

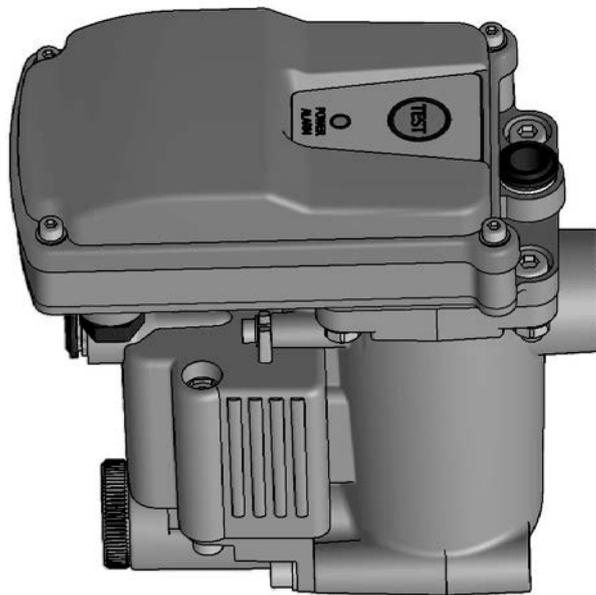
# STERLING<sup>®</sup>

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## separation Ltd

# Installation and operating manual

(EMD12)



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

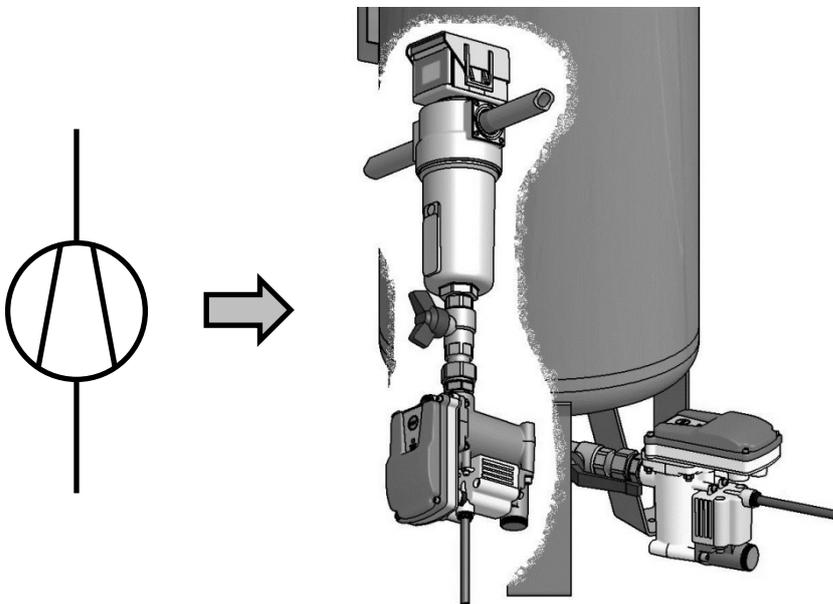


## Description

EMD12 is an electronically controlled condensed water drain that 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 EMD12 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 valve is located in the valve assembly which is constructed so, that it can be replaced easily. Another part of the valve assembly is a strainer where solid parts of debris are intercepted. The strainer is located in front of EMD12 so that it could be reached easily.

In the condensed water leaving the EMD12, 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, STERLING water-oil separator device should be used.



Because of its construction, the EMD12 could be attached to the compressed air system horizontally or vertically. Under the pressure vessel or under the refrigerator dryer, the EMD12 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 EMD12 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 EMD12'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 EMD12 collects rapidly so that venting period would never expire and there are no air losses. When production rests, EMD12 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 EMD12 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 EMD12 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 EMD12 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 EMD12 with communication electronics built in could be connected. The service network is used for uploading data that are collected in EMD12 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 EMD12 like venting period in timed venting mode could be set. Additionally, valve could be operated remotely.

