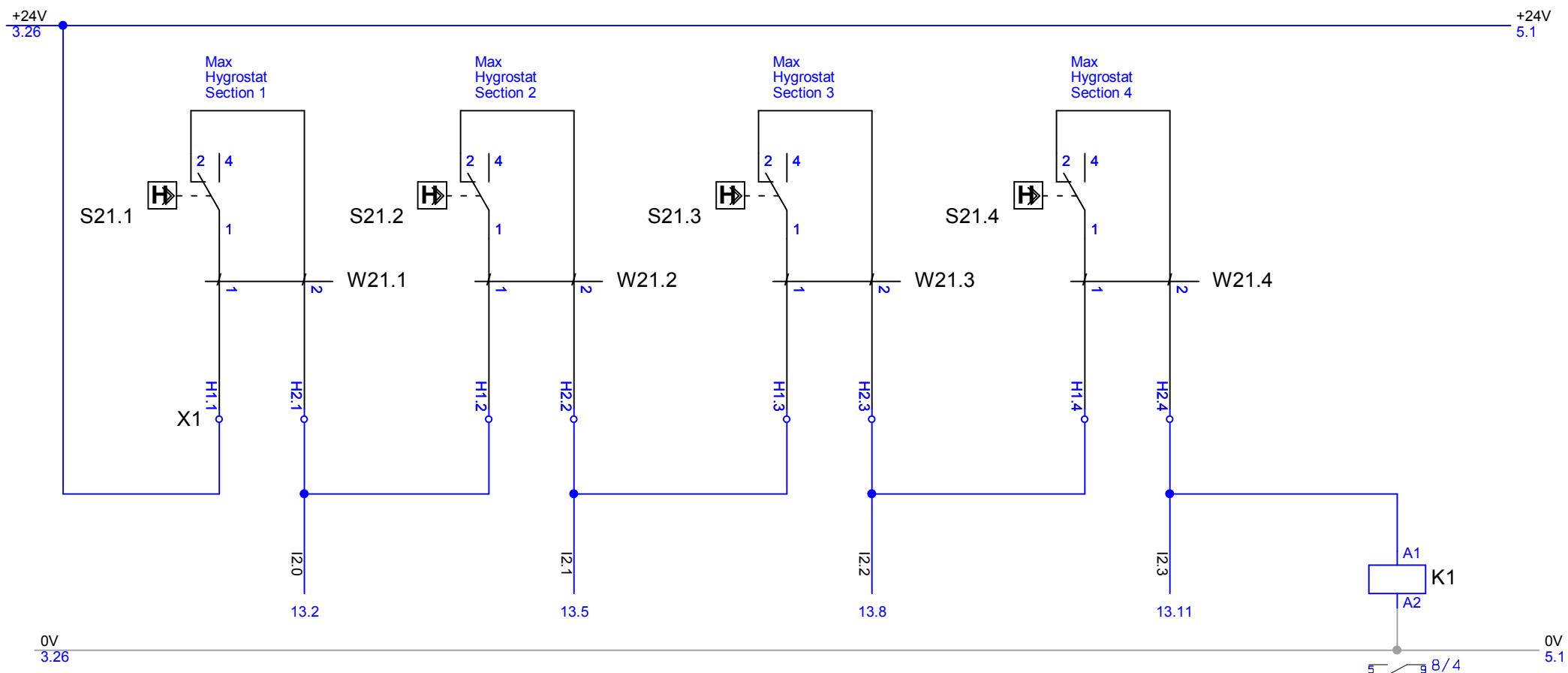
ML SYSTEM INC.	
PROJECT: MLP RO 500 RO System	
FILE NAME: MLP RO 500 Layout	
DRAWN BY: DJM	CHKD:
DATE: 11-8-12	SCALE: NONE

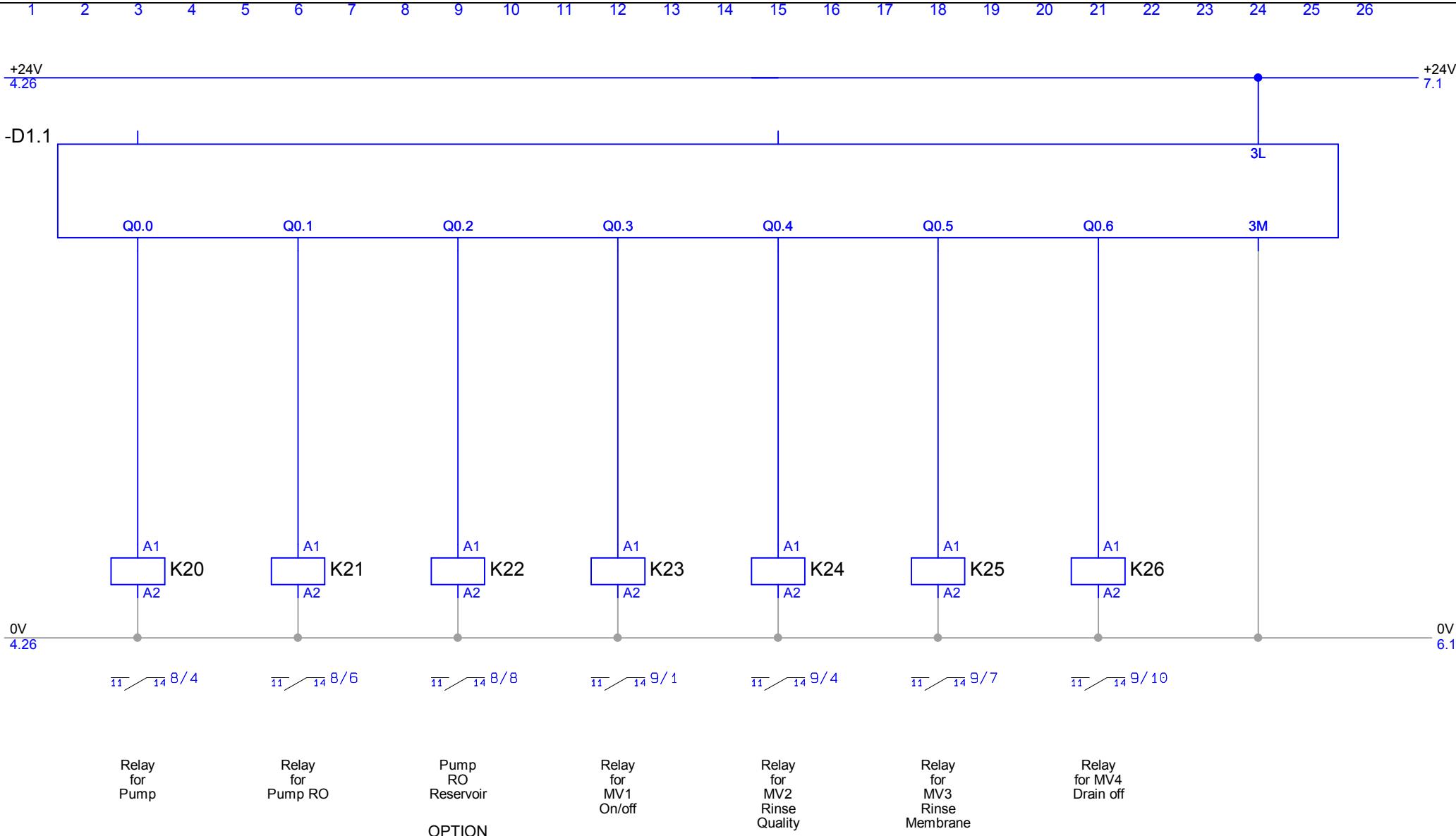
Table of contents

Page	Description
2-3	Main wiring diagram
4	Max Hygrostat diagram
5-10	Digitale Outputs
11-13	Digitale inputs
14-15	Analog inputs
16-18	Layout of components
19-26	Cable wiring diagram
27-28	IO list









