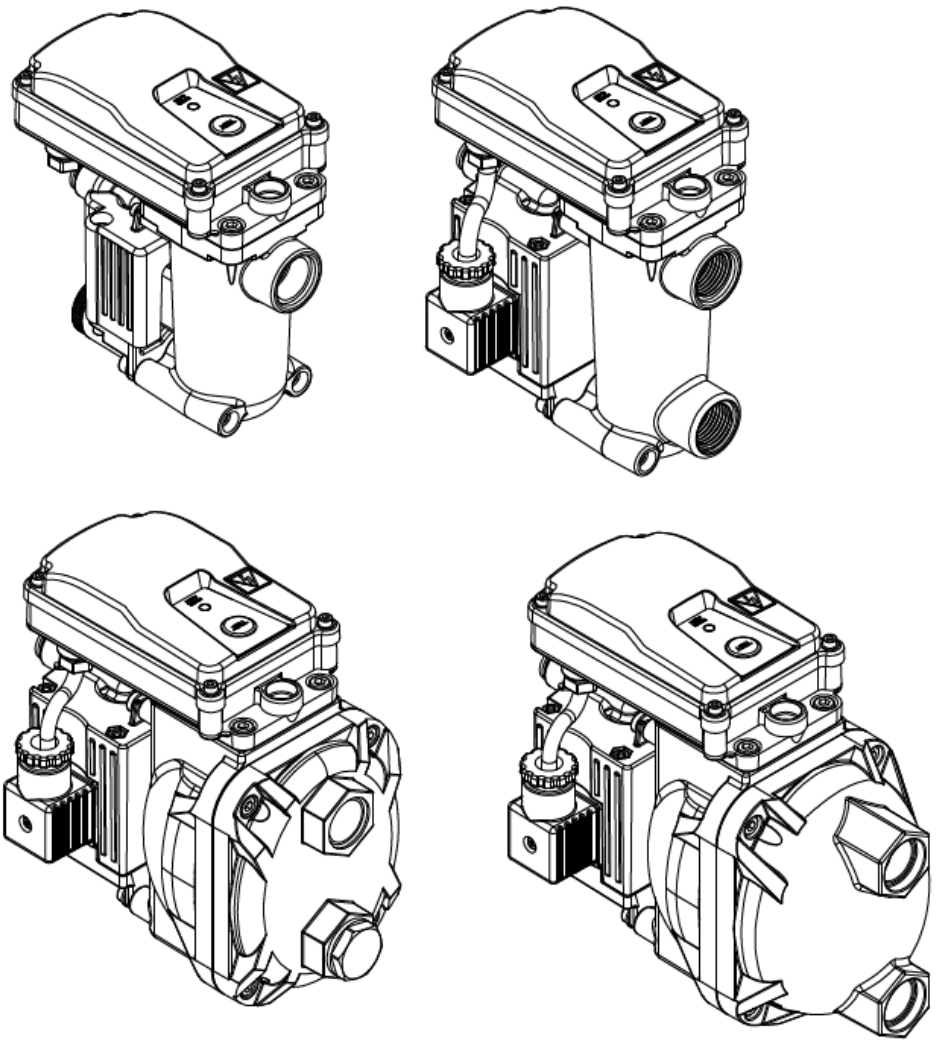
STERLING®
separation ltd

Installation and Operating Manual

EMD series

(Automatic electronic condensate drains)



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

Description

EMD series drains are electronically controlled condensed water drains that discharge water trapped from the lowest parts of compressed air installation out of the system.

The EMD series drains consist 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 EMD so that it can be cleaned easily.

In the condensed water leaving the EMD, 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, a STERLING oil/water separator should be used

The EMD may be attached to the compressed air system horizontally or vertically (see later diagrams). Under the pressure vessel or under the refrigerator dryer, the EMD 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 can check that the EMD is operational. The test button makes it possible to manually discharge water that has collected in a system during maintenance.

The normal mode of operation is a water-level-triggered discharging. The valve opens when water level in EMD'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.

(Version C only) In timed venting mode, the valve operates normally when water level reaches the threshold. Additionally, if the valve has not operated for a predetermined period, it is briefly opened even though there may be no water in the tank.

When air demand is high, water collects frequently in EMD, and it operates normally before the timer period expires. When demand reduces, so does condensate quantity. EMD still operates normally, but where the periods between operation are longer than the timer period, the timer briefly opens the valve to clear it.
The timed venting mode is especially valuable where there is a lot of debris in the condensate, and where the pipe run from the drain point to the EMD has limited downward inclination.
The periodic timer operation is a protection against 'air-locking', a condition where the drain's normal operation is interrupted because there is no pathway for air in the drain's tank to be displaced back into the system as condensate enters.

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

Only the models of EMD with communication electronics built in can be connected to the service network. The service network is used for uploading data that are collected in EMD during its operation. The data are elapsed hours, number of water discharges, 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 like venting period in timed venting mode can be set. Additionally, the valve could be operated remotely.

Features by version:

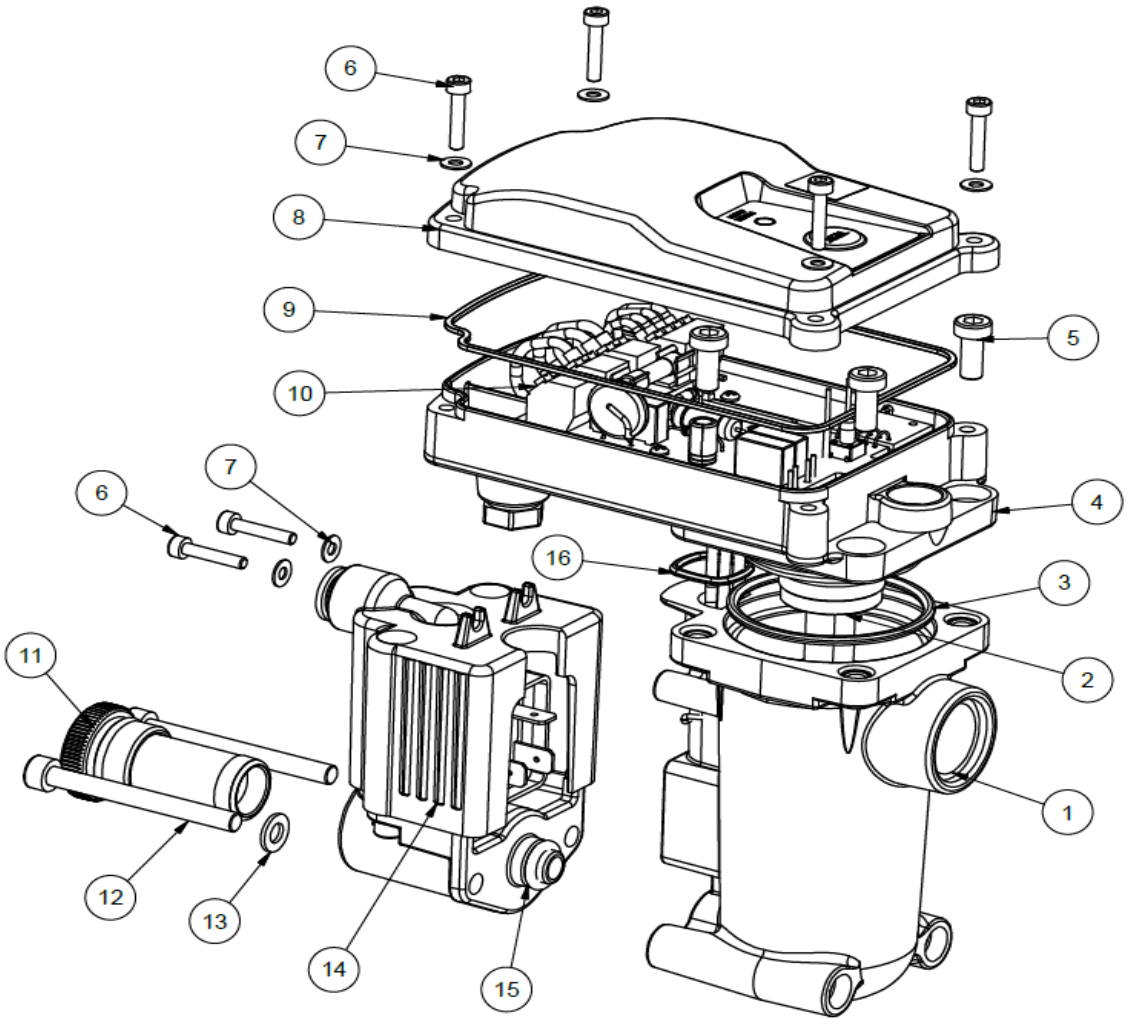
- No loss drain - All versions
- EMD could be fixed horizontally or vertically - All versions
- Strainer is located front of EMD so that it can be serviced easily - All versions
- Optional time venting mode of operation - Version C
- Optional Alarm/ Warning output - Version A
- Service Network Protocol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

