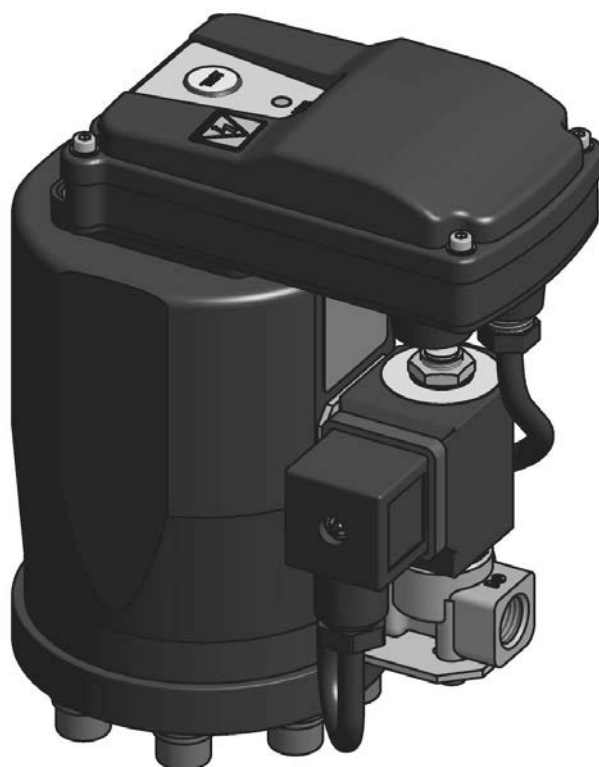




Installation and operating manual

(EMD HP)



Please read the following instructions carefully before installing filter into service. Trouble free and safe operating of the filter can only be guaranteed if recommendations and conditions stated in this manual are respected.

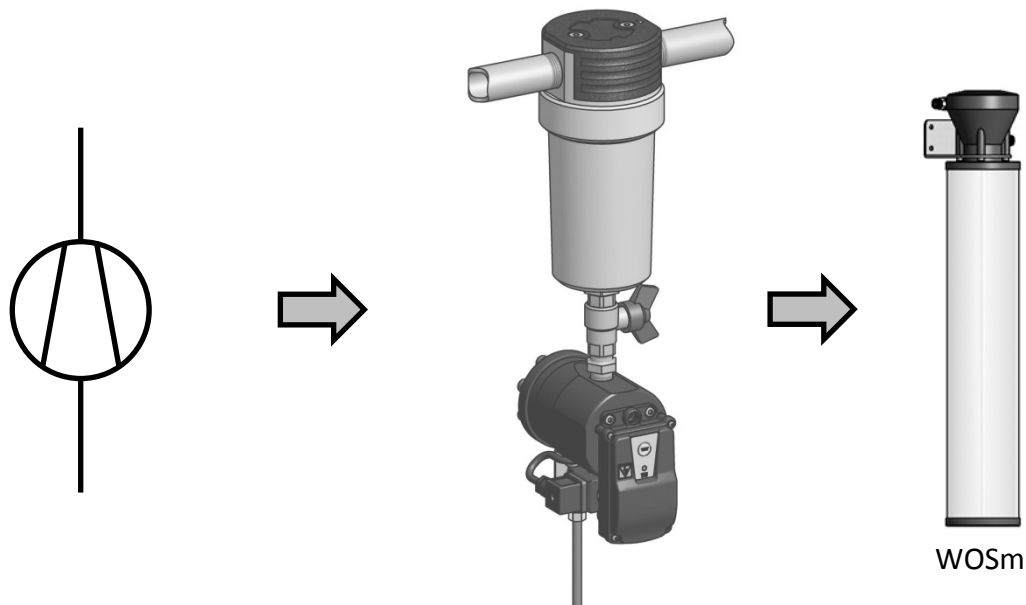


Description

EMD HP is an electronically controlled condensed water drain, which is designed for use in compressed air systems with pressure up to 50 bar. It discharges water trapped in the lowest parts of compressed air installation out of the system. This water is a condensed water vapor that is always present in the atmosphere. Because of laws of physics, some vapor always condenses during compression of air.

The EMD HP consists of a water tank, valve assembly and electronics. The water tank should be the lowest part of the compressed air system where condensed water collects. In the tank, there is a water level sensor. This way, electronics could detect the tank is full. Then, it operates the electromagnetic valve to discharge condensed water from compressed air system. The bottom cover of water tank is designed as debris trap where solid parts are intercepted. The bottom can be removed from EMD HP for cleaning.

In the condensed water leaving the EMD HP, there are still small particles of rust and remains of compressor oil. Oil must be removed before the water is drained to sewage system. To remove oil, water-oil separator WOS or WOSm device could be used.



Because of its construction, the EMD HP could be attached to the compressed air system horizontally or vertically. Under the pressure vessel or under the refrigerator dryer, the EMD HP is fixed horizontally whereas under filters, it is more convenient to fix it vertically.

The valve is operated by electronics. It opens the valve when a button on the electronics cover is pressed or when water level in the tank reaches threshold. Occasionally, a timed venting mode that combines water level triggered discharging and timed venting is desired.