D1.1

Q0.7 Q1.0 Q1.1

A1
K27
A2A1
K28
A20V
5.260V
7.1

11 14 9/13

Option
Relay
for
MV6
C02

Page Title: Digitale Outputs

Drawing No: 2060220

Order no: 2060220

Project : MLP-RO 500L 4 Sections

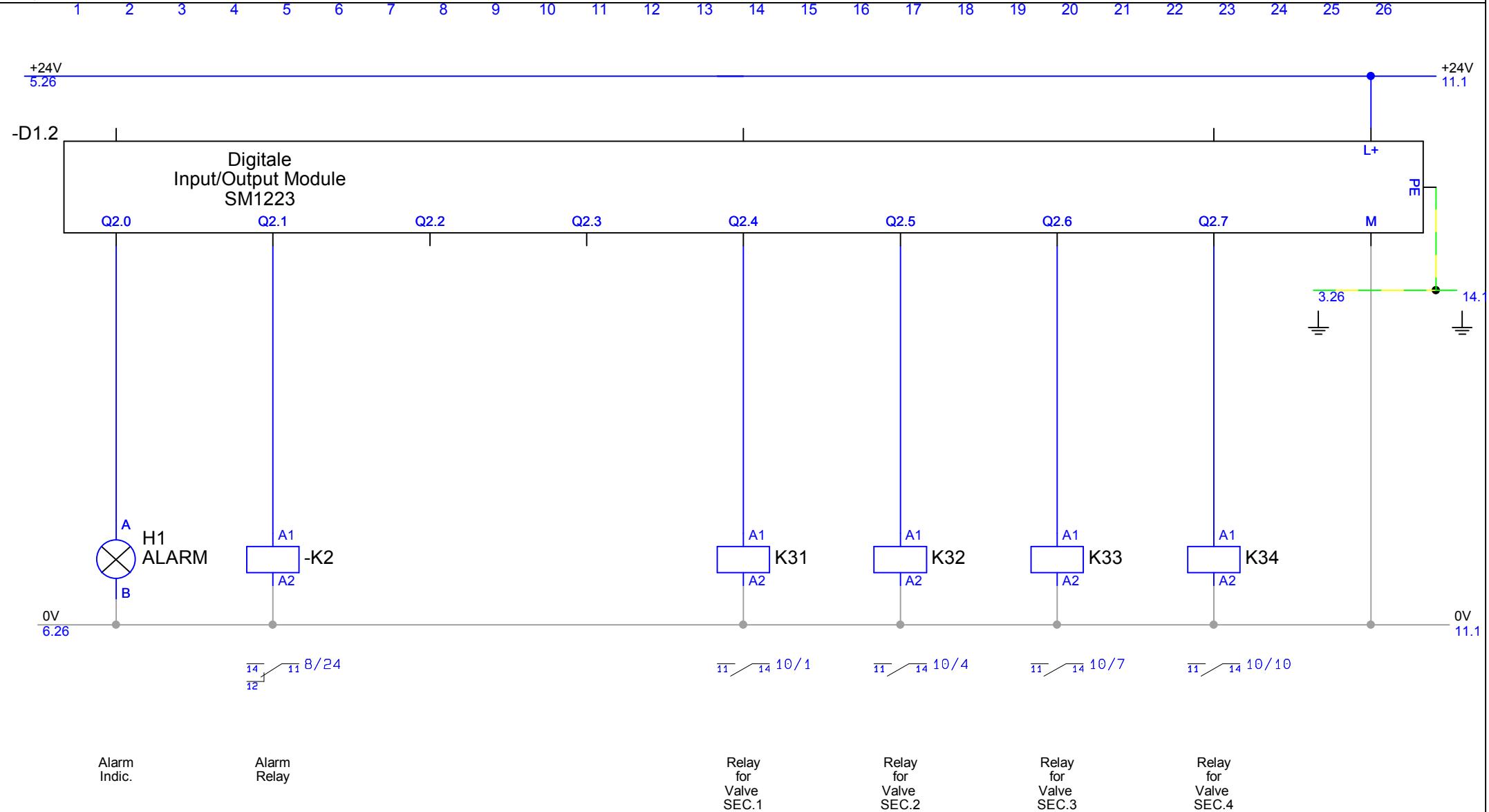
Printed : 07-12-2012

Title: ML Draabe System Inc

Date: 01-09-2011

By: TH

Page 6 Of : 28



Alarm Indic.