Components

Do not disassemble Valve assembly, water level sensor and electronics!

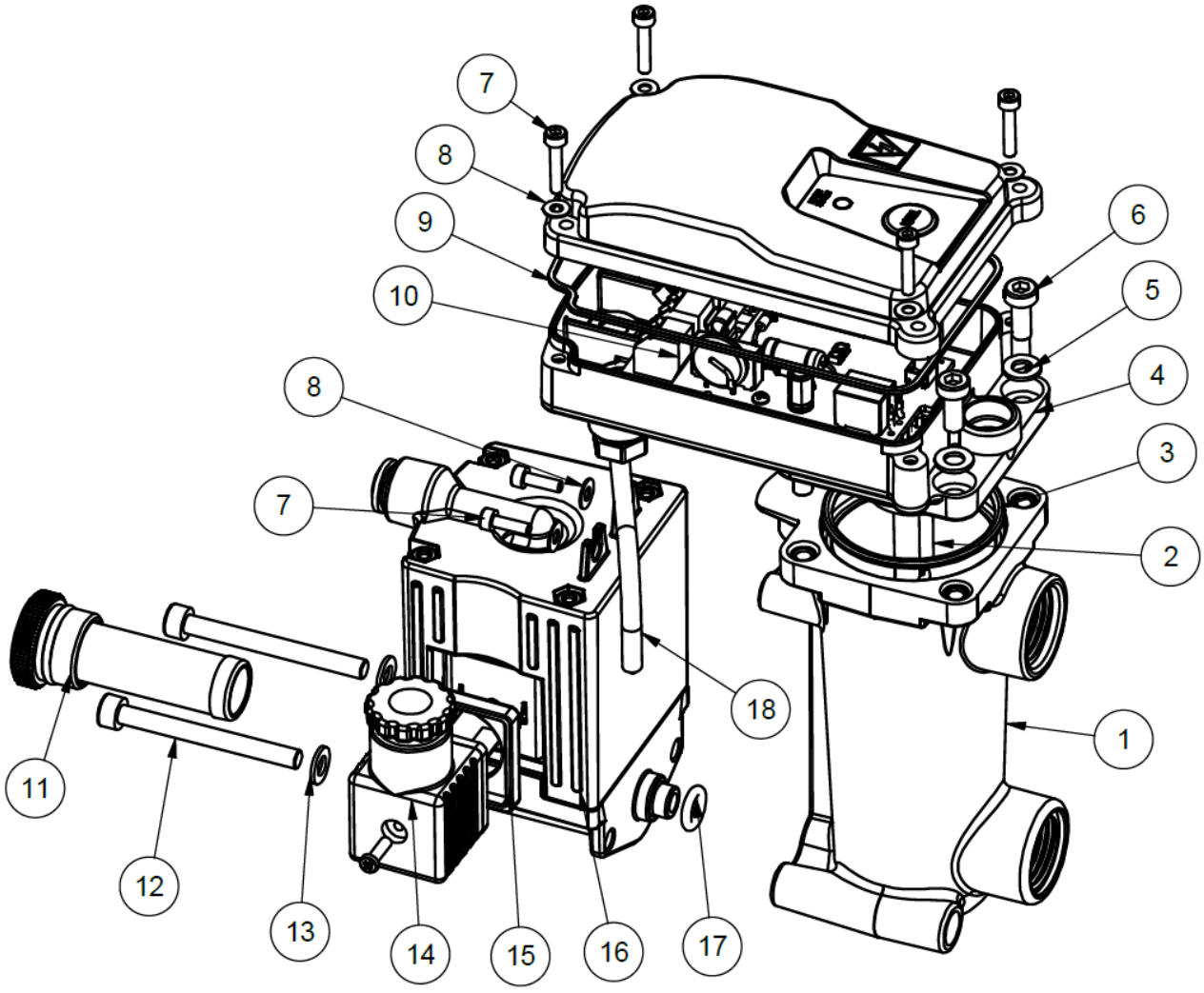
EMD 12

1	Water tank
2	Water level sensor
3	Sealing, O-Ring 42 x 2.5
4	Electronic housing
5	Screw M5x12 DIN 912
6	Screw M3x16 DIN 912
7	Washer 3.2 DIN 125A
8	Electronic housing cover
9	Sealing, O-Ring 100 x 1.5
10	Electronics
11	Strainer Insert
12	Bolt M5x50 DIN 912
13	Washer 5.3 DIN 125A
14	Valve Assembly
15	Sealing, O-Ring fi 7x2,5
16	Sealing, O-Ring 14 x 2.0