By pressing the test button, we could see if EMD HP is operational. Besides, the test button makes possible to discharge water that has collected in a system during maintenance manually.

The main mode of operation is a water level triggered discharging. The valve opens when water level in EMD HP's tank reaches threshold and it closes back before the tank is empty. This way, only condensed water is discharged and no compressed air is lost.

In the timed venting mode, the valve is opened when water level reaches threshold, too. Besides, when the valve is closed continuously for a predetermined period, it is opened shortly although there is no water in the tank. During working day, water in EMD HP collects rapidly so that venting period would never expire and there are no air losses. When production rests, EMD HP is opening its valve. But since these discharges are short and sparse, air losses are small. The timed venting mode should be used when there is a lot of debris in condensed water and piping upward the EMD HP could not be inclined enough. Such situation is quite common under pressure vessels. It may happen that air could not escape from the tank upward the piping and while there is air around water level sensor, the EMD HP would never open. In the timed venting mode, the valve is opened after the venting period has expired and trapped air is allowed to escape through drainage. Now, condensed water can reach water level sensor and EMD HP is opening its valve until all collected water is discharged.

The timed venting mode is disabled initially since situations when this mode is needed are rare. The mode could be enabled through the service network.

To service network, only types of EMD HP with communication electronics built in could be connected. The service network is used for uploading data that are collected in EMD HP during its operation. The data are elapsed hours, number of water discharging, current water level in the tank and other data that could help to supervise and troubleshoot the system. Through the service network, some operating parameters of EMD HP like venting period in timed venting mode could be set. Additionally, valve could be operated remotely.

Features:

- ❑ No loss drain
- ❑ EMD HP could be fixed horizontally or vertically
- ❑ Strainer integrated in the bottom cover of water tank
- ❑ Optional time venting mode of operation
- ❑ Optional Alarm/ Warning output and Service Network Protocol for remote surveillance
- ❑ Elapsed hour counter, valve operating counter and other data collection
- ❑ Easy replacement of parts due to wear