### Features:

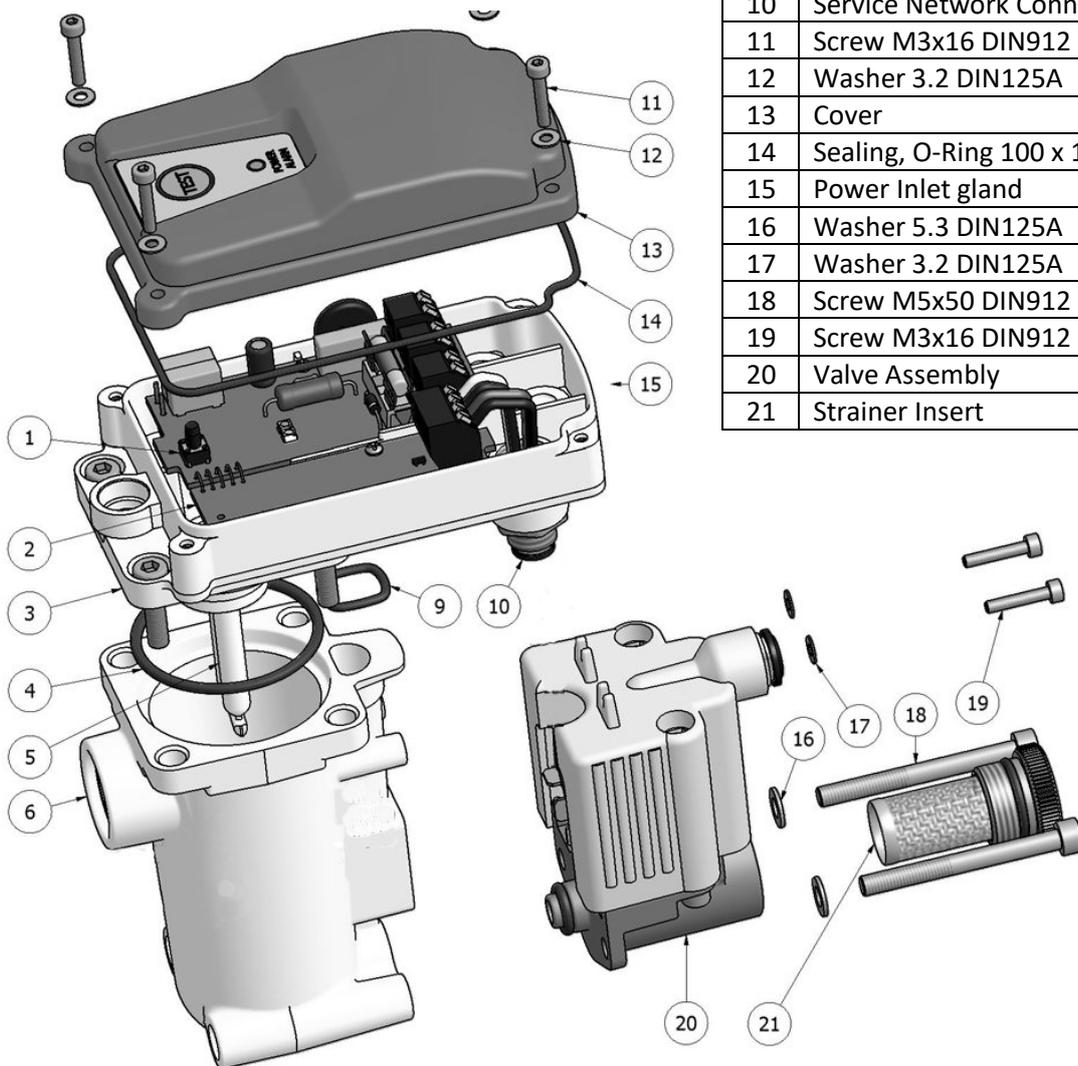
- ❑ No loss drain
- ❑ EMD12 could be fixed horizontally or vertically
- ❑ Strainer is located front of EMD12 so that it could be reached easily
- ❑ Optional time venting mode of operation
- ❑ Optional Alarm/ Warning output and Service Network Protocol for remote surveillance
- ❑ Elapsed hour counter, valve operating counter and other data collection
- ❑ Easy replacement of parts due to wear

## Components

Remarks:

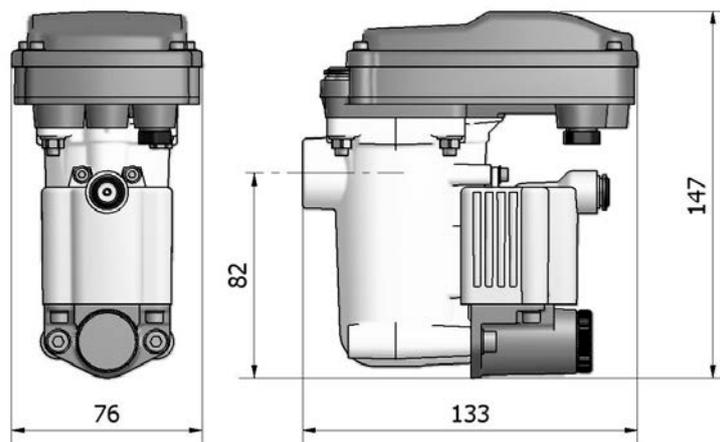
- ❑ Do not disassemble parts from 1 to 9 (Water Tank, Water level sensor and Electronics).