EMD 25

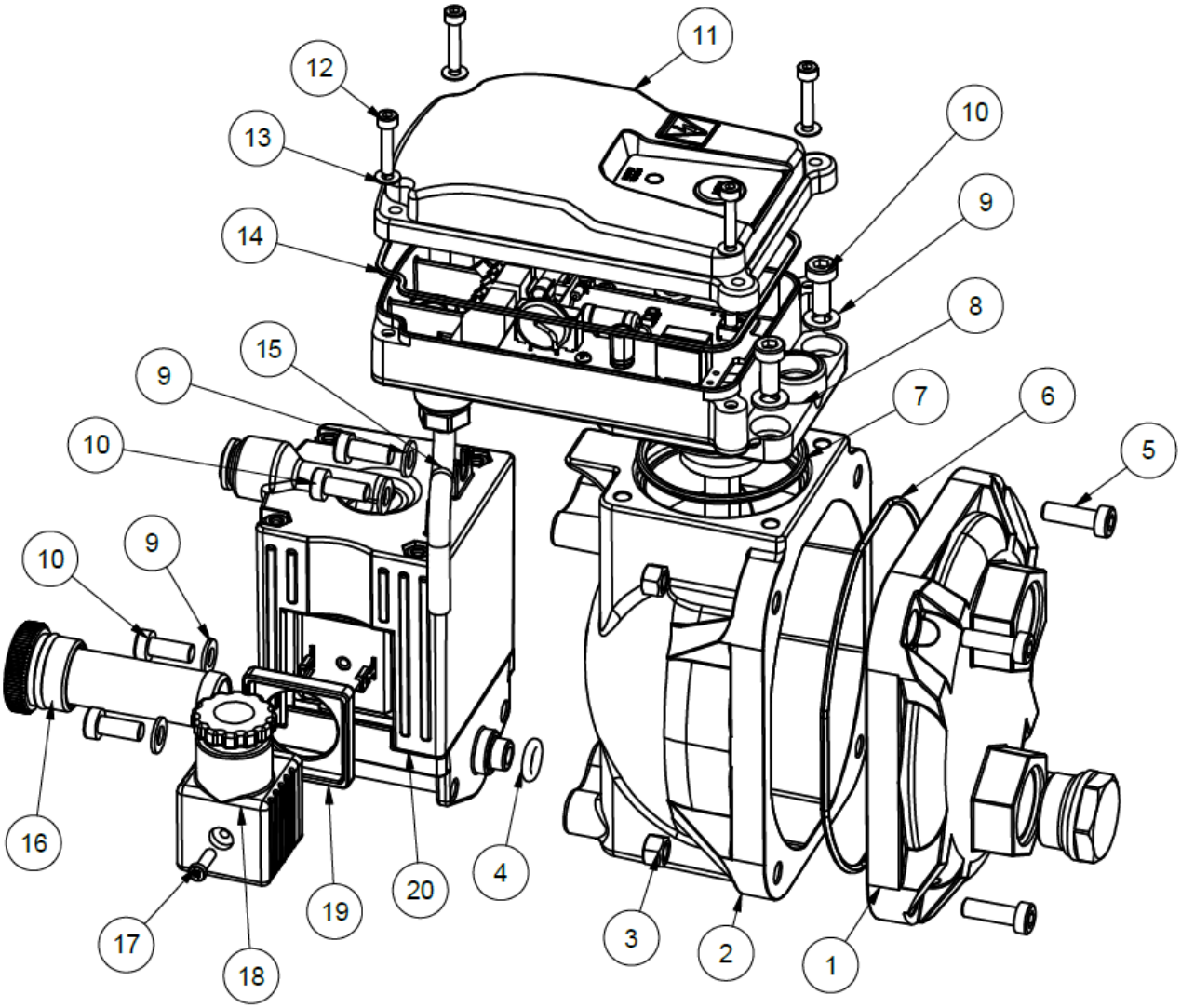
1	Water tank	10	Electronics
2	Water level sensor	11	Strainer Insert
3	Sealing, O-Ring 42 x 2.5	12	Bolt M5x50 DIN 912
4	Electronic housing	13	Washer 5.3 DIN 125A
5	Washer 5.3 DIN 125A	14	Valve connector
6	Screw M5x12 DIN 912	15	Connector sealing
7	Screw M3x16 DIN 912	16	Valve assembly
8	Washer 3.2 DIN 125A	17	Sealing, O-Ring fi 7x2,5
9	Sealing, O-Ring 100 x 1.5	18	3 x 0,75 cable



EMD 75

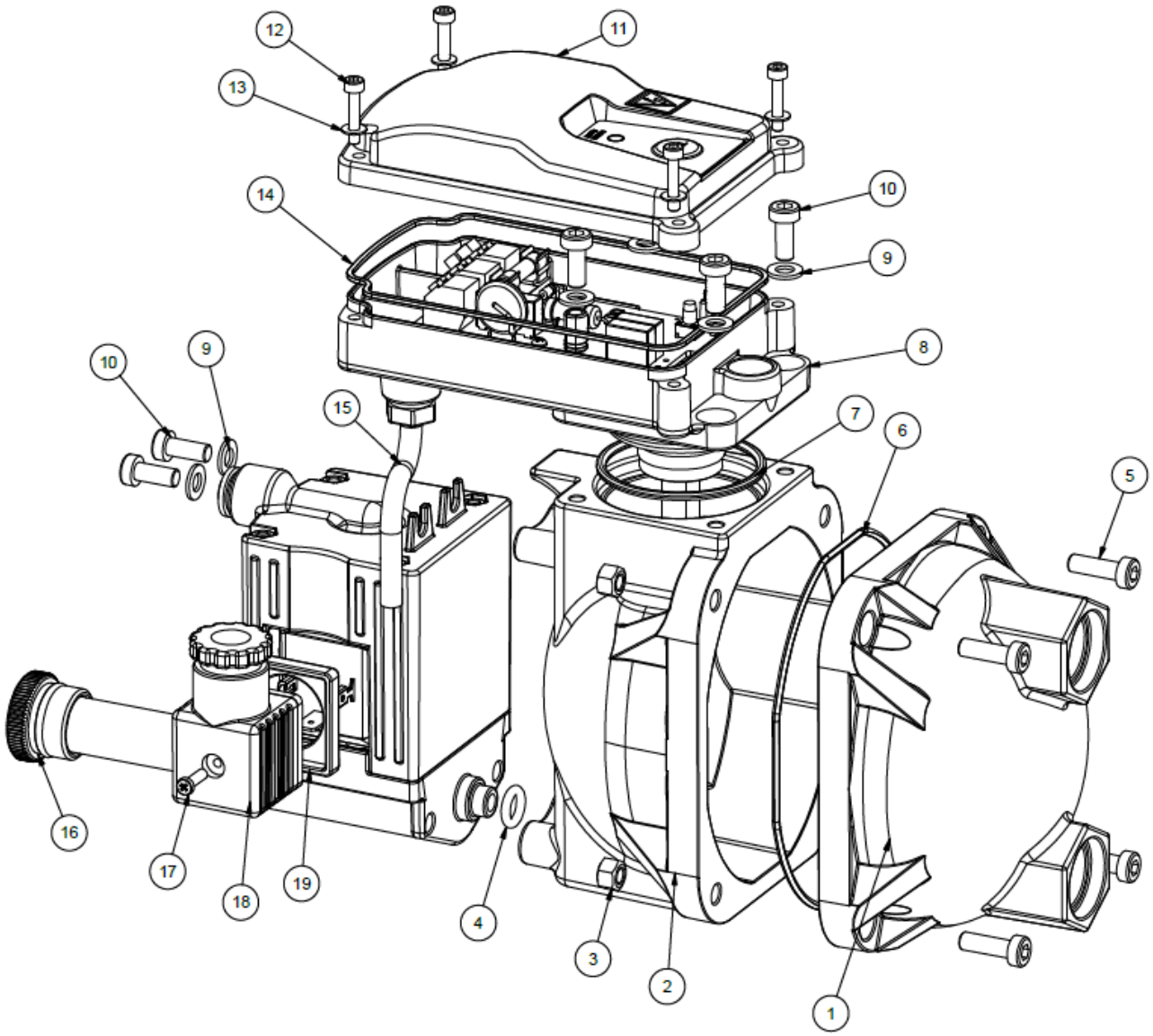
1	Water tank cover
2	Water tank
3	Nut M5 DIN 934
4	Sealing, O-Ring fi 7x2,5
5	Screw M5x16 DIN 912
6	Sealing O-Ring fi 95x2
7	Sealing, O-Ring 42 x 2.5
8	Electronics housing
9	Washer 5.3 DIN 125A
10	Screw M5x12 DIN 912

11	Electronic housing cover
12	Screw M3x16 DIN 912
13	Washer 3.2 DIN 125A
14	Sealing, O-Ring 100 x 1.5
15	3 x 0,75 cable
16	Strainer Insert
17	Connector screw
18	Valve connector
19	Connector sealing
20	Valve assembly