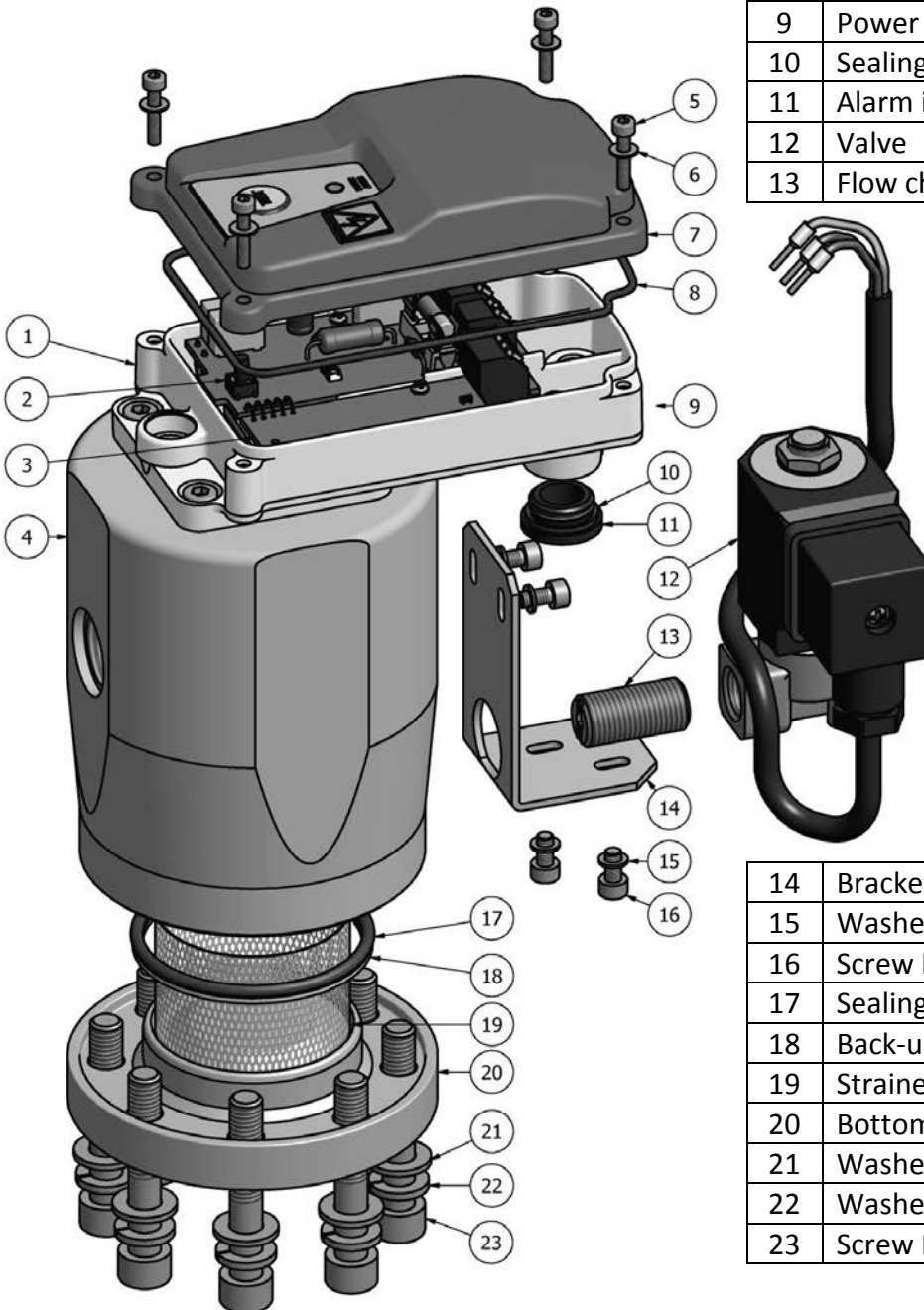


Components

Remarks:

- ❑ Do not disassemble Water tank with level sensor (4).

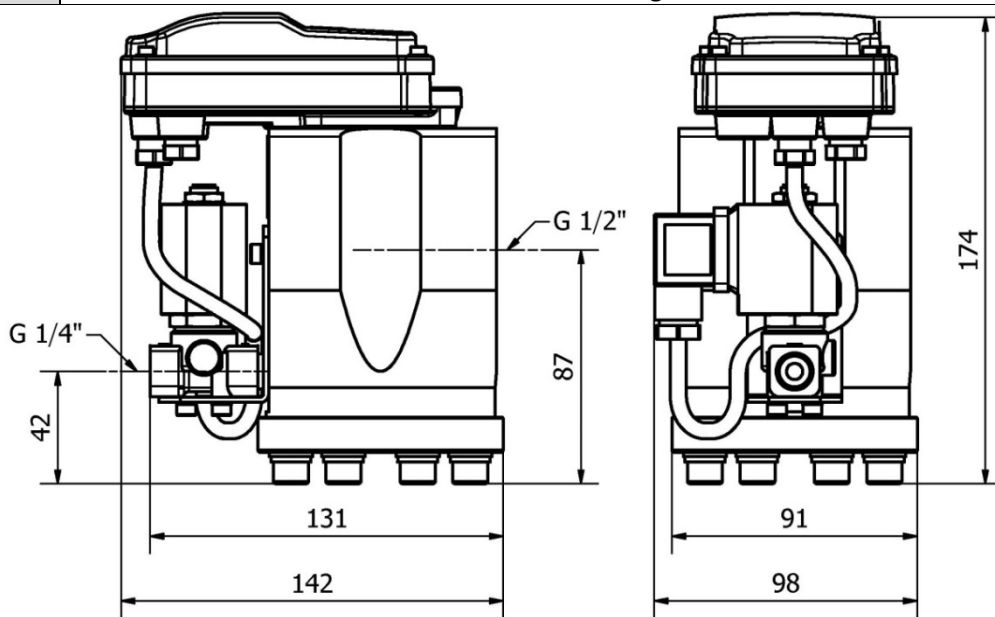
1	Electronic housing
2	Electronics
3	Communication electronics
4	Water tank with level sensor
5	Screw M3x16 DIN912
6	Washer 3.2 DIN125A
7	Cover
8	Sealing, O-Ring 100 x 1.5
9	Power Inlet gland
10	Sealing, O-Ring 12 x 2.0
11	Alarm inlet plug
12	Valve
13	Flow choke



14	Bracket
15	Washer 5.3 DIN125A
16	Screw M4x8 DIN912
17	Sealing, O-Ring 54 x 3.0
18	Back-up ring SRI PTFE 54x2.6
19	Strainer mesh
20	Bottom cover
21	Washer M8 DIN127A
22	Washer 8.4 DIN125A
23	Screw M8x50 DIN912

Technical data

Type	EMD HP 230V	EMD HP A 230V	EMD HP C 230V	EMD HP 115V	EMD HP A 115V	EMD HP C 115V	EMD HP 24Vac	EMD HP A 24Vac	EMD HP A 24Vdc
Service Network Connection	No	No	Yes	No	No	Yes	No	No	No
Alarm output	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Voltage	230V ac, 50 – 60Hz			115V ac, 50 – 60Hz			24V ac, 50 – 60Hz		24V dc
Fuse inside EMD12	5x20 1A T			5x20 1A T			2A		2A
Power	25VA						25VA		22W
Operating pressure range	0 – 50 bar 0 – 725 psi								
Drain capacity Kv	30.4 l/h @ 50 bar, 0.018 cfm @ 725 psi 4.3 (l/h) / vbar								
Operating temperature range	1,5°C – 65°C								
Protection class	IP 54								
Inlet connection	G 1/2" (parallel thread)								
Outlet connection	G 1/4" (parallel thread)								
Mass	2.3 kg								



Peak Compressor Capacity

System pressure	Northern Europe, Canada, Central Asia	Rest of the world	Moist tropical and subtropical regions
50 bar	29.5 m ³ /min	22.2 m ³ /min	12.9 m ³ /min
40 bar	26.4 m ³ /min	19.9 m ³ /min	11.5 m ³ /min
30 bar	22.9 m ³ /min	17.2 m ³ /min	10.0 m ³ /min
20 bar	18.7 m ³ /min	14.0 m ³ /min	8.1 m ³ /min