1	Electronics
2	Communication electronics
3	Electronic housing
4	Sealing, O-Ring 42 x 2.5
5	Water level sensor
6	Water tank
7	-
8	-
9	Sealing, O-Ring 14 x 2.0
10	Service Network Connector
11	Screw M3x16 DIN912
12	Washer 3.2 DIN125A
13	Cover
14	Sealing, O-Ring 100 x 1.5
15	Power Inlet gland
16	Washer 5.3 DIN125A
17	Washer 3.2 DIN125A
18	Screw M5x50 DIN912
19	Screw M3x16 DIN912
20	Valve Assembly
21	Strainer Insert



**Technical data**

Type	EMD12 230V	EMD12A 230V	EMD12C 230V	EMD12 115V	EMD12A 115V	EMD12C 115V
Service Network Connection	No	No	Yes	No	No	Yes
Alarm output	No	Yes	Yes	No	Yes	Yes
Voltage	230VAC			115VA		
Fuse	5x20 1A T			5x20 1A T		
Power	10VA					
Frequency	50 – 60Hz					
Operating pressure range	0 – 16 bar, 0 – 232 psi					
Drain capacity (@ 7 bar, 101 psi)	12 l/h, 0.007 cfm					
Operating temperature range	1,5°C – 65°C					
Protection class	54					
Inlet connection	G 1/2" (parallel thread)					
Outlet connection	Push connection for tube ø8					
Mass	0,55 kg					



Climate zone <i>The amount of condensed water in compressed air system depends mainly on outside air temperature</i>	Northern Europe, Canada, Central Asia	Rest of the world	Moist tropical and subtropical regions
Peak compressor capacity [m <sup>3</sup> /min]	8,8	7,4	4,6
Peak dryer capacity [m <sup>3</sup> /min]	18,6	14,9	9,28
Peak filter capacity [m <sup>3</sup> /min]	92,8	74,4	46,4

## 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

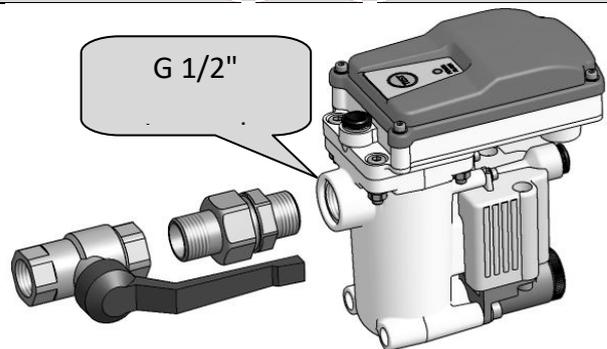
**Keep to the safety rules when working with pressure equipment.**



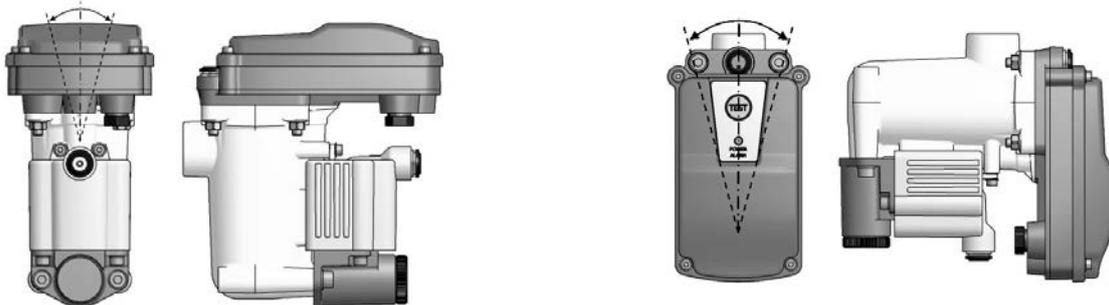
The EMD12 should be connected to a pressure system by ball valve and pipe union.