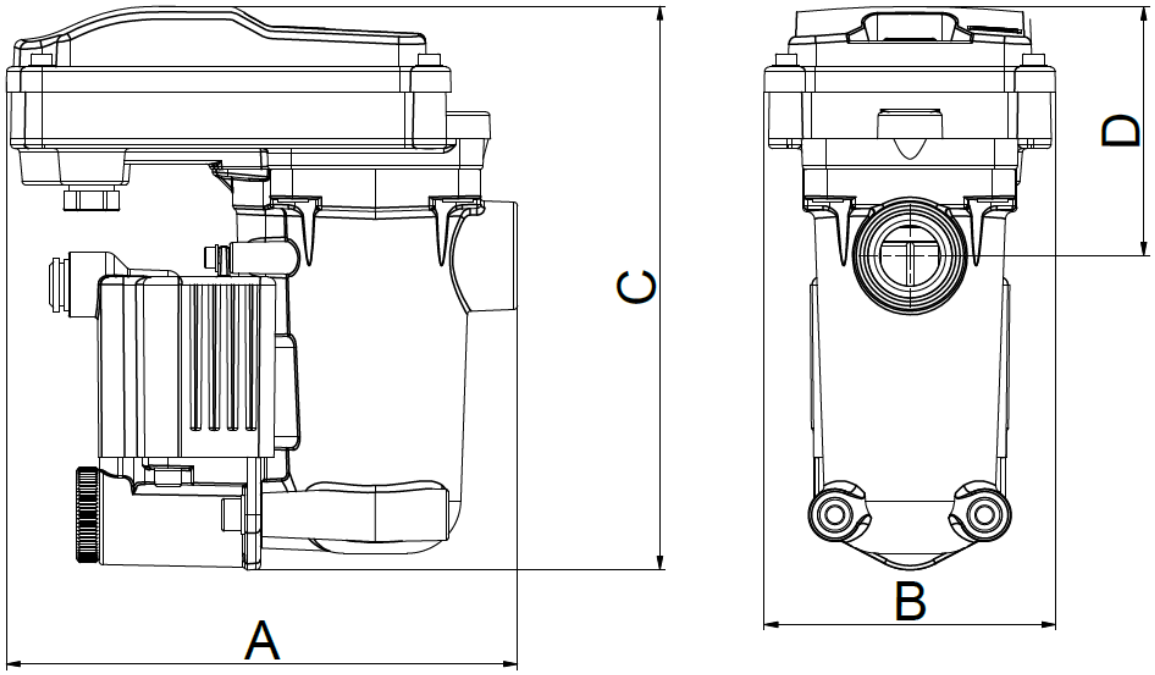
EMD 150

1	Water tank cover	11	Electronic housing cover
2	Water tank	12	Screw M3x16 DIN 912
3	Nut M5 DIN 934	13	Washer 3.2 DIN 125A
4	Sealing, O-Ring fi 7x2,5	14	Sealing, O-Ring 100 x 1.5
5	Screw M5x16 DIN 912	15	3 x 0,75 cable
6	Sealing, O-Ring fi 95x2	16	Strainer Insert
7	Sealing, O-Ring 42 x 2.5	17	Connector screw
8	Electronics housing	18	Valve connector
9	Washer 5.3 DIN 125A	19	Connector sealing
10	Screw M5x12 DIN 912	20	Valve assembly



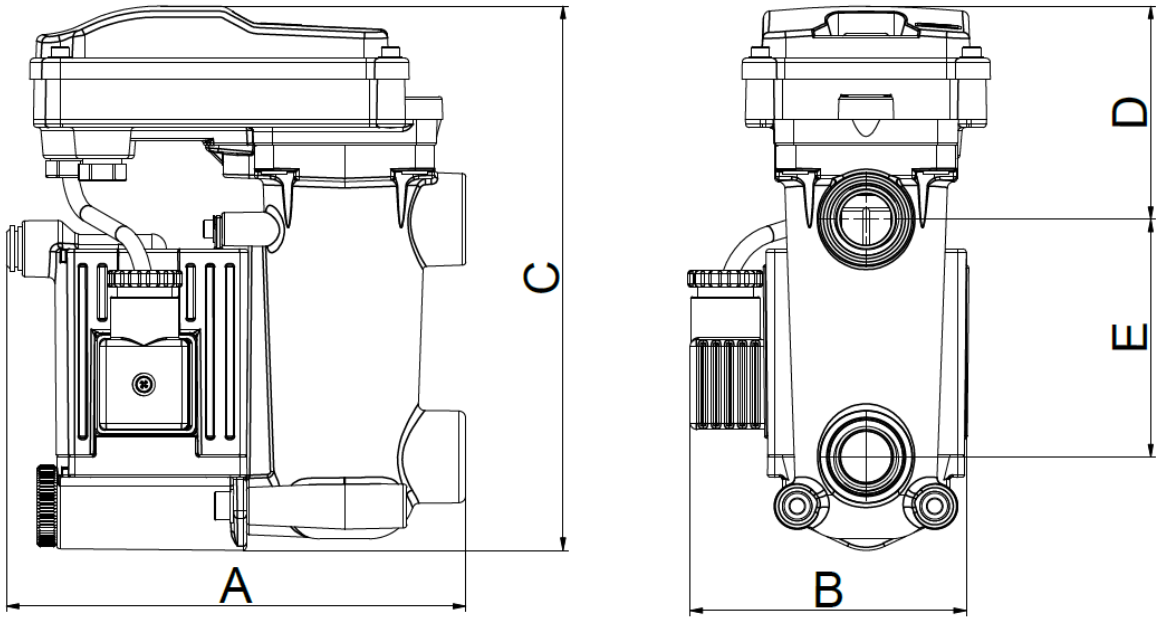
EMD12 Technical data

Type	EMD 12 230V	EMD 12 115V	EMD 12 24Vac	EMD 12A 24Vdc
Voltage	230V ac, 50 – 60Hz	115V ac, 50 – 60Hz	24V ac, 50 – 60Hz	24V dc
Fuse inside EMD	5x20 1A T		2A	2A
Power	10VA		10VA	8.5W
Operating pressure range	1 – 16 bar (14 – 232 psi)			0 - 8 bar (0-116 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			
Dimensions A x B x C x D [mm]	133 x 76 x 147 x 65			



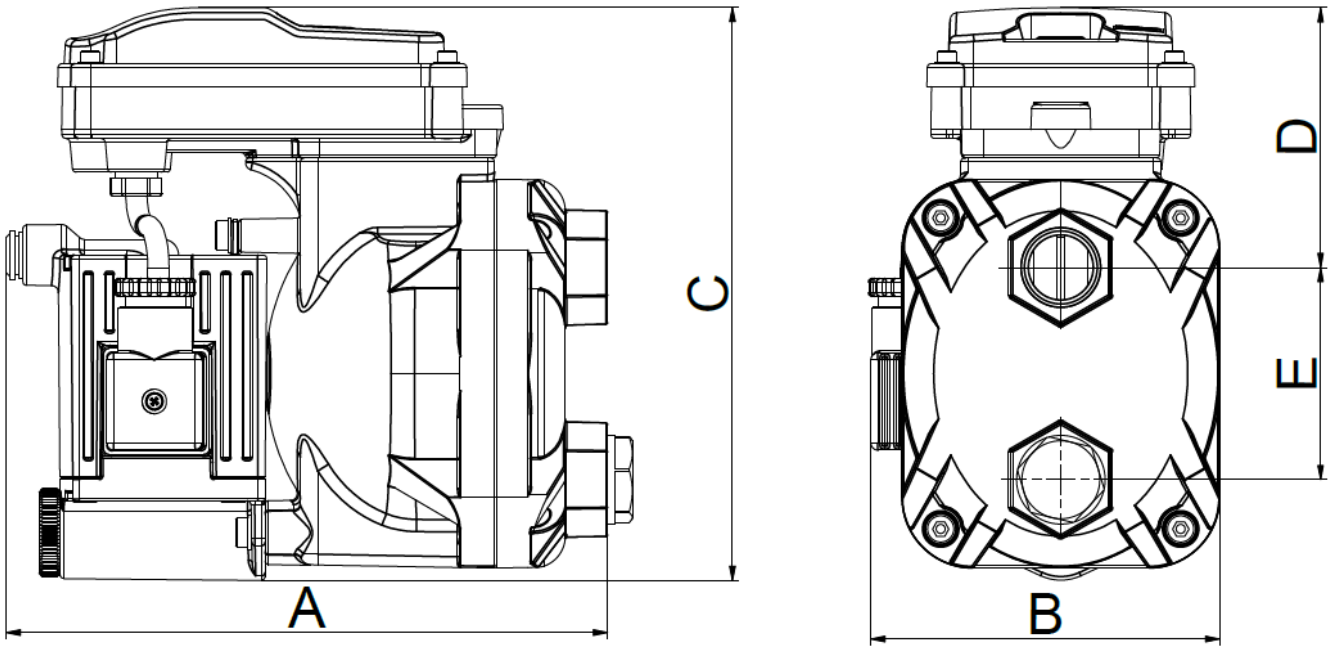
EMD 25 Technical data

Type	EMD 25 230V	EMD 25 115V
Voltage	230V ac, 50 – 60Hz	115V ac, 50 – 60Hz
Fuse inside EMD	5x20 1A T	
Power	22 VA	
Operating pressure range	1 – 16 bar (14 – 232 psi)	
Drain capacity @7 bar (101 psi)	25 l/h (0.014 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	0.73 kg	
Dimensions A x B x C x D x E [mm]	140 x 85 x 166 x 65 x 72,5	