Safety instructions

- ❑ Installation and maintenance work may only be carried out when the device is not under pressure. To depressurize the device, close ball valve and press the test button on device until pressure in it drops.
- ❑ Installation and maintenance work may only be carried out by trained and experienced personnel.
- ❑ Installation and maintenance workers must use proper safety / protection equipment (e.g. protection gloves, protection goggles, ...)
- ❑ Disconnect electrical power supply before opening the top cover of the device.
- ❑ Installation and maintenance work may only be carried out when electrical power supply is disconnected.
- ❑ Electrical work must always be carried out by qualified electrician.
- ❑ Do not exceed maximal operating pressure or operating temperature range (see data label).
- ❑ Do not use the device in hazardous areas with potentially explosive atmospheres.
- ❑ Use original spare parts only.
- ❑ Use the device for the appropriate purpose only.



Appropriate use

EMD series electronic condensate drain is intended exclusively for the following purpose:

- ❑ Draining condensate from compressed air system (air compressors, air receivers/pressure vessels, air dryers and air filters).

Any other form of use or one going beyond this shall be considered as inappropriate. We shall have no liability whatsoever for any damage incurred as a result.



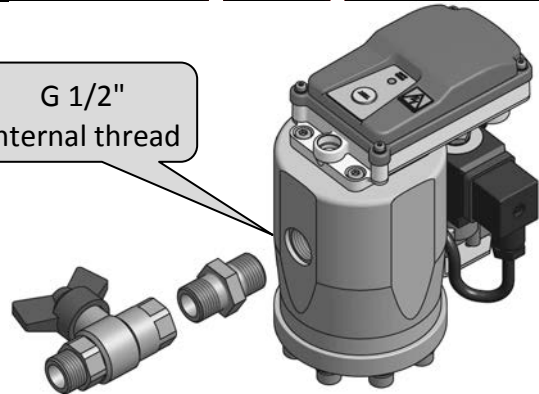
Installation guidelines

Keep to the safety rules when working with pressure equipment.



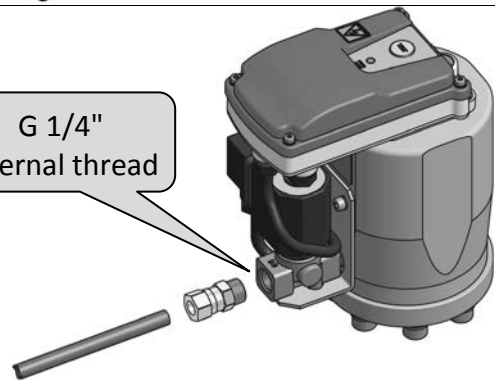
The EMD HP should be connected to a pressure system by ball valve. This way, it is not needed to depressurize the whole system each time strainer cleaning or other maintenance takes place.

G 1/2"
Internal thread



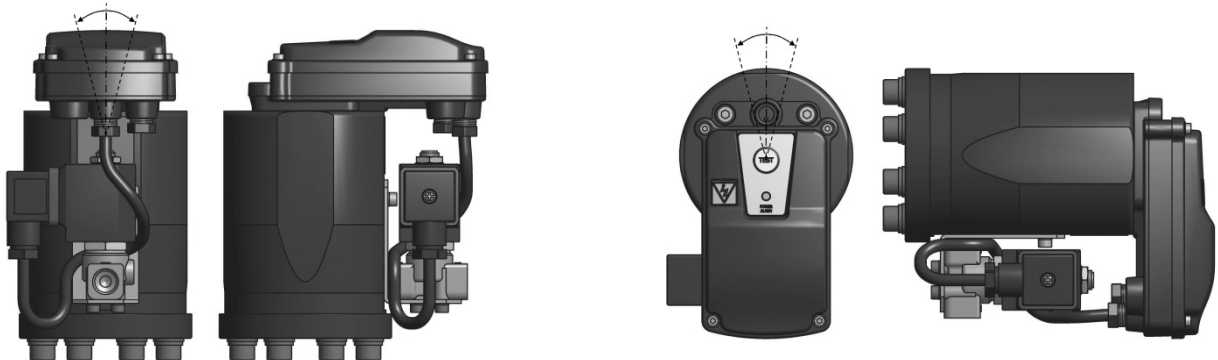
The outlet of EMD HP's valve is connected to drainage system by suitable connection and pipe.