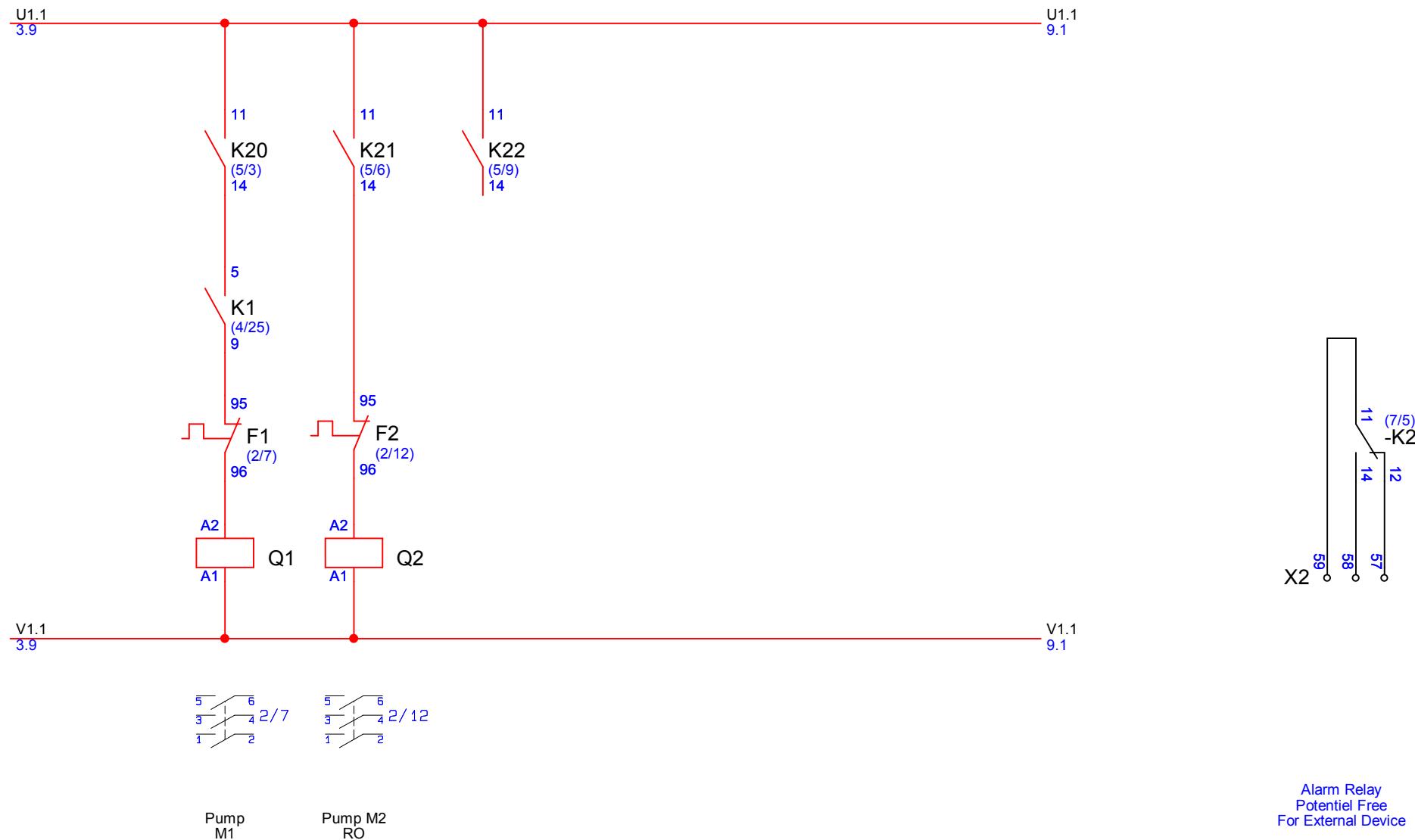
Alarm Relay

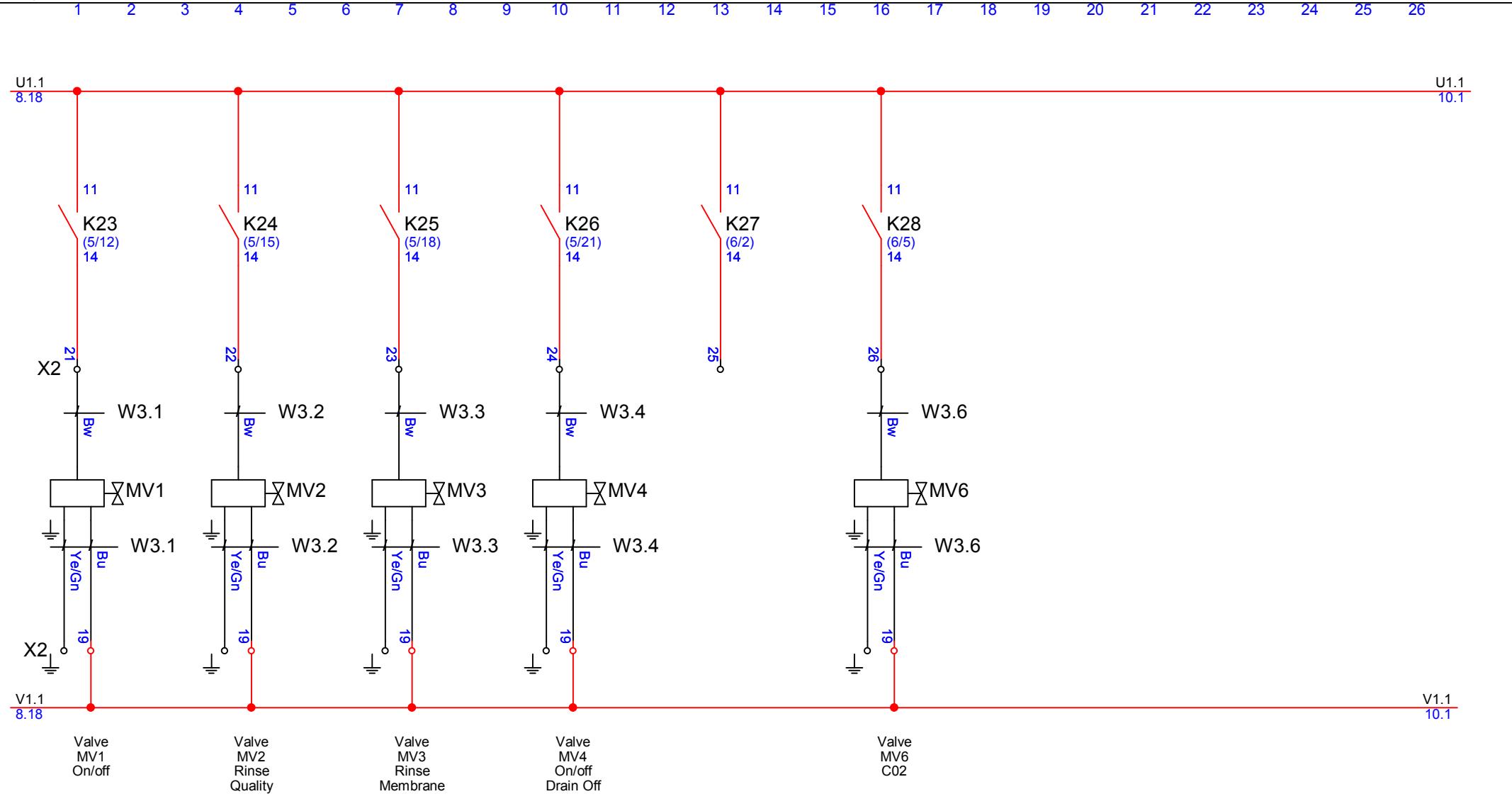
Relay for Valve SEC.1

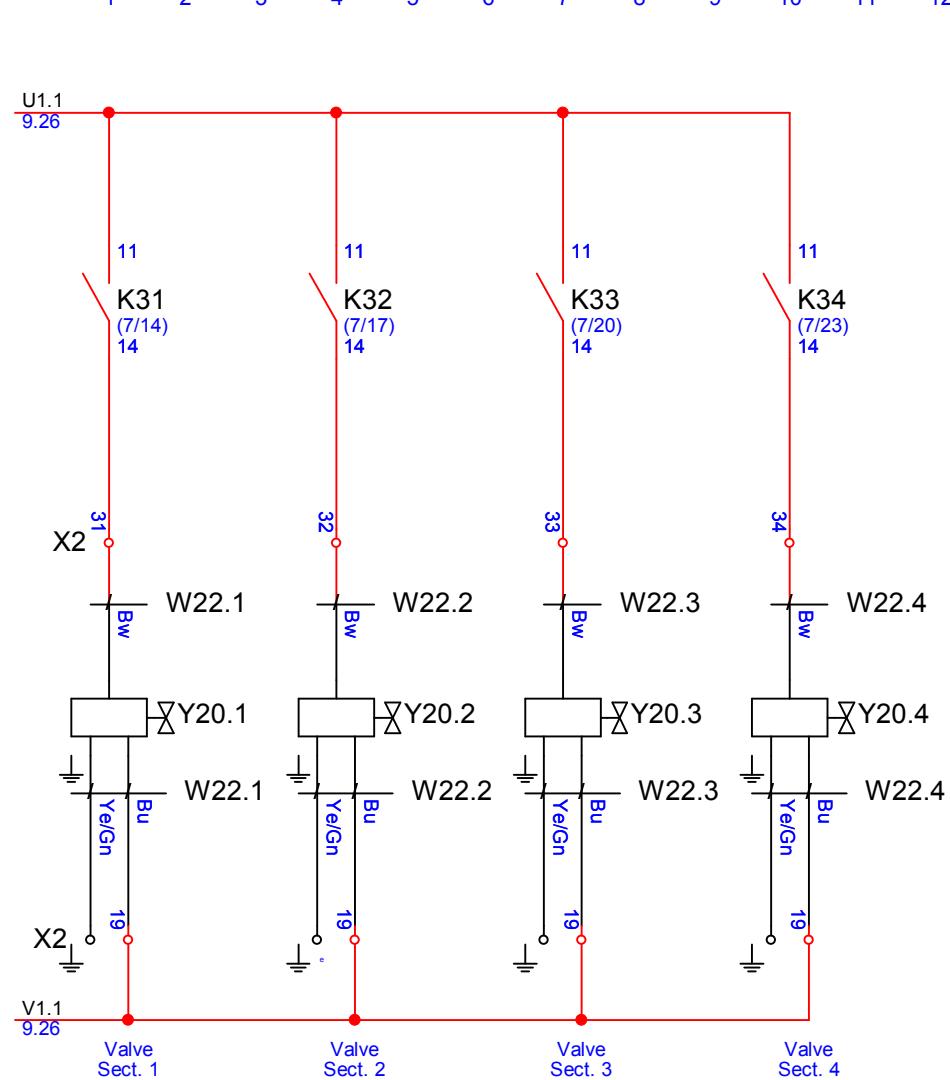
Relay for Valve SEC.2