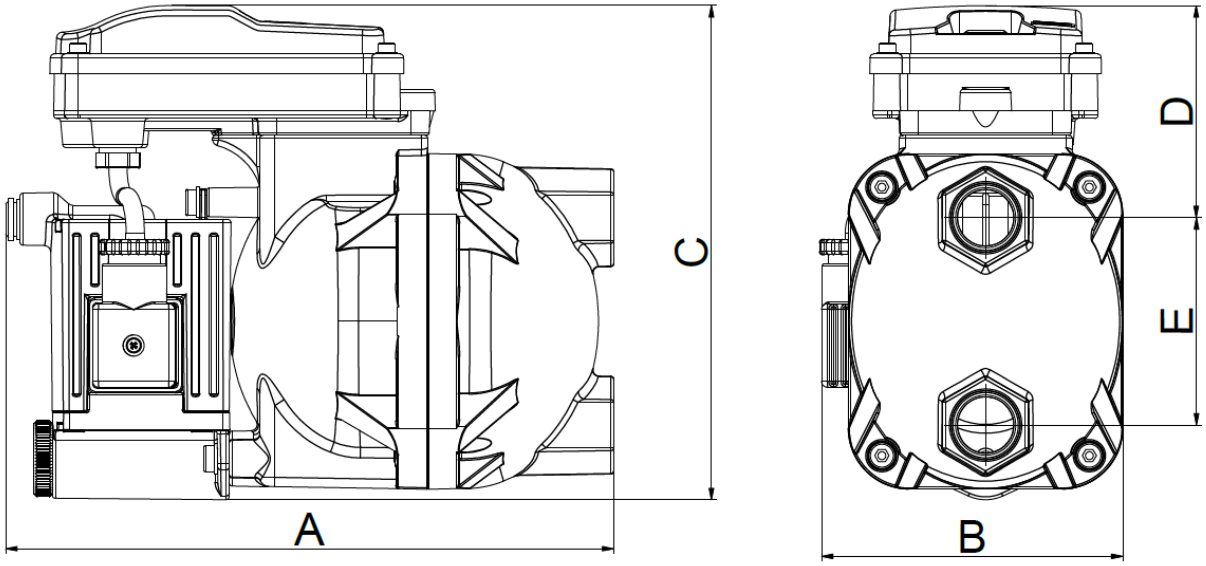
EMD 75 Technical data

Type	EMD 75 230V	EMD 75 115V
Voltage	230V ac, 50 – 60Hz	115V ac, 50 – 60Hz
Fuse inside EMD	5x20 1A T	
Power	22 VA	
Operating pressure range	1 – 16 bar (14 – 232 psi)	
Drain capacity @7 bar (101 psi)	75 l/h (0.044 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	1.2 kg	
Dimensions A x B x C x D x E [mm]	170x 99 x 162 x 74 x 60	



EMD 150 Technical data

Type	**EMD 150 230V**	**EMD 150 115V**
Voltage	230V ac, 50 – 60Hz	115V ac, 50 – 60Hz
Fuse inside EMD	5x20 1A T	
Power	22 VA	
Operating pressure range	1 – 16 bar (14 – 232 psi)	
Drain capacity @7 bar (101 psi)	150 l/h (0.088 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	1.3 kg	
Dimensions A x B x C x D x E [mm]	199 x 99 x 162 x 70 x 68	



Signal connection

Version	Service Network Connection	Alarm output
EMD 12	No	No
EMD 12A	No	Yes
EMD 12C	Yes	Yes
EMD 25	No	No
EMD 25A	No	Yes
EMD 25C	Yes	Yes
EMD 75	No	No
EMD 75A	No	Yes
EMD 75C	Yes	Yes
EMD 150	No	No
EMD 150A	No	Yes
EMD 150C	Yes	Yes

* EMD 12 24V ac only available in normal and alarm version

** EMD 12 24V dc only available in alarm version

For more details about signals see chapters 'Electrical wiring' and 'Service Network and 'Alarm'!

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 drains are 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.

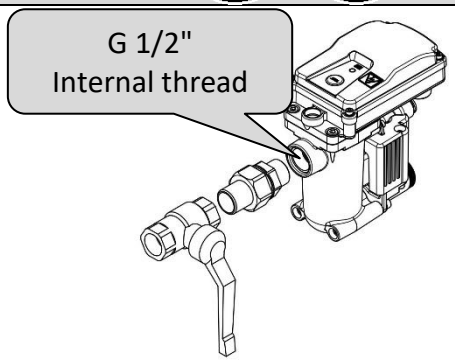
Installation guidelines

Keep to the safety rules when working with pressure equipment.

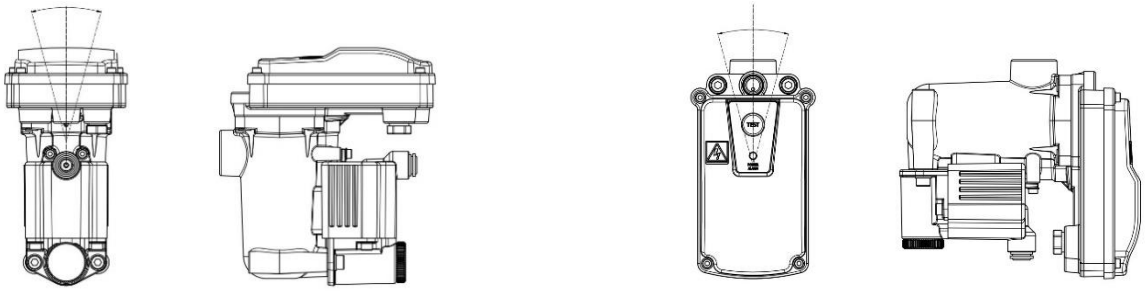
The EMD should be connected to a pressure system by ball valve and pipe union.

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

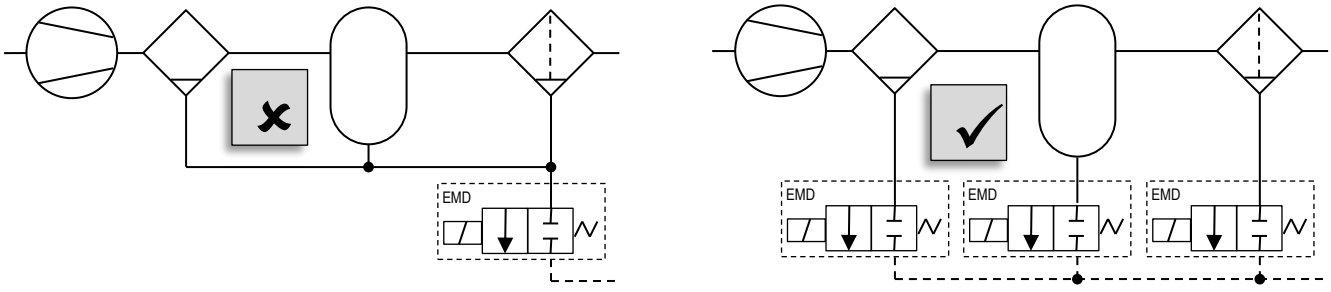
Make sure that inlet connection has parallel thread. Do not use tapered thread!