G 1/4"
Internal thread

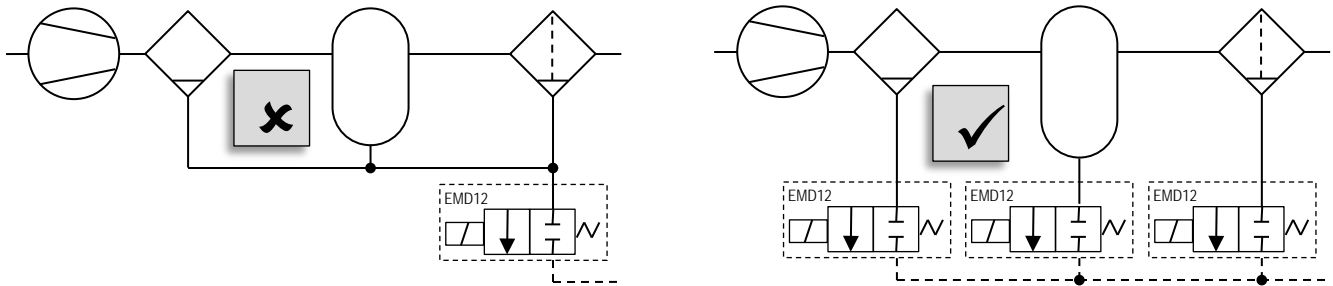


Pay attention that in case of clogged drainage, pressure in it would rise up to the system level pressure!

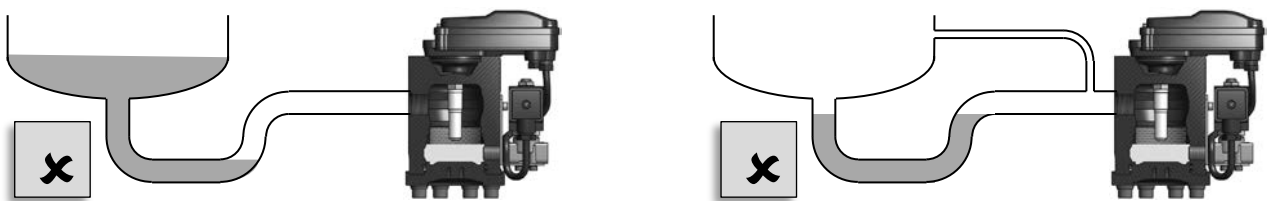
The EMD HP could be mounted horizontally (left) or vertically (right). But, it must not be rolled aside more than $\pm 15^\circ$. The horizontal position is preferred in case of a lot of debris in condensed water.



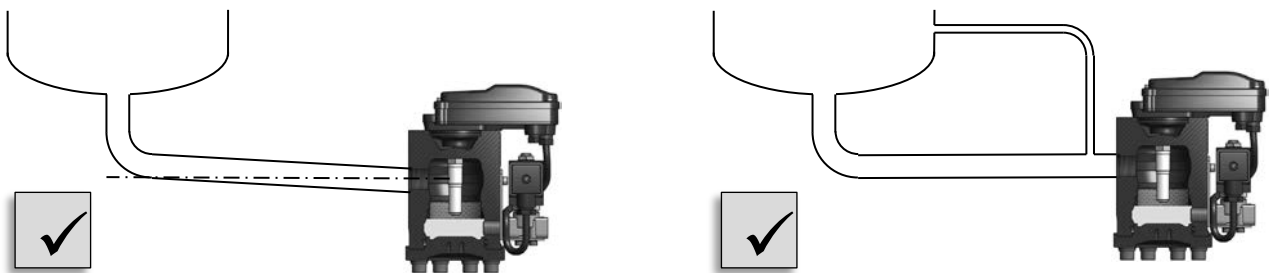
Do not connect several condensed water sources to one drain device because air would bypass filtering (left). Instead, each spot where condensed water collects must have its own condensate drain device (right).



Drainage piping must be built without traps that would trap air in the EMD HP and prevent condensed water to enter it (left). Additional venting would not help because debris collects in the lowest part of drainage pipe and clog it (right).



Horizontal drainage pipes must be inclined so that air could escape from EMD HP and that debris is flushed toward EMD HP (left). When horizontal drainage pipes are long, venting should be built (right).

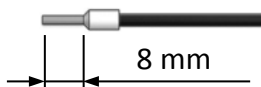


Electrical wiring:



- ❑ Fully disconnect power from EMD HP before opening the cover of electronic compartment.
- ❑ Please ensure that the installation is carried out according to valid regulations.

Power Connection Cable



2 x 0,75mm² + PE

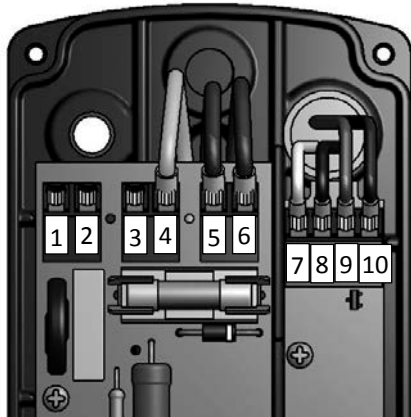
Oil resistant insulation recommended

Wires should be equipped with appropriate ferrules. Make sure, that all strands of a wire are fitted inside the ferrule.

Make sure that all wires are fitted into terminals firmly!