This way, it is not needed to depressurize the whole system each time strainer cleaning or other maintenance takes place.

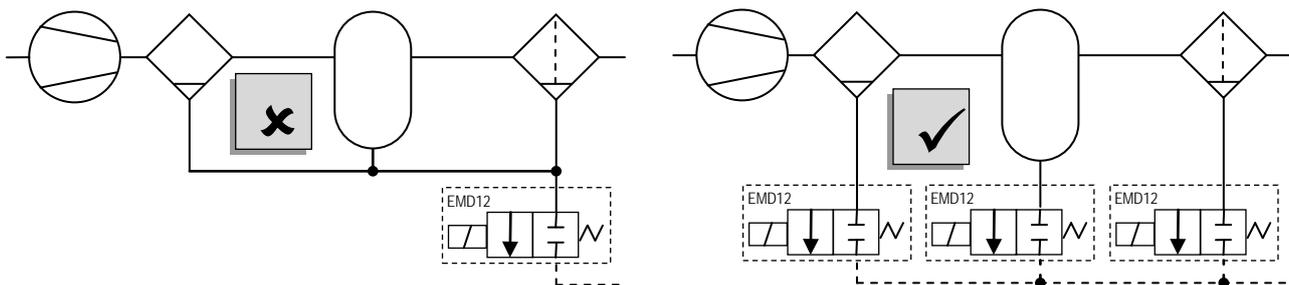
**Make sure that inlet connection has parallel thread. Do not use tapered thread!**



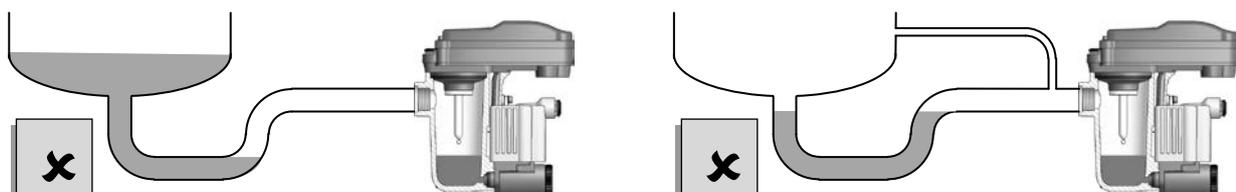
The EMD12 could be mounted horizontally (left) or vertically (right). But, it must not be rolled aside more than  $\pm 15^\circ$ . The horizontal position is preferred in case of a lot of debris in condensed water.



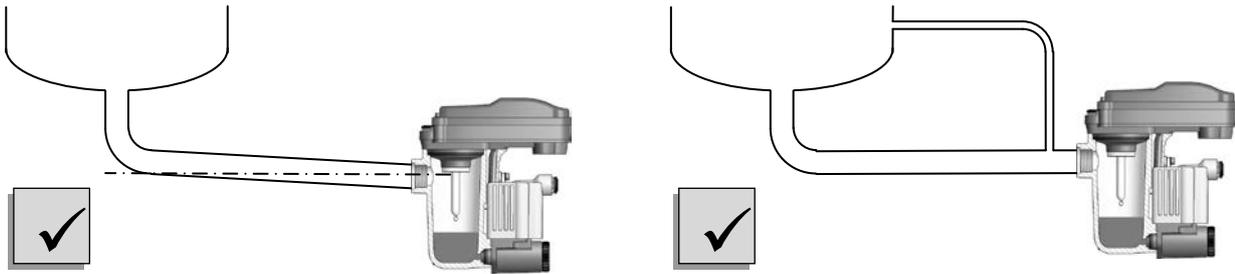
Do not connect several condensed water sources to one drain device because air would bypass filtering (left). Instead, each spot where condensed water collects must have its own condensate drain device (right).



Drainage piping must be built without traps that would trap air in the EMD12 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).