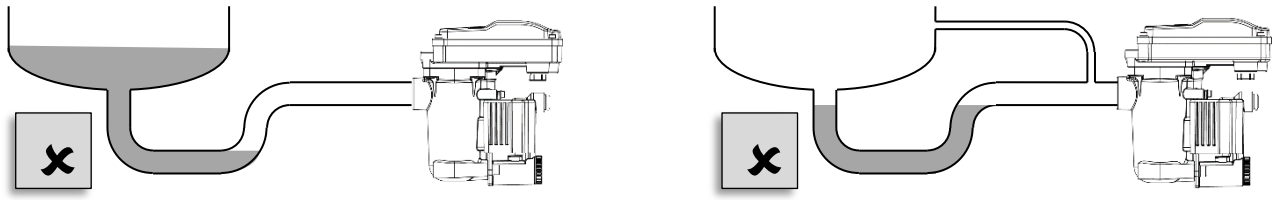
The EMD series could be mounted horizontally (left) or vertically (right). But, it must not be rolled aside more than ±15°. The horizontal position is preferred if there is a lot of debris in the condensed water.



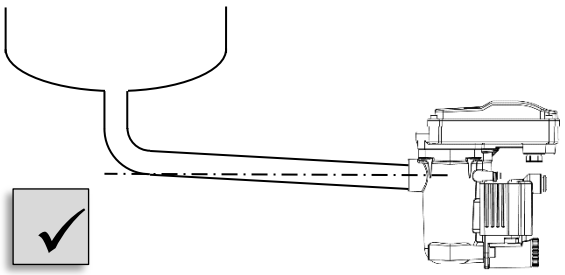
Do not connect several condensed water sources to one drain device because air would bypass filtering (left). Instead, each spot where condensed water collects must have its own condensate drain device (right).

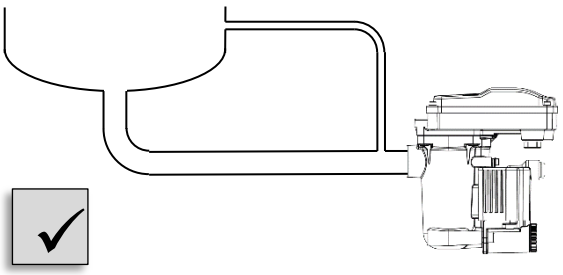


Drainage piping must be built without traps that would trap air in the EMD and prevent condensed water to enter it (left). Additional venting would not necessarily help because debris collects in the lowest part of drainge pipe and could clog it (right).

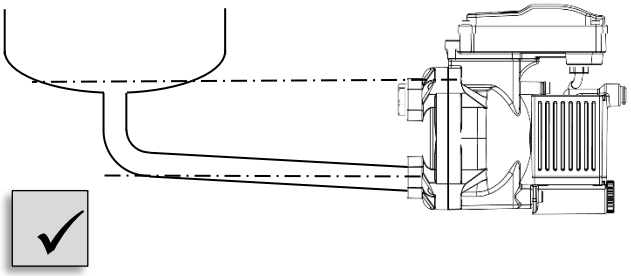


Horizontal drainage pipes must be inclined so that air could escape from EMD and that debris is flushed toward EMD (left). When horizontal drainge pipes are long, venting should be built (right).

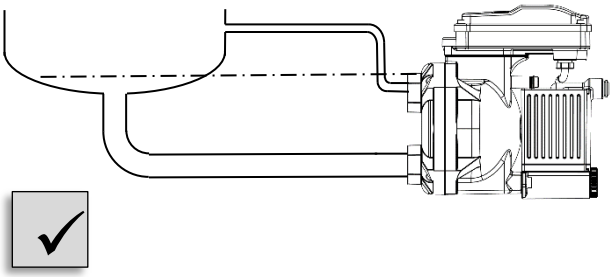




If if the bottom connection is used, the height of the upper connection must be lower than the lowest point of the condensate level. Upper unused connection must be properly sealed (pluged).



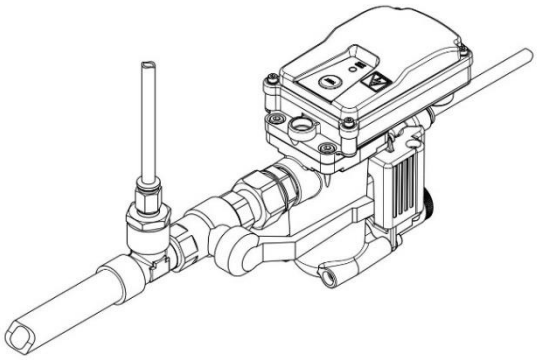
Use upper connection to mount venting line back to pressure equipment (e.g. pressure vessel). Venting line prevents creation of air bubbles assuring constant flow of condensate into the drain.



Venting is made by T-piece.

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

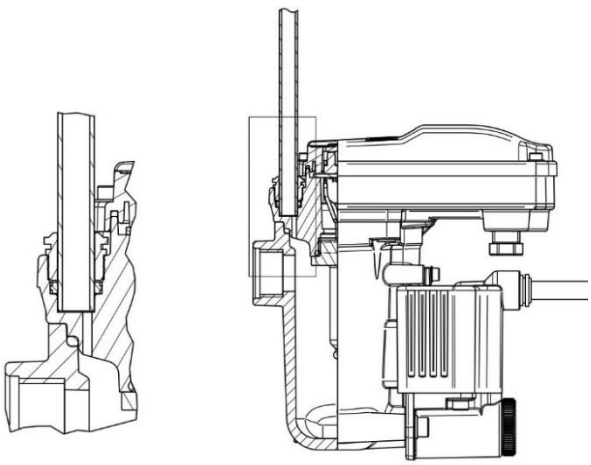
Venting with T-piece can only be used with upper inlet connection.



Venting is made through auxiliary inlet.

EMD has provisions for building an auxiliary inlet where venting could be connected. This auxuliary inlet is not implemented in the standard EMD.

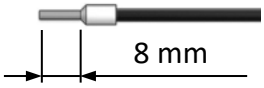
Contact STERLING for more information about EMD with the auxiliary inlet.



Electrical wiring:

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

Power Connection Cable

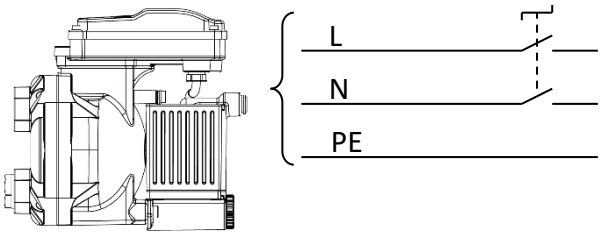


2 x 0,75mm^2 + PE
Oil resistant insulation recomended

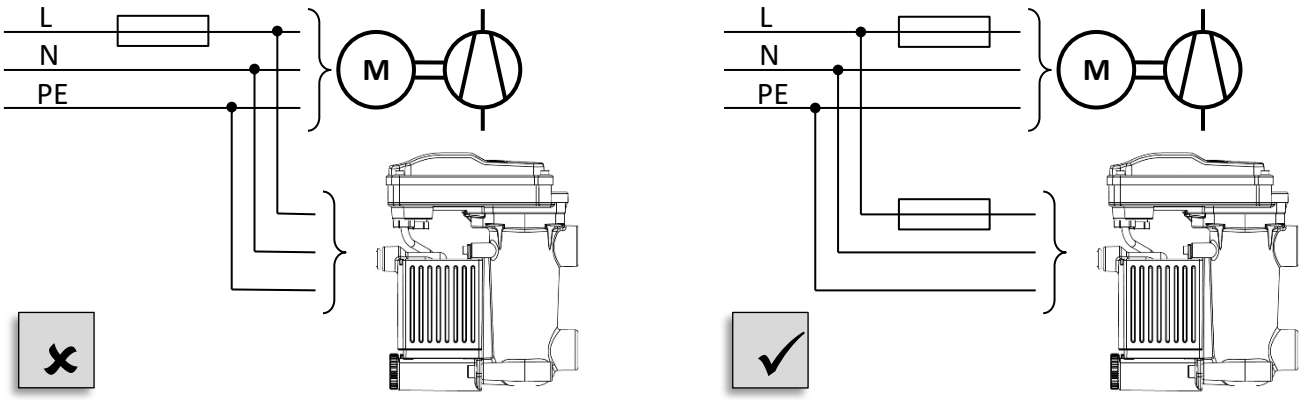
Wires should be equipped with appropriate ferrules. Make sure, that all strands of a wire are fitted inside the ferrule.