EMD HP 230Vac, 115Vac
EMD HP A 230Vac, 115Vac
EMD HP C 230Vac, 115Vac



Power Connection

1	230Vac (115Vac) Neutral
2	230Vac (115Vac) Line
3	PE Conductor

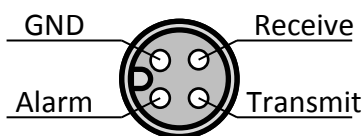
Valve Connection

4	PE Conductor
5	Power line
6	Power line

Service Network (EMD HP C)

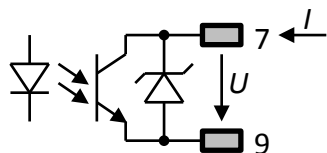
7	Alarm/W. (white X2.4 BE)
8	Transmit (blue X2.3 MO)
9	GND (brown X2.2 RJ)
10	Receive (black X2.1 CR)

Connector pins' description:



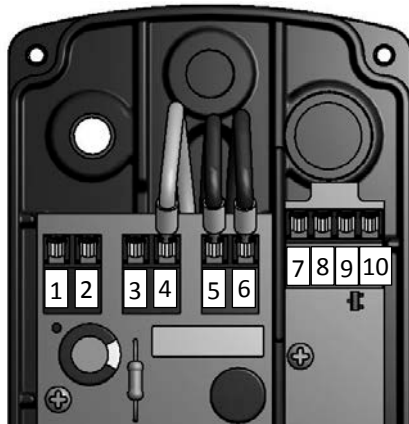
Alarm output (EMD HP A)

7	Alarm/ Warning
9	GND



U_{max} (at high impedance): 39V
 I_{max} (at low impedance): 200mA
 U reverse: -0,7V

EMD HP 24Vac
EMD HP A 24Vac



Power Connection

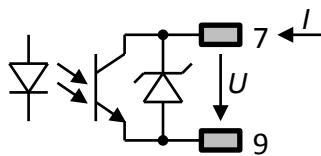
1	24Vac (grounded line)
2	24Vac
3	PE Conductor

Valve Connection

4	PE Conductor
5	Power line
6	Power line

Alarm output (EMD HP A)

7	Alarm/ Warning
9	GND



U_{max} (at high impedance): 39V
 I_{max} (at low impedance): 200mA
 U reverse: -0,7V

EMD HP A 24Vdc



Power Connection

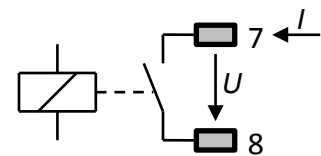
1	24Vdc positive pole
2	24Vdc negative pole
3	PE Conductor

Valve Connection

4	PE Conductor
5	Power line
6	Power line

Alarm output (EMD HP A)

7	Alarm/ Warning
8	GND

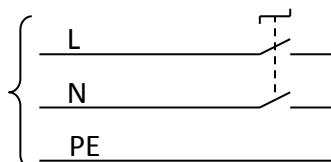


Relay contact: NO
 U_{max} : 250Vac, 30Vdc
 I_{max} : 8A

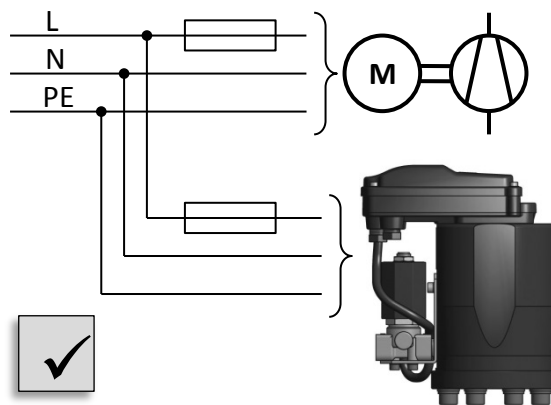
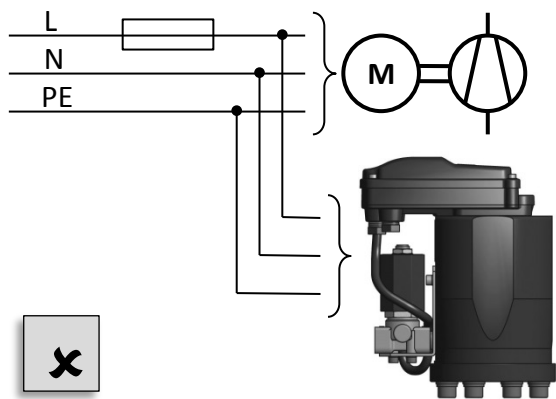
Touching electronics should be avoided, when cables are being connected!
Place the cover back immediately after the cables are connected!



Provide means for full disconnection of electric power from EMD HP.



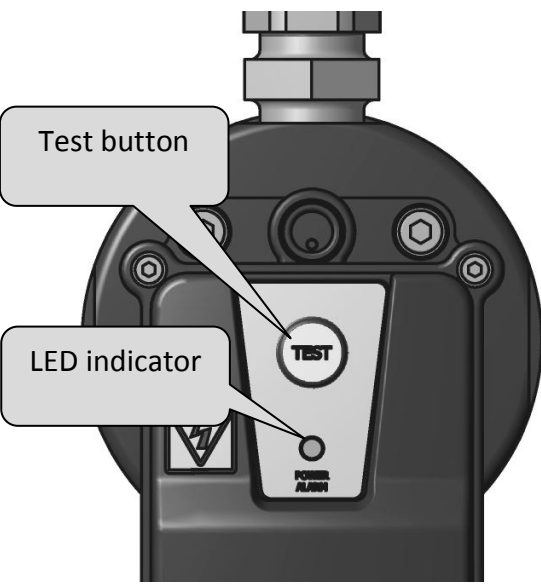
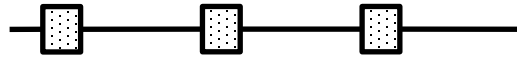

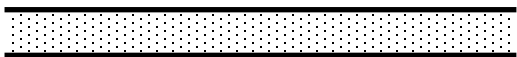

Do not connect EMD HP after protection device of heavy inductive load like compressor motor (left). Instead, heavy inductive load and EMD HP should be protected separately (right).