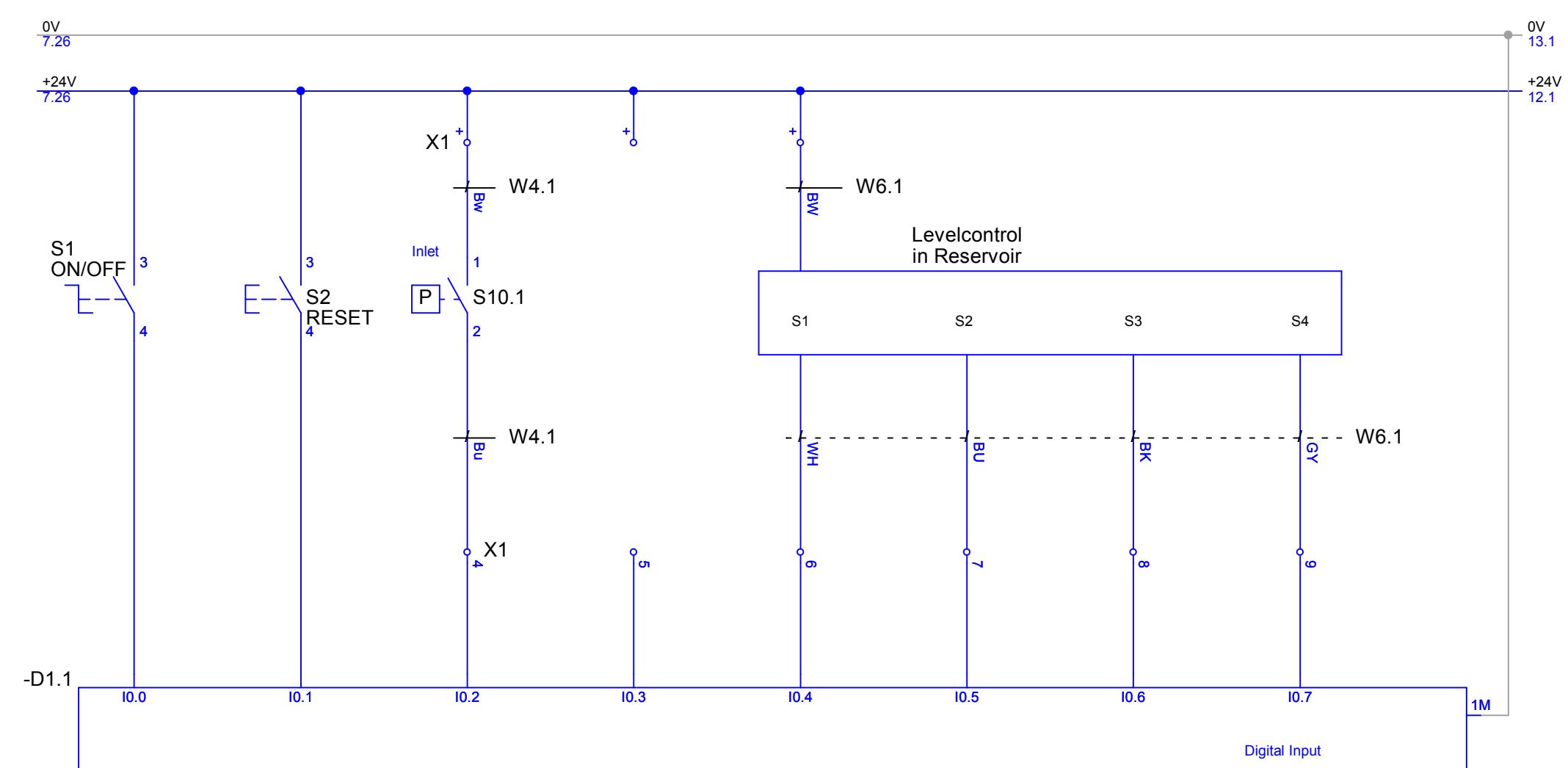
Relay for Valve SEC.3

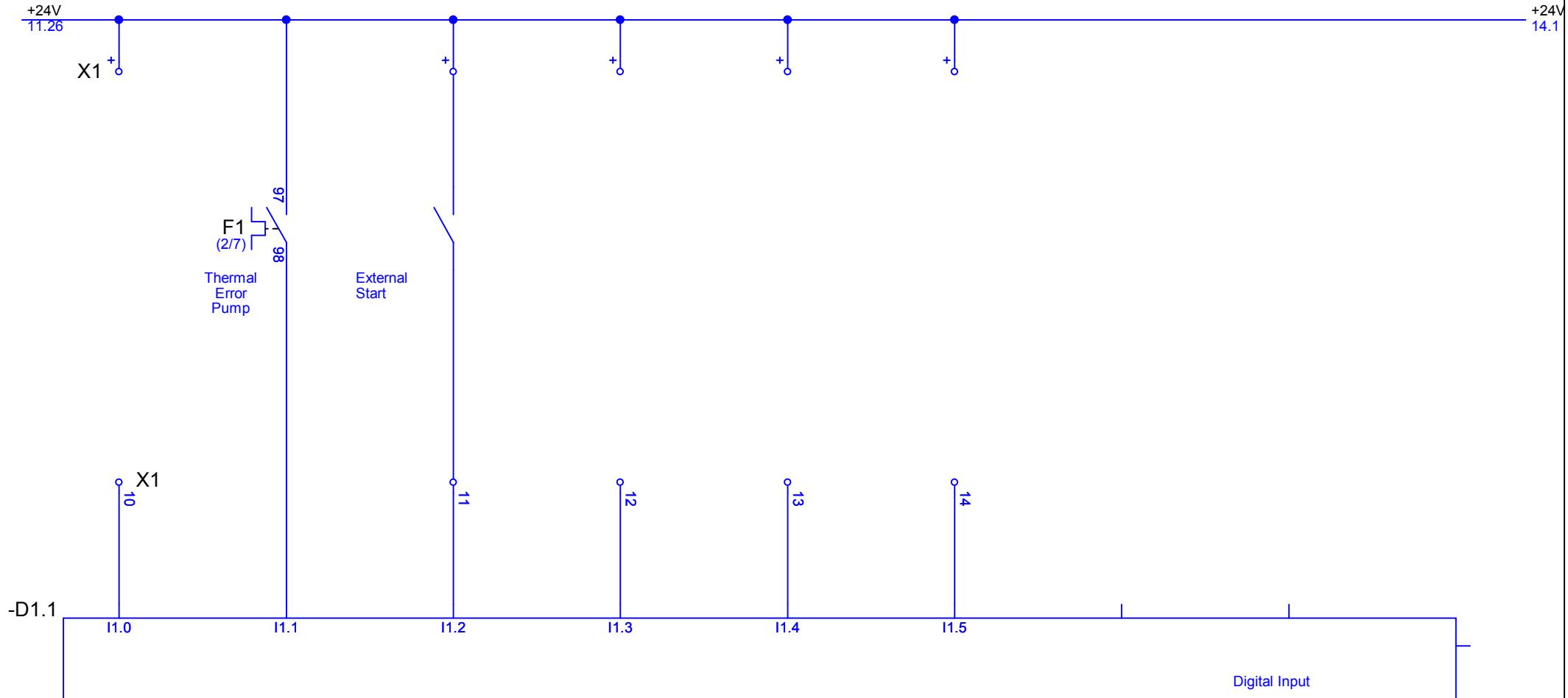
Relay for Valve SEC.4

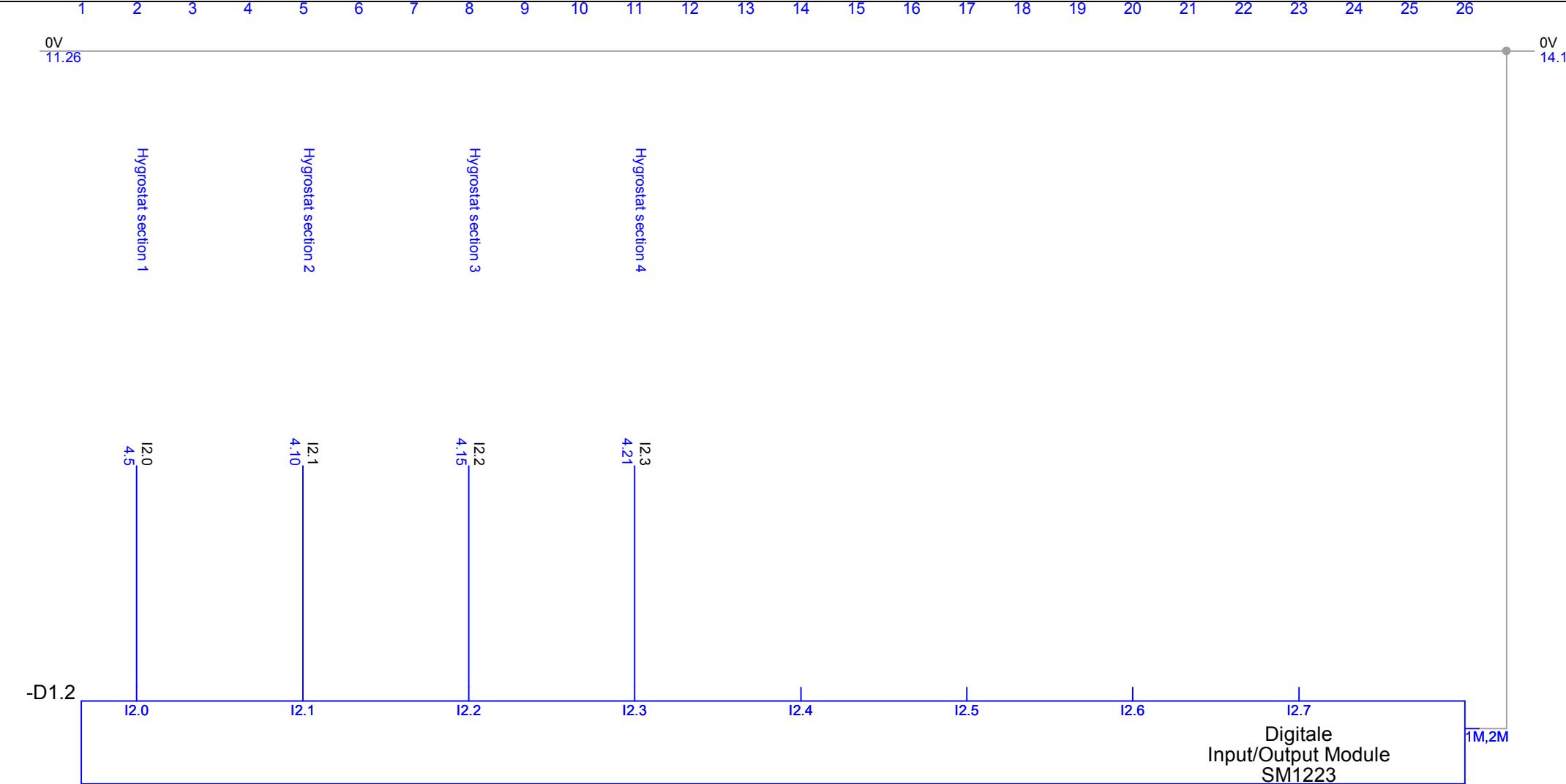