Make sure that all wires are fitted into terminals firmly!

Provide means for full disconnection of electric power from EMD.

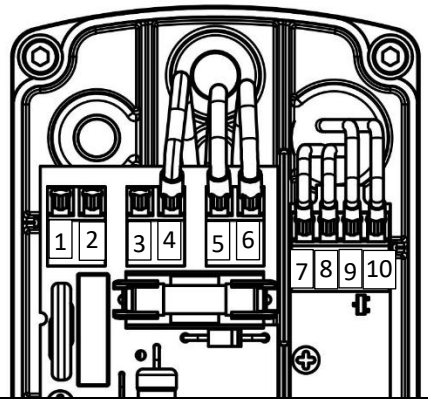


Do not connect EMD after protection device of heavy inductive load like compressor motor (left). Instead, heavy inductive load and EMD should be protected separately (right).



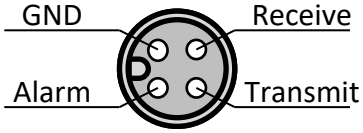
After installation or maintenance work, press the test button to drain all condensed water which has collected in the compressed air system during installation.

EMD series 230Vac, 115Vac
EMD A series 230Vac, 115Vac
EMD C series 230Vac, 115Vac

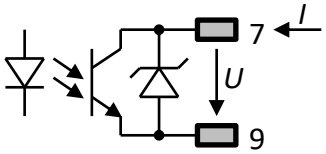


Power Connection	
1	230Vac (115Vac) Neutral
2	230Vac (115Vac) Line
3	PE Conductor
Valve Connection	
4	PE Conductor
5	Power line
6	Power line
Service Network (EMDC)	
7	Alarm/W. (white X2.4 BE)
8	Transmit (blue X2.3 MO)
9	GND (brown X2.2 RJ)
10	Receive (black X2.1 CR)

Connector pins' description:

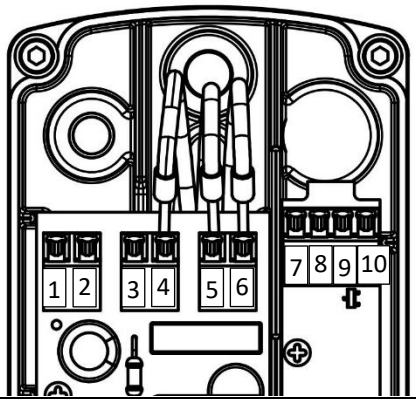


Alarm output (EMDA)	
7	Alarm/ Warning
9	GND

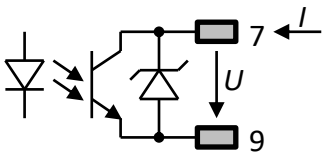


U_{max} (at high impedance): 39V
I_{max} (at low impedance): 200mA
U reverse: -0,7V

EMD12 24Vac
EMD12A 24Vac



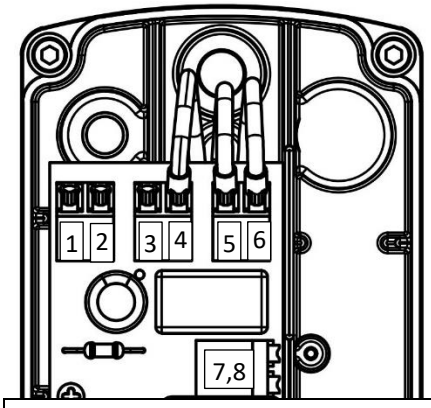
Power Connection	
1	24Vac (grounded line)
2	24Vac
3	PE Conductor
Valve Connection	
4	PE Conductor
5	Power line
6	Power line
Alarm output (EMDA)	
7	Alarm/ Warning
9	GND



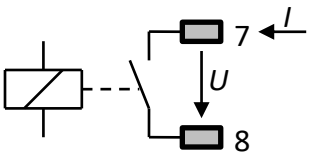
U_{max} (at high impedance): 39V
I_{max} (at low impedance): 200mA
U reverse: -0,7V

Only EMD12 is currently available in 24Vac version.

EMD12A 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 (EMDA)	
7	Alarm/ Warning
8	GND

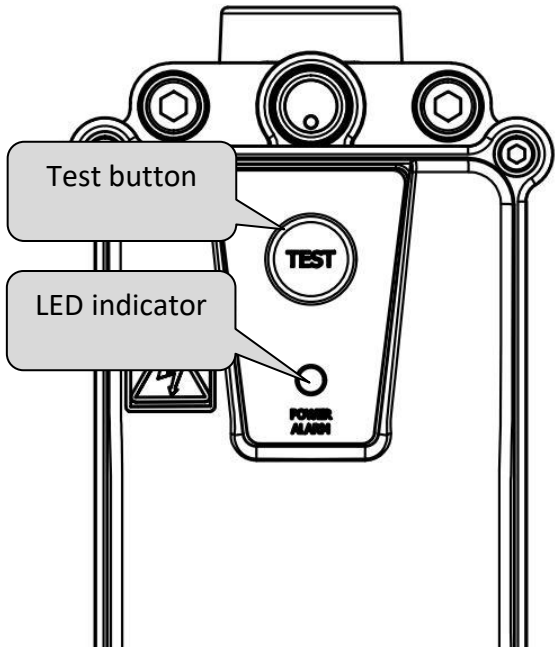


Relay contact: NO
U_{max}: 250Vac, 30Vdc
I_{max}: 8A

Only EMD12 is currently available in 24Vdc version.

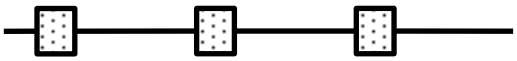
Touching electronics should be avoided, when cables are being connected!
Place the cover back immediately after the cables are connected!

Operation



By pressing the test button, valve is opened.

Green LED indicator shows water level in tank. Short green flashes show that water in tank is under the threshold.



Long green flashes indicate that the tank is almost full.

When the tank is full, the green is on permanently.

Red LED indicator is on permanently during alarm mode.

Description:

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 is not able to remove it in 90s, it enters overload mode. In this mode, EMD opens its valve longer and more frequently and its capacity is doubled. When EMD is still not able to discharge all the water in 5min, it enters alarm mode. In alarm mode, EMD 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 gets empty.

Extreme amount of condensed water is possible after maintenance work. In front of EMD, there is valve that is closed during maintenance. Behind this valve, condensed water collects. After a while, there is so much water that EMD 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

EMD 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 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's parameters at commissioning.

The Service network consists of two devices. These are a slave device which is EMD 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 are described. There, we see which work data are collected, which parameters could be set and which remote commands are available in EMD.