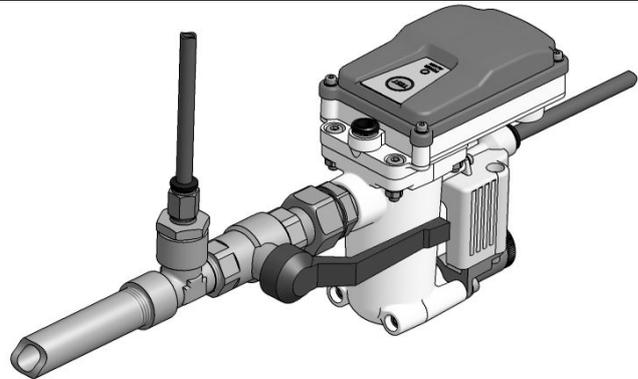


Horizontal drainage pipes must be inclined so that air could escape from EMD12 and that debris is flushed toward EMD12 (left). When horizontal drainage pipes are long, venting should be built (right).



Venting is made by T-piece.

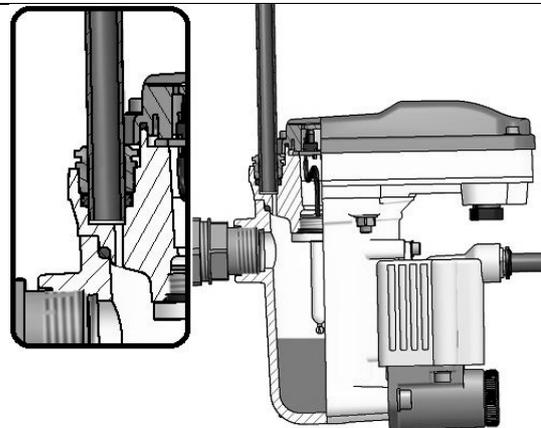
The T-piece should be located just in front of valve so that path from the EMD12 tank to the venting piece is as short as possible to prevent compressed air from being trapped in the tank.



Venting is made through auxiliary inlet.

EMD12 has provisions for building an auxiliary inlet where venting could be connected. The auxiliary inlet is built by drilling a hole into tank cover and inserting a push-in connection.

The auxiliary inlet is not implemented in the standard EMD12. Contact manufacturer for EMD12 with the auxiliary inlet.



**Electrical wiring:**



- Fully disconnect power from EMD12 before opening the cover of electronic compartment.
- Please ensure that the installation is carried out according to valid regulations.