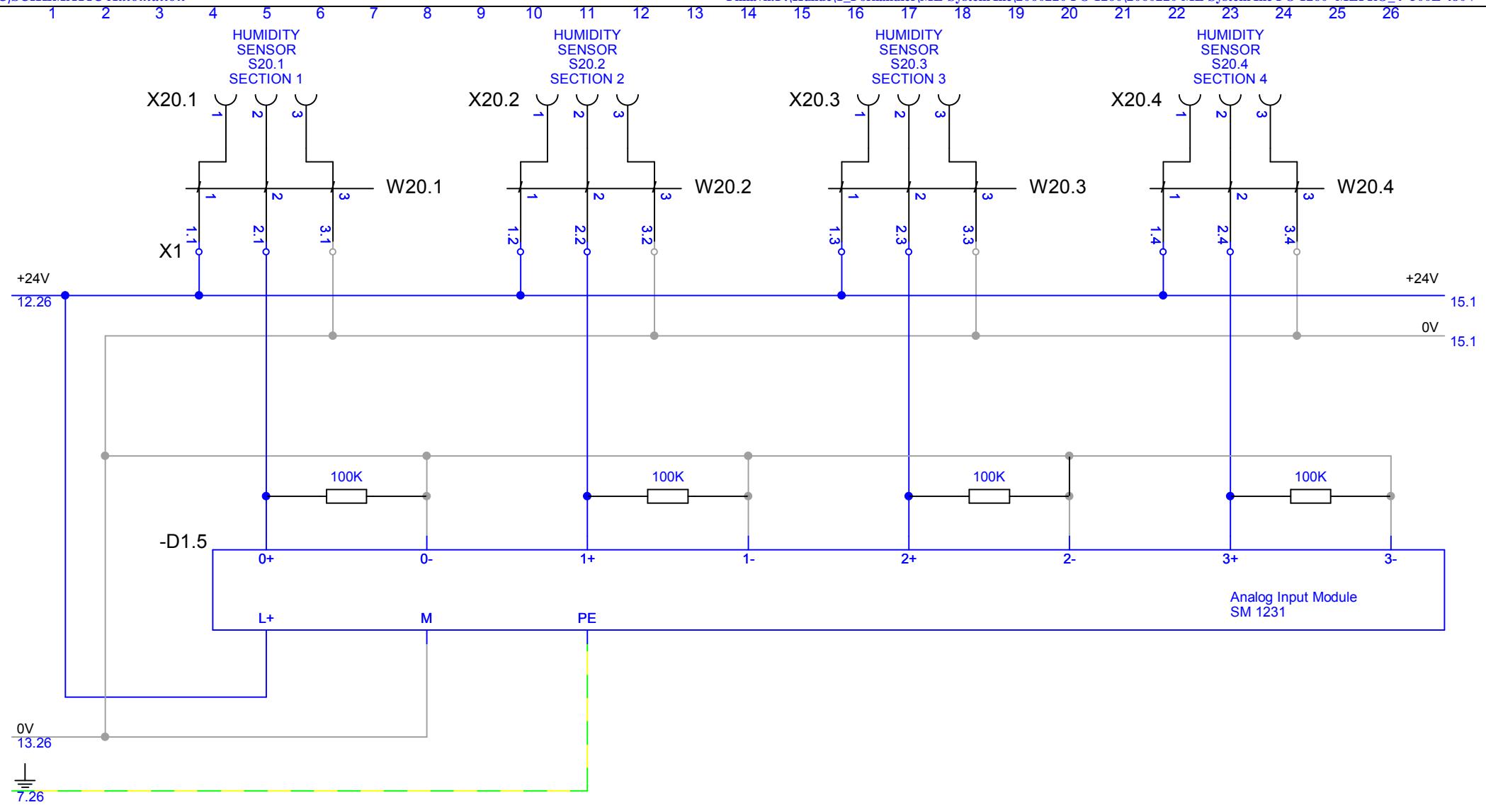


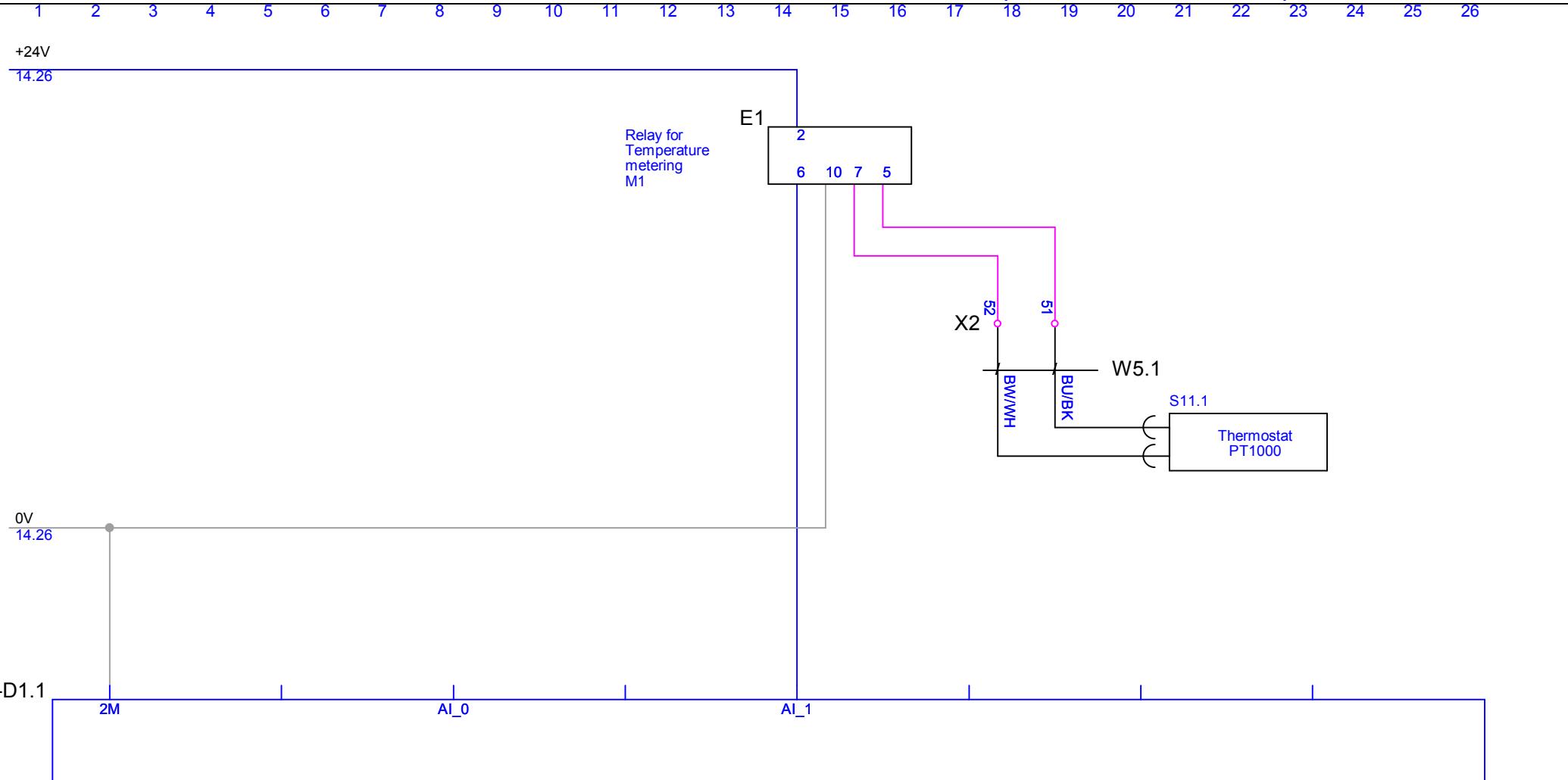




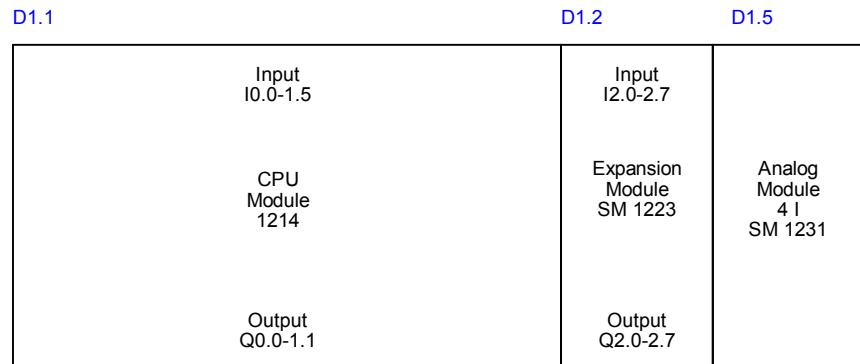






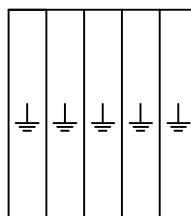