After installation or maintenance work, press the test button to drain all condensed water which has meanwhile collected in the compressed air system.



Operation

	<p>By pressing the test button, valve is opened.</p>
	<p>Green LED indicator shows water level in tank. Short green flashes show that water in tank is under the threshold.</p> 
	<p>Long green flashes indicate that the tank is almost full.</p> 
	<p>When the tank is full, the green is on permanently.</p> 
	<p>Red LED indicator is on permanently during alarm mode.</p> 

In normal mode, EMD measures condensed water level in its tank. When level reaches threshold, the valve is opened and water is discharged. Period between successive discharges is from 5s to 7s long. When there is so much water, that EMD HP is not able to remove it in 90s, it enters overload mode. In this mode, EMD HP opens its valve longer and more frequently and its capacity is doubled. When EMD HP is still not able to discharge all the water in 5min, it enters alarm mode. In alarm mode, EMD HP opens its valve so that it would discharge 50% of its nominal capacity. The capacity in alarm mode is limited to limit air losses in case of drain malfunction. EMD HP returns from overload or alarm mode to normal mode when the tank get empty.

Extreme amount of condensed water is possible after maintenance work. In front of EMD HP, there is valve that is closed during maintenance. Behind this valve, condensed water collects. After a while, there is so much water that EMD HP is not able to drain it without entering alarm mode. To avoid entering alarm mode, test button should be pressed after each maintenance work to discharge all condensed water manually.

Service Network and Alarm/ Warning output

EMD HP variants C, which are equipped with communication electronics and connector could be connected to a Service Network. The Service Network is a communication protocol used in EMD HP and other compressed air equipment that allow a remote supervision. Work data could be regularly read out of the device with a network or they could be read by a data logger. At the same time, the Service Network could also serve as display and keypad for setting EMD HP's parameters at commissioning.

The Service network consists of two devices. These are a slave device which is EMD HP and a master device. The master device could be a Service Network Reader SN-10.200. It's a handheld device that allows user to send command messages manually. It also comprises a display where answer to command are read. In the table in next page, command message codes specific to EMD HP are described. There, we see which work data are collected, which parameters could be set and which remote commands are available in EMD HP.

More detailed description of Service Network Protocol could be found in document SN-02.000, Service Network Protocol.

An alarm/warning output is included in the service network. Nevertheless, it may be used to signal alarm condition without being connected to service network. The alarm/warning output is an open collector output and it shares its GND with serial communication of Service Network. The output is in high impedance state during alarm. When EMD HP operates normally, the output is in low impedance state.



Important Service Network command message codes and their meaning

Code	Description
0x80...0x9F	Device data
0x84	Device Name
	Manufacturer, manufacturer's address and other important data.
0xA0...0xBF	Device State
0xA4	Device condition – general
0xA8	Power on counter, Elapsed hours counter
0xAC	Valve operation counter, Timed venting counter
0xB0	Overload timer, Alarm timer
0xB4	Processor events: Brown out counter, Voltage error counter
0xB8	Processor events: Watch dog reset counter, Software reset counter
0xBC	Water level sensor adjustment data
0xC0	Current working parameters
0xE0...0xF0	Settings
0xE4	Timed Venting - valve opened period Values: 0.6s, 0.8s, 1.2s, 1.7s, 2.4s, Timed venting off (default)
0xE8	Timed Venting - Period to first operating of valve: Values: 60min, 40min (default), 20min, 10min, 5min
0xEC	Timed Venting - Period between subsequent operating of valve: Values: 120min, 60min (default), 40min, 20min, 10min
0xF0	Overload duration: Values: 2min, 5min (default), 10min
0xF4...0xFF	Control
0xFB	Remote triggering of condensed water purging from EMD HP

Alarm in 24Vdc version

Contrary to ac versions of EMD HP, a dc version of EMD HP has a built-in relay, which provides a voltage free contact. It is of NO type and it is closed, when EMD HP operates normally.



Maintenance

For EMD HP to work reliably, strainer mesh should be cleaned regularly. The mesh is part of bottom cover. It intercepts larger solid particles that would clog valve. Cleanings period depends on condition of compressed air system.

The valve is due to wear. When the valve is worn out, a complete valve assembly should be replaced. The valve assembly could be ordered as spare part.