Power Connection Cable



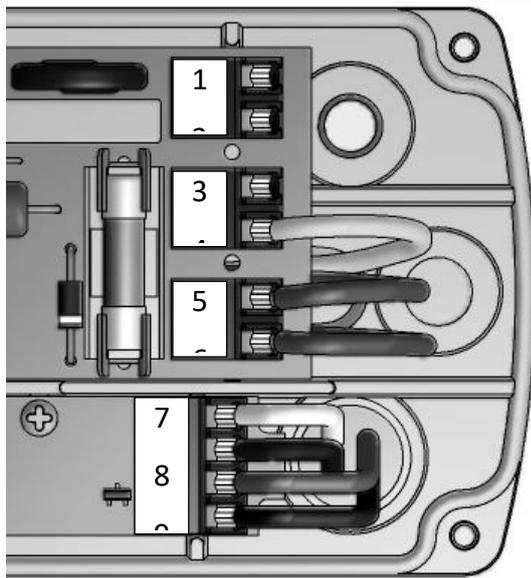
2 x 0,75mm<sup>2</sup> + PE

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!**

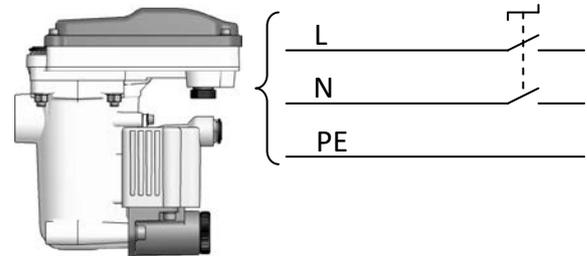




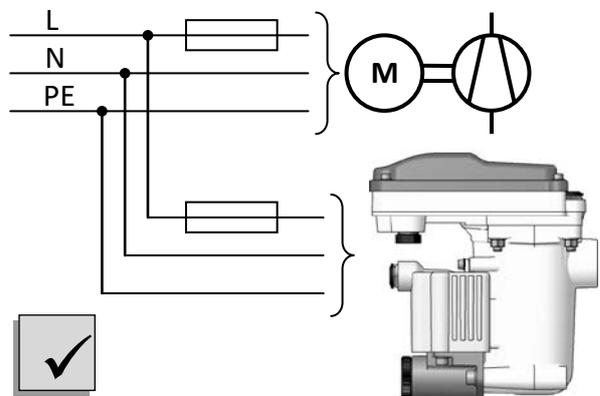
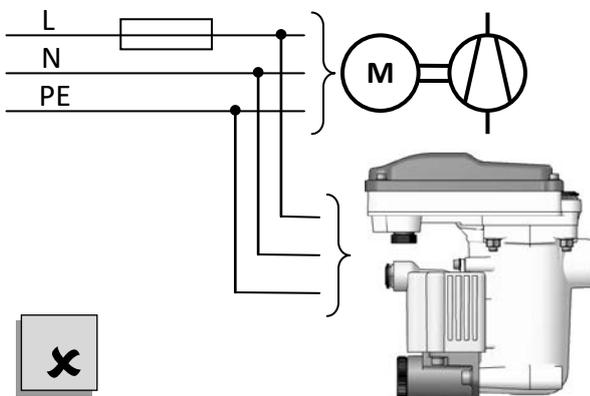
Power Connection		
1	230V (115V) Neutral	
2	230V (115V) Line	
3	PE Conductor	
Valve Connection		
4	PE Conductor	
5	Power line	
6	Power line	
Service Network (only EMD12-C)		
7	Alarm/ Warning	(white X2.4 BE)
8	Transmit	(blue X2.3 MO)
9	GND	(brown X2.2 RJ)
10	Receive	(black X.2.1 CR)
Alarm output EMD12 A, EMD12 C		
7	Alarm/ Warning	
9	GND	

During connecting cables try to avoid touching electronics!  
Place the cover back immediately after the cables are connected!

Provide means for full disconnection of electric power from EMD12.



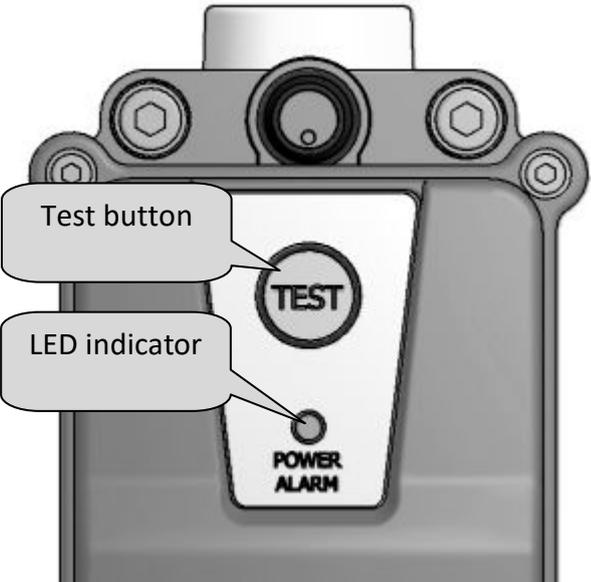
Do not connect EMD12 after protection device of heavy inductive load like compressor motor (left). Instead, heavy inductive load and EMD12 should be protected separately (right).



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>Test button</p> <p>LED indicator</p> <p>TEST</p> <p>POWER ALARM</p>	<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 EMD12 is not able to remove it in 90s, it enters overload mode. In this mode, EMD12 opens its valve longer and more frequently and its capacity is doubled. When EMD12 is still not able to discharge all the water in 5min, it enters alarm mode. In alarm mode, EMD12 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 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 EMD12, there is valve that is closed during maintenance. Behind this valve, condensed water collects. After a while, there is so much water that EMD12 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

EMD12 variants C equipped with communication electronics and connector could be connected to a Service Network. The Service Network is a communication protocol used in EMD12 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 EMD12's parameters at commissioning.

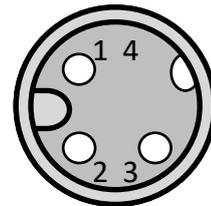
The Service network consists of two devices. These are a slave device which is EMD12 and a master device. The master device could be a Service Network Reader SN-10.200. It's a handheld device that allows user to send command messages manually. It also comprises a display where answer to command are read. In the table in next page, command message codes specific to EMD12 are described. There, we see which work data are collected, which parameters could be set and which remote commands are available in EMD12.

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 EMD12 operates normally, the output is in low impedance state.