PLC box



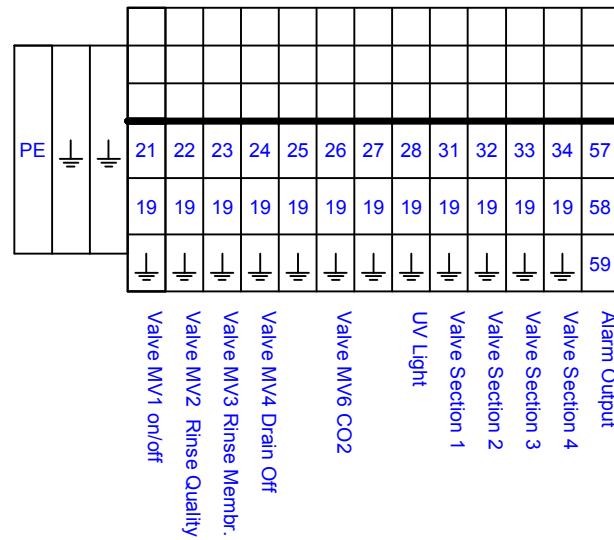
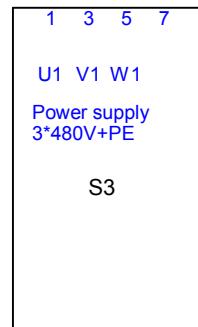
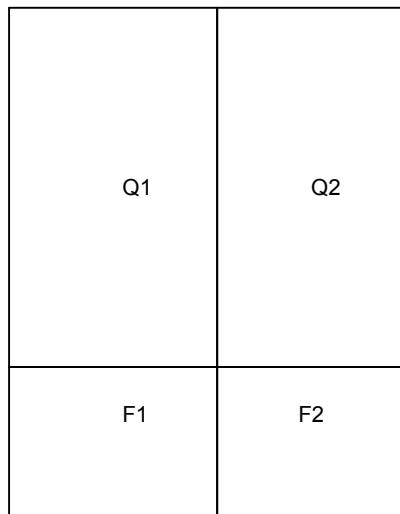
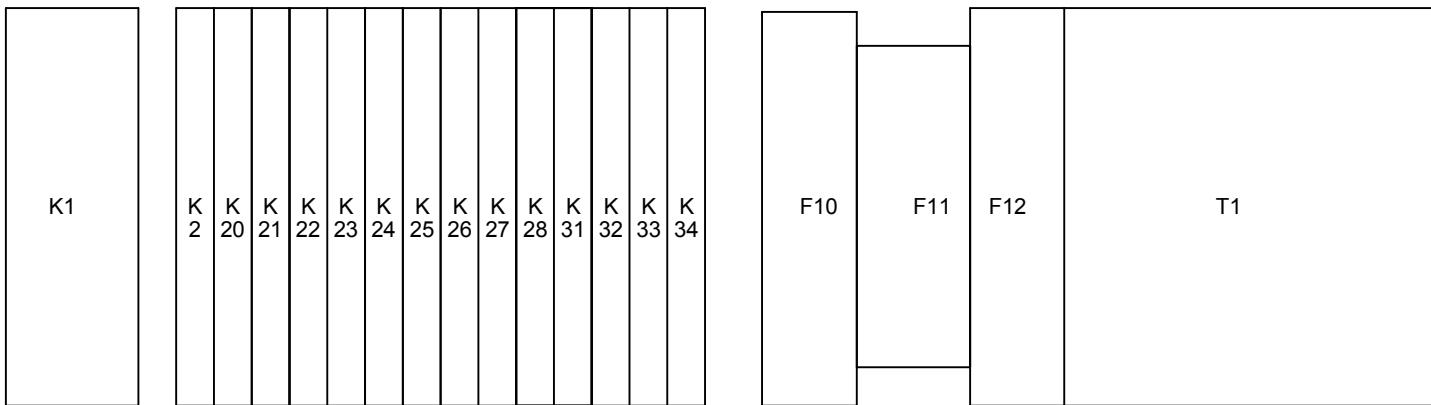
U1