Strainer cleaning procedure

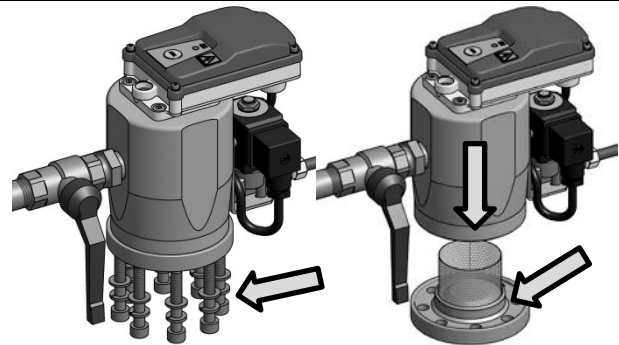
Keep to the safety rules when working with pressure equipment.



First, close the valve. Then, press the test button to depressurize EMD HP!



Detach the bottom cover with strainer mesh. Then, clean strainer mesh. At the same time, check its integrity. Clean also O-ring sealing and its gland thoroughly. Otherwise, strainer sealing may start to leak.



Be careful while cleaning, because solid particles in debris may be sharp.

Reattach bottom cover insert back to its position and open valve slowly.

Replacement of valve assembly

1. First, close the valve in press the test button to depressurize EMD HP.
2. Than disconnect the unit from electrical power supply.
3. Detach valve connector and bracket 14. Unscrew the valve 12 and flow choke 13.
4. Clean remains of a treadlocker glue.
5. Install new valve with flow choke 13. To seal assembly, use threadlocker glue. Fix the valve with bracket 14. Reattach valve connector.
6. Only after the glue is cured, pressurize EMD HP.

After maintenance work, press the test button to drain all condensed water which has meanwhile collected in the compressed air system.



Troubleshooting

After powering EMD, it enters overload mode and afterwards, it enters alarm mode.

During power down, large amount of condensed water has collected in compressed air system. Hold the test button until all the water is drained.

EMD enters alarm mode occasionally. But, it gets back to normal mode immediately after all the water is drained by holding the test button.

The reason might be extremely hot and moist day.

EMD is undersized and it should be replaced by bigger drain.

Pressing test button does not open the valve.

Check electric power and cable connections.

Check the fuse.

There is no LED signal although the valve could be opened by pressing test button.

The LED is not bright enough to be seen in daylight.

Fuse is blown.

Check integrity of electronics. Replace the fuse if there is no visible damage on electronics.

Air leaks through the drain pipe even when EMD is disconnected from power.

There might be debris in valve or valve may be damaged. Check integrity of strainer. The valve assembly should be cleaned or replaced by authorized person.

Long flashes of green LED indicate full tank although the tank is empty.

Clean the water level sensor surface.

EMD is in alarm and there is no water drained, only air.

Clean the water level sensor surface.

EMD is in alarm and valve opens, but there is no water or air drained.

Path between EMD's tank and valve is clogged. Clean the tank, strainer and valve assembly. Replace strainer or valve assembly when they are damaged.

Condensed water is not drained automatically. Instead, it is drained only when test button is pressed.

If the amount of drained water is small, then the water in tank hasn't reached the threshold, yet.

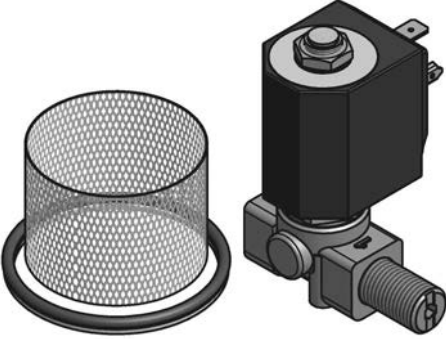
If water is drained during pressing the test button, then we should check the piping in front of EMD. Pipe's inclination is too small or there may be debris in the pipe so that air in the EMD's tank is trapped. When the test button is pressed, this air escapes through drainage and makes place for condensed water. Solution: clean pipe, build venting. Switch timer function on.

Red LED is flashing.

EMD is in one of production modes or there is some other error. First, check supply voltage. Then, contact supplier.



Auxiliary and spare parts

Service kit EMD HP 230V Strainer mesh (19) and sealing elements (17), (18). Valve 230V (12) and flow choke (13).	
Service kit EMD HP 115V Strainer mesh (19) and sealing elements (17), (18). Valve 115V (12) and flow choke (13).	
Service kit EMD HP 24Vac Strainer mesh (19) and sealing elements (17), (18). Valve 24Vac (12) and flow choke (13).	
Service kit EMD HP 24Vdc Strainer mesh (19) and sealing elements (17), (18). Valve 24Vdc (12) and flow choke (13).	

Pictures are illustrative only!

Warranty exclusion

The guarantee shall be void if:

- ❑ The installation and operating manual was not followed with respect to installation, initial commissioning and maintenance.
- ❑ The unit was not operated properly and appropriately.
- ❑ The unit was operated when it was clearly defective.
- ❑ Non-original spare parts or replacement parts were used.
- ❑ The unit was not operated within the permissible technical parameters.
- ❑ Unauthorized constructional changes were made to the unit or if the unit has been opened/disassembled by an unauthorized person.

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