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

An alarm 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 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

Alarm in 24Vdc version – EMD 12

Contrary to ac versions of EMD 12, a dc version of EMD 12 has a built-in relay, which provides a voltage free contact. It is of NO type and it is closed, when EMD 12 operates normally.

Maintenance

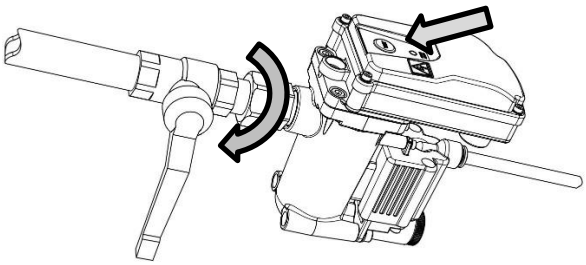
For EMD to work reliably, a strainer should be cleaned regularly. The Strainer of EMD is located in the entrance to a valve. Its purpose is to intercept larger solid particles that would clog valve. Cleaning period depends on condition of compressed air system.

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

Strainer cleaning procedure

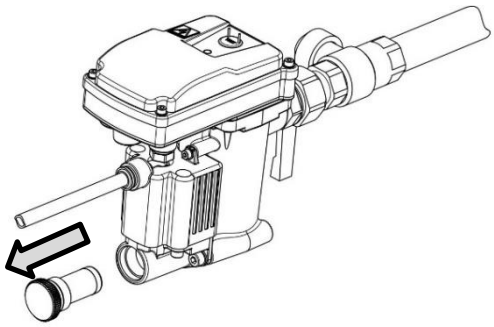
Keep to the safety rules when working with pressure equipment.

First, close the valve then press the test button to depressurize EMD.

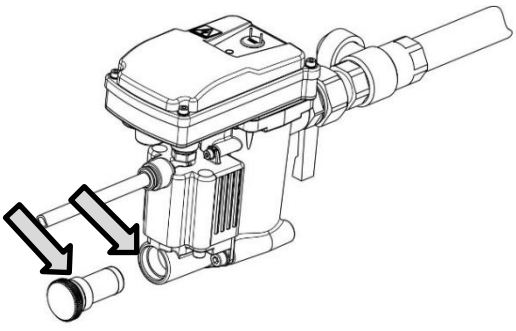


Remove strainer insert and clean it. At the same time, check integrity of mesh.

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



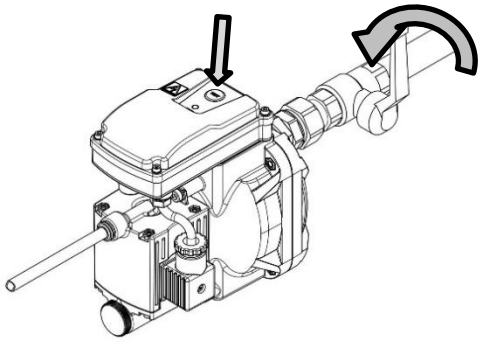
Clean also O-ring sealing and its gland thoroughly. Otherwise, strainer sealing may start to leak.
Be careful while cleaning, because solid particles in debris may be sharp.
Return strainer insert back to its position. It needs not to be tightened with tools! Then, open valve slowly.



Replacement of valve assembly

Keep to the safety rules when working with pressure equipment.

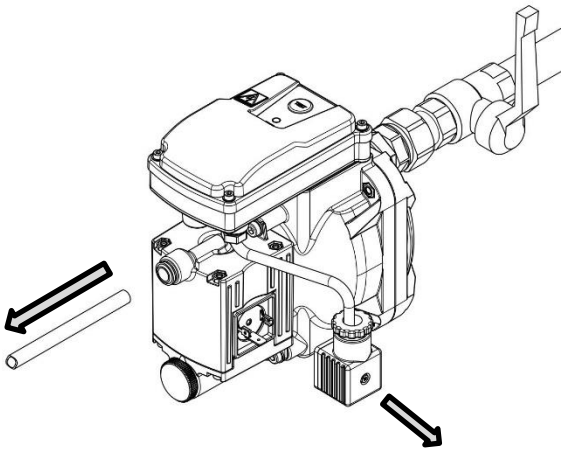
First, close the valve then press the test button to depressurize EMD.



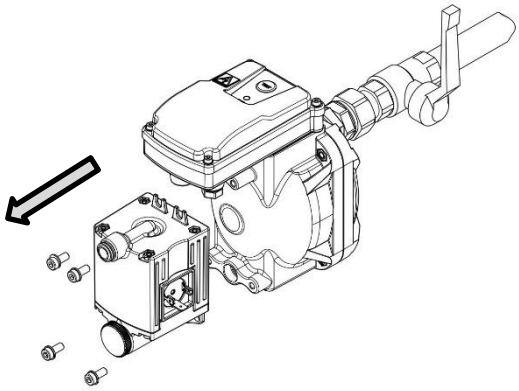
Remove ø8 tube from push connection.

Unscrew connector bolt an carefully remove connector and connector sealing from valve assembly.
The cable can stay connected to the electronics as we are only replacing valve assembly.

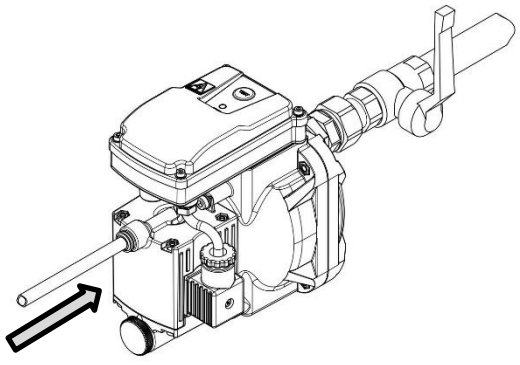
Make sure that the electrical power supply is disconnected during the procedure!



Unscrew four screws and carefully remove complete valve assembly by pulling it aside like shown.



Install new valve assembly. Make sure that the O-ring and connector gasket are positioned correctly.
Tighten all four screws alternately and not tighten too much.
Connect hose to outlet “push” connection, connect power supply and slowly pressurize the unit.
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.

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.

Spare parts

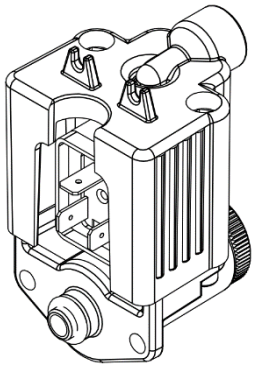
EMD 12

Service kit EMD12 230V - 3400856
Valve Assembly 230V
(strainer insert included)

Service kit EMD12 115V - 3400857
Valve Assembly 110V
(strainer insert included)

Service kit EMD12 24Vac - 3401139
Valve Assembly 24Vac
(strainer insert included)

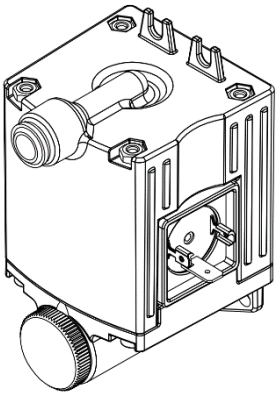
Service kit EMD12 24Vdc - 3401138
Valve Assembly 24Vdc
(strainer insert included)



EMD 25, EMD75, EMD 150

Service kit EMD 230V - 3401642
Valve Assembly 230V
(strainer insert included)

Service kit EMD 115V - 3401643
Valve Assembly 115V
(strainer insert included)



* Valve connector, Replacement sealings and bolts are available on request. Please contact your distributor or STERLING Separation.

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 humid 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.

STERLING Separation Ltd
Units 22-24 Longford Industrial Estate
Longford Rd
Cannock
Staffs
WS11 0DG
England
+44 (0) 1543 502010
E-mail: sales@sterlingsep.com
www.sterlingsep.com