E1

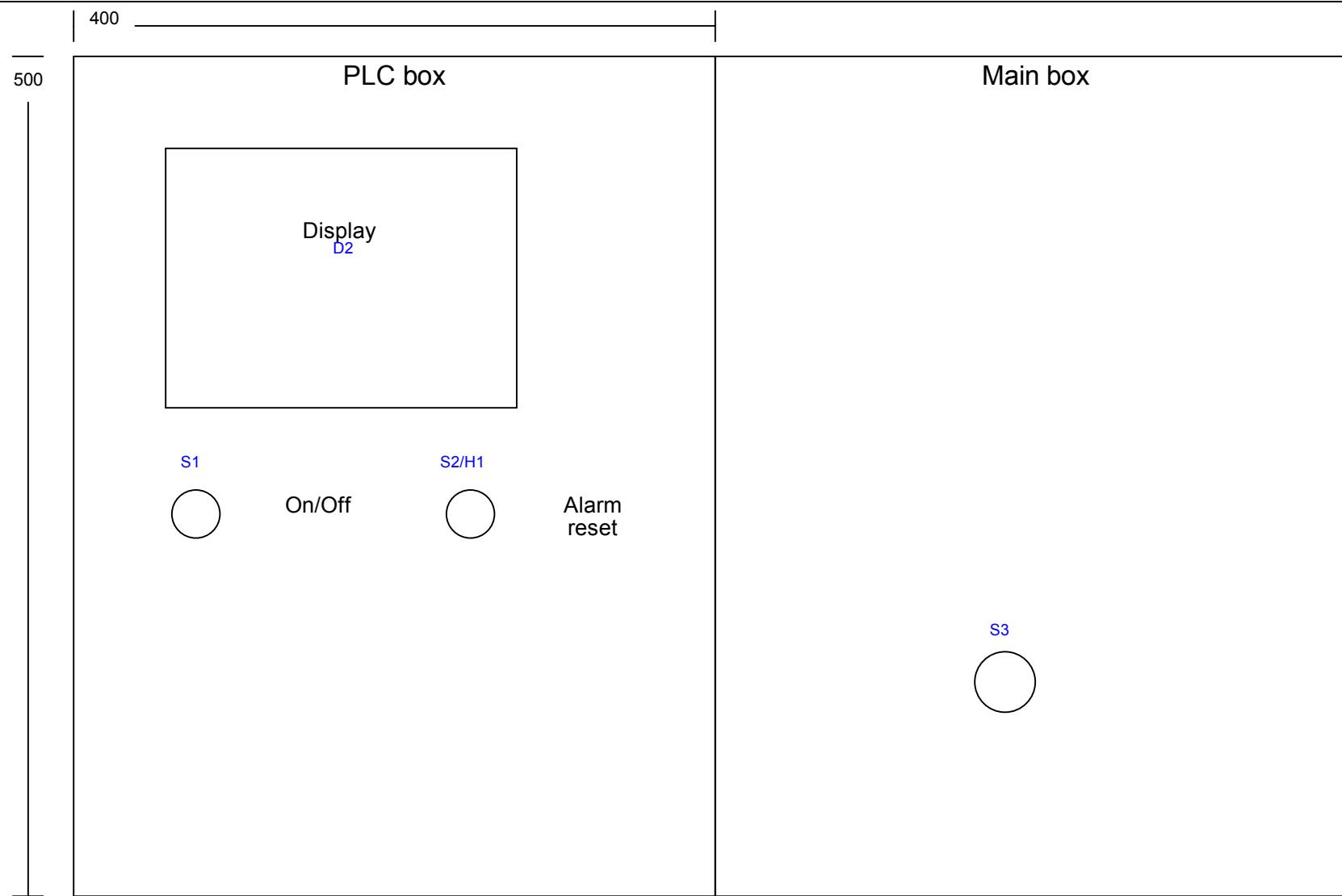


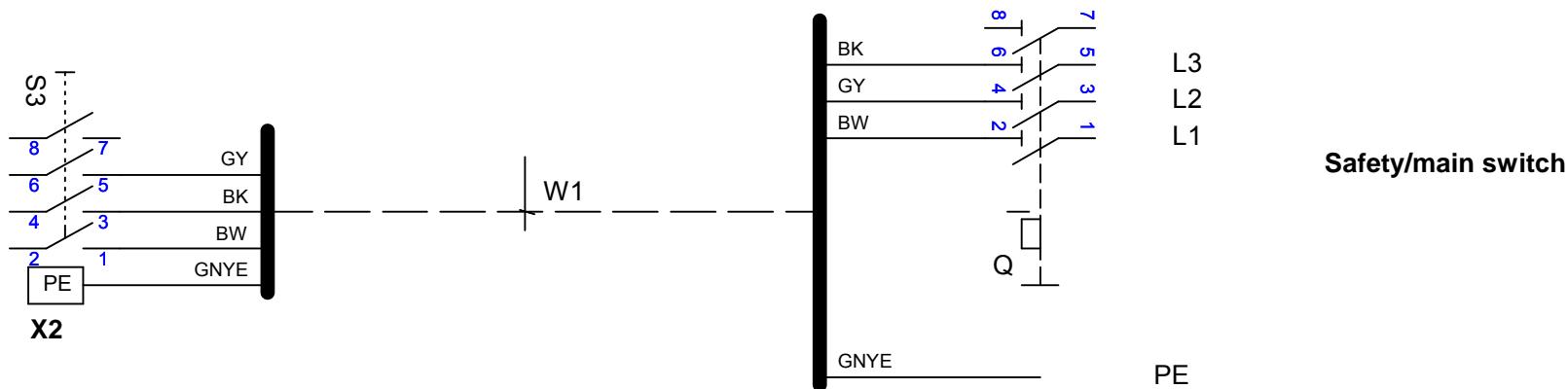
PT 1000 temp sensor

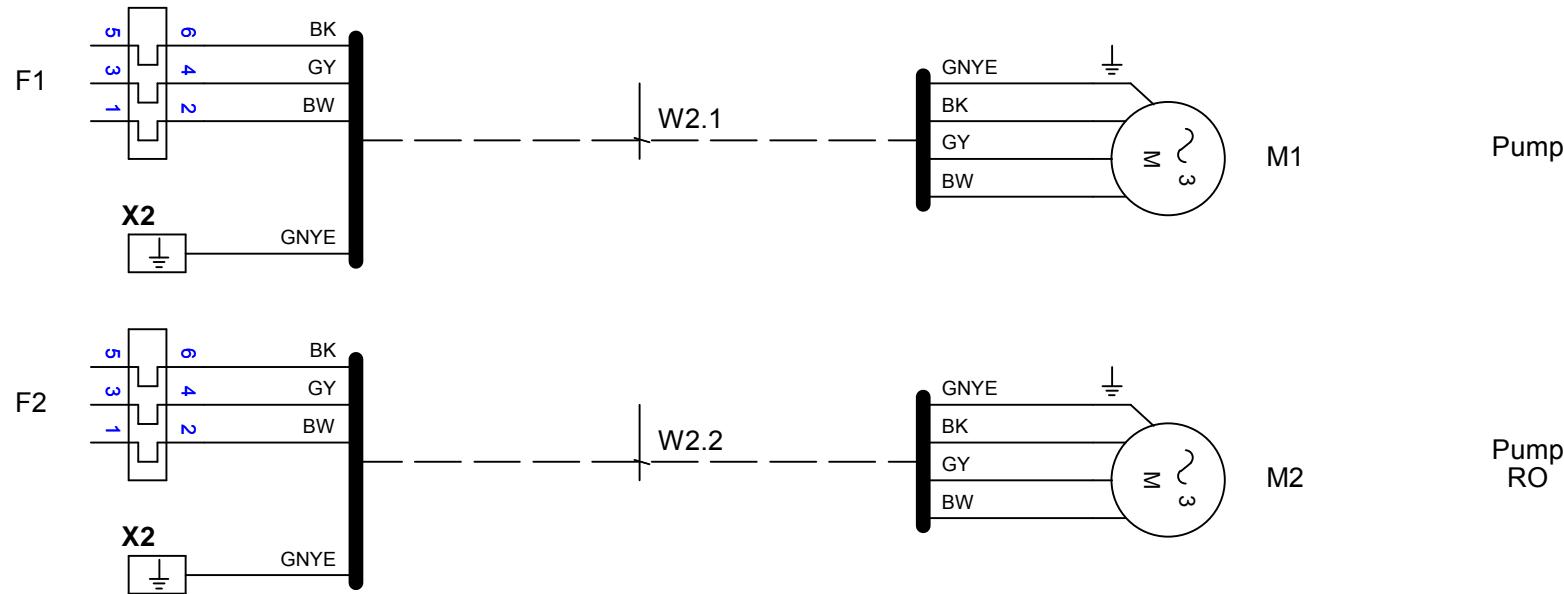
Main box

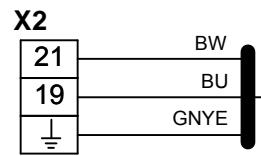


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Project : MLP-RO 500L 4 Sections	Printed :	07-12-2012
	Date:	05-10-2012
Title: ML Draabe System Inc	By:	TH
	Page 17	Of : 28

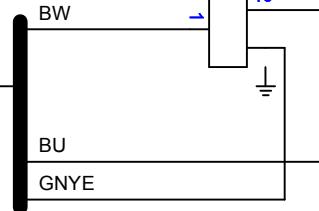






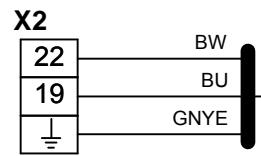


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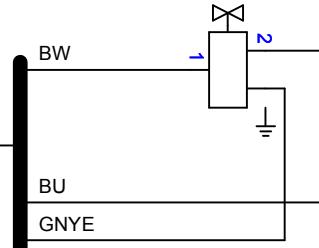


MV1

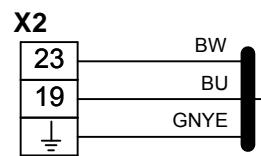
Valve On/Off



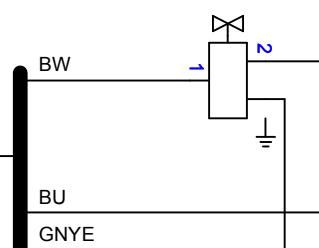
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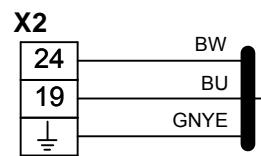
MV2

Valve for
flushing Start up

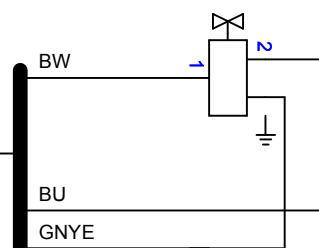
W3.3



MV3

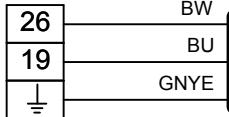
Valve for
flushing membrane

W3.4

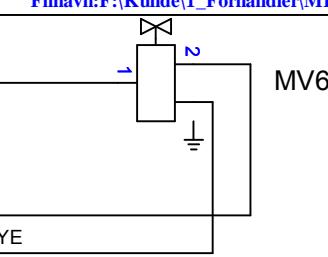


MV4

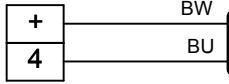
Valve for
Drain Off

X2

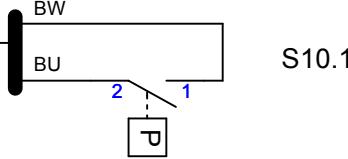
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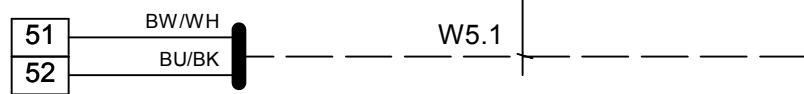


OPTION

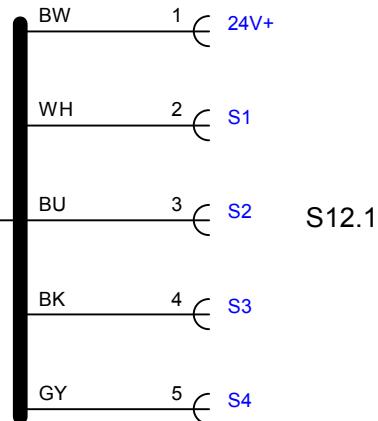
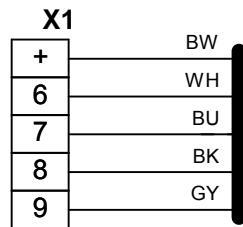
**Valve for
CO2****X1**