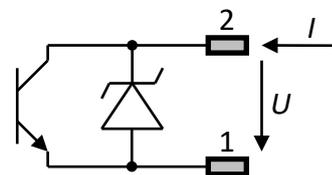
### Connector pin description

- |   |   |
|---|---|
| 1 | GND (terminal X2.2 on PCB, see page 9)            |
| 2 | Alarm/ Warning (terminal X2.4 on pcb, see page 9) |
| 3 | Transmit  |
| 4 | Receive   |



### Alarm/ Warning Output

Max. voltage (at high impedance):	39V
Max. current (at low impedance):	200mA
Max. reverse voltage:	0,7V



Important Service Network command message codes and their meaning	
Code	Description
<b>0x80...0x9F</b>	<b>Device data</b>
0x84	Device Name
	Manufacturer, manufacturer's address and other important data.
<b>0xA0...0xBF</b>	<b>Device State</b>
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
<b>0xE0...0xF0</b>	<b>Settings</b>
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
<b>0xF4...0xFF</b>	<b>Control</b>
0xFB	Remote triggering of condensed water purging from EMD12

## Maintenance

For EMD12 to work reliably, a strainer should be cleaned regularly. The Strainer of EMD12 is located in the entrance to a valve. Its purpose is to intercept larger solid particles that would clog valve. Cleanings period depends on condition of compressed air system.

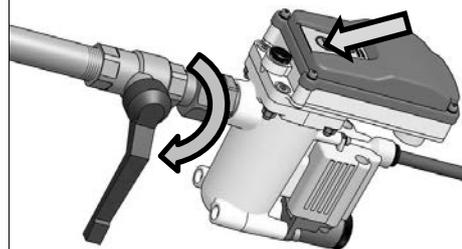
The valve is due to wear. When the valve is worn out, a complete valve assembly should be replaced. The valve assembly could be ordered as spare part.

### Strainer cleaning procedure

**Keep to the safety rules when working with pressure equipment.**

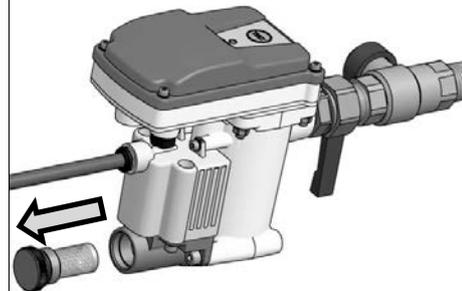


First, close the valve in press the test button to depressurize EMD12.



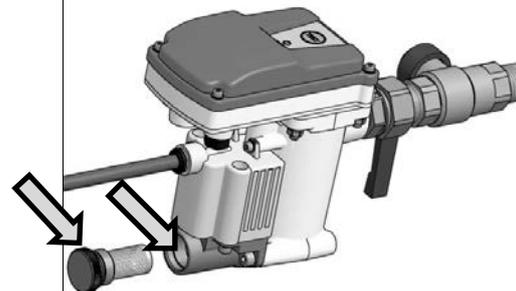
Remove strainer insert and clean it. At the same time, check integrity of mesh.

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



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.



Return strainer 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 EMD12.
2. Than disconnect the unit from electrical power supply.
3. Remove hose from outlet "Push" connection.
4. Unscrew two screws 18 and two screws 19 (see page 4) and remove complete valve assembly by bulling aside.
5. Install new valve assembly. Make sure Oring is positioned correctly.
6. Tighten screws 18 and 19 alternately.
7. Connect hose to outlet "push" connection, connect power supply and slowly pressurize the unit.

8. Check for any potential leakages and press test button to check proper operation.

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



## Troubleshooting

***After powering EMD12, 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.***

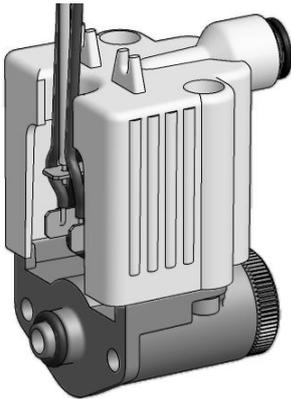
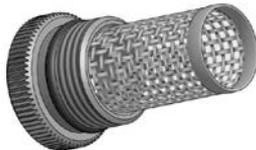
If the amount of drained water is small, then the water in tank hasn't reached the threshold, yet.

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**

<p><b>Service kit EMD12 230V</b> Valve Assembly 230V (strainer insert EMD12-30.160 included)</p>	
<p><b>Service kit EMD12 115V</b> Valve Assembly 110V (strainer insert included)</p>	
<p>Strainer insert (available only with service kit)</p>	

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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