W4.1

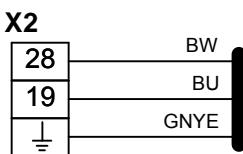
Pressure
switch



Thermostat
pt1000

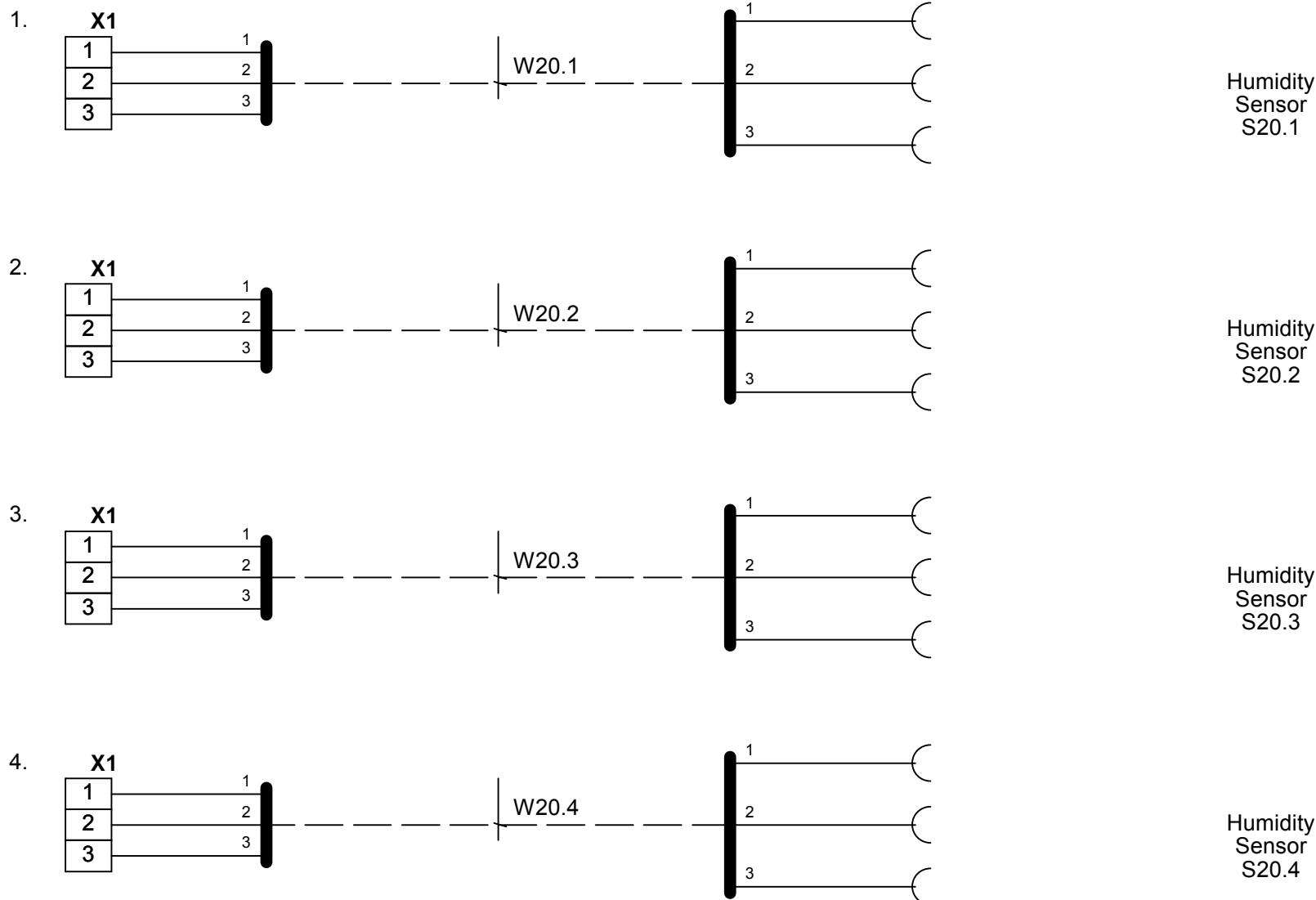


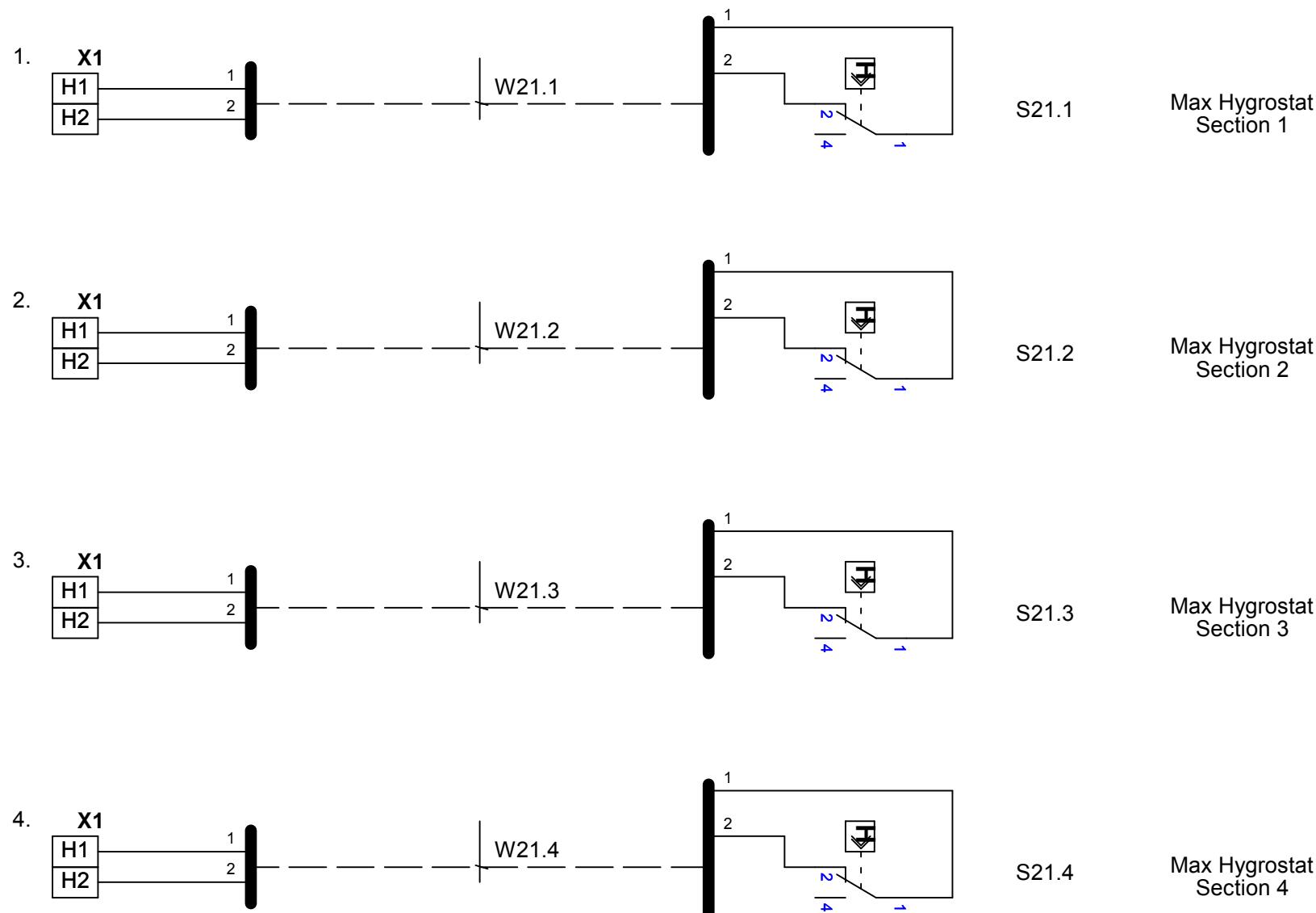
Level control
reservoir

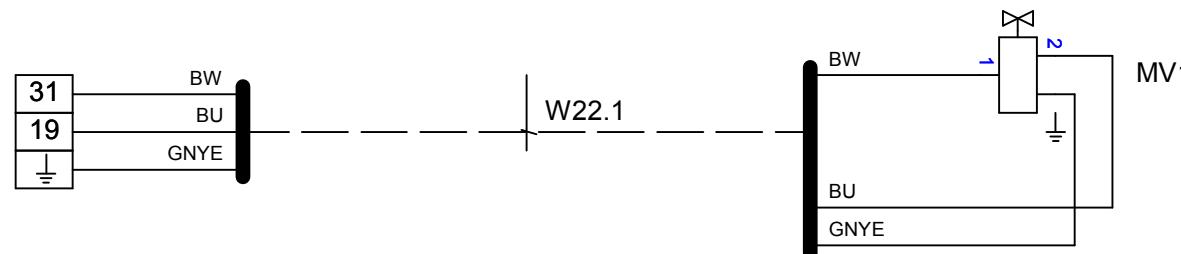
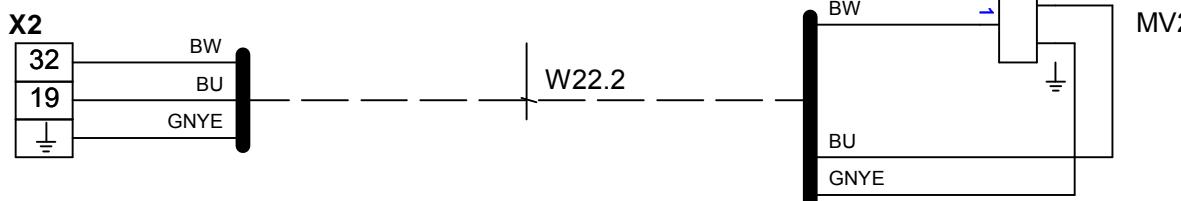
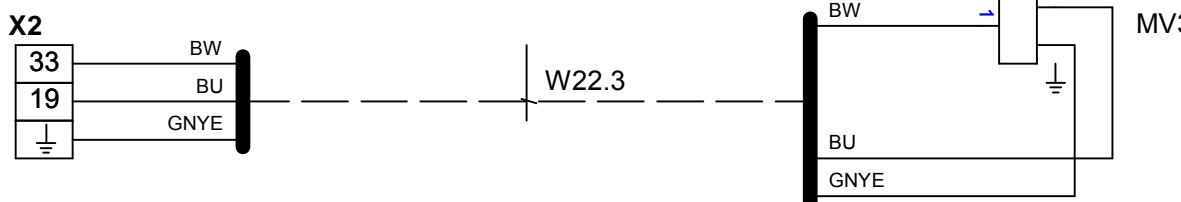
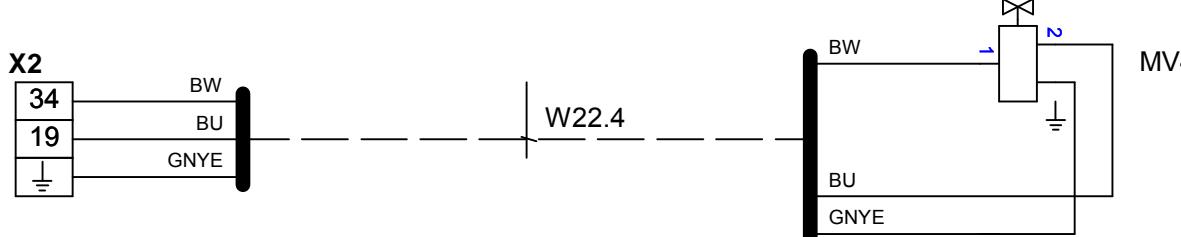


UV1 light







Valve On/Off
Section 1Valve On/Off
Section 2Valve On/Off
Section 3Valve On/Off
Section 4

I/O list

Input	Description
I0.0	On/off switch
I0.1	Reset switch
I0.2	Pressure switch 1 inlet
I0.3	
I0.4	Level switch S1 reservoir
I0.5	Level switch S2 reservoir
I0.6	Level switch S3 reservoir
I0.7	Level switch S4 reservoir
I1.0	
I1.1	Thermal relay fault Motor
I1.2	External Start
I1.3	
I1.4	
I1.5	
I2.0	Max Hygr. section 1
I2.1	Max Hygr. section 2
I2.2	Max Hygr. section 3
I2.3	Max Hygr. section 4
I2.4	
I2.5	
I2.6	
I2.7	

Analog Input	Description
D1.1 / A.0	
D1.1 / A.1	Sensor PT1000
D1.5 / 0+	Humidity sensor section 1
D1.5 / 1+	Humidity sensor section 2
D1.5 / 2+	Humidity sensor section 3
D1.5 / 3+	Humidity sensor section 4

IO list

Output	Description
Q0.0	Pump High pressure
Q0.1	Pump RO water
Q0.2	Pump RO water Reservoir
Q0.3	Valve M1 On/Off
Q0.4	Valve M2 Rinse quality
Q0.5	Valve M3 Rinse membrane
Q0.6	Valve M4 drain Off
Q0.7	
Q1.0	Valve M6 CO2
Q1.1	
Q2.0	HI Alarm indication
Q2.1	Alarm output
Q2.2	
Q2.3	
Q2.4	Valve Section 1
Q2.5	Valve Section 2
Q2.6	Valve Section 3
Q2.7	Valve Section 4