



Instruction Manual

Oil Mist Trap

Model

TM201

TM401

Read this manual before operation and keep it at your
hand for immediate reference

ULVAC, Inc.
Components Division

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Certificate of Decontamination

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1. Before Using This Trap

Thank you for purchasing the oil mist trap (hereafter, "this trap") made by ULVAC (hereinafter, "we"). To ensure safety, upon receiving the trap, confirm that it matches the details of your order and has not been damaged in transit or for another reason.

This instruction manual (hereinafter, "this document") describes appropriate handling and maintenance procedures to safely use this trap and to maximize its performance. Read this document in advance to properly use this trap.

Install and operate this trap according to the safety-related laws and regulations (such as fire prevention laws and electrical wiring regulations) in your country or region. To this end, you must first attend a publicly recognized general safety training (including on electrical and loading safety topics) in your country or region. Never handle this trap without first undergoing safety training. The operator must attend such training. The operator must have expertise, skills, and certifications related to electricity, machinery, loading, vacuum usage, and other fields.

This trap has been designed to conform to the rules in place when this document was created. Conformity is not guaranteed because the applicable standards may change in the future.

Performance and safety may not be ensured if equipment connected to this trap does not conform to the same rules or if the trap is altered. In such cases, we cannot guarantee (take responsibility for) performance or safety. Product alterations made by the customer are not covered by the warranty, and we cannot take responsibility for them.

Before installing or removing this trap, separate all energy sources (including power and cooling water) from the product.

None of this trap's parts may continue to be used permanently while maintaining the performance upon delivery. Performance inevitably degrades after a certain amount of time elapses, thus increasing the likelihood of product problems even in assumed common usage scenarios. We ask that our customers perform preventive maintenance to avoid problems in accordance with their usage scenarios.



By performing preventive maintenance measures, you can lower the probability of problems with this trap due to parts failures caused by parts becoming worn out as well as the probability of other risks, such as downtime caused by trap problems, fire, or effects on other processes.

From the viewpoint of preventive maintenance, we also ask our customers to prepare maintenance and inspection plans and to replace parts and perform overhauls according to such plans.

If you have any questions about handling or other matters, please contact our nearest sales office or dealer.

1.1 Warning Label Types and Display Positions

Attach warning labels to the warning locations on this pump. Before operating this pump, be sure to confirm the warning contents.

	<p>Do not operate this trap while equipment is attached that prevents gas from moving to the exhaust port (e.g., that blocks the exhaust port). The trap's internal pressure may rise, causing the casing or level gauge to rupture, oil leakage, or motor overload.</p> <p>Explosive or flammable gas, gas that increases the susceptibility of substances to fire, or other gas may ignite inside the trap, thus increasing the trap's internal pressure. Do not exhaust gas that has these characteristics.</p>
	<p>Before use, read through the instruction manual and fully understand its contents.</p>

1.2 Warning Label Display Positions

Warning label display positions of TM201 and TM401 are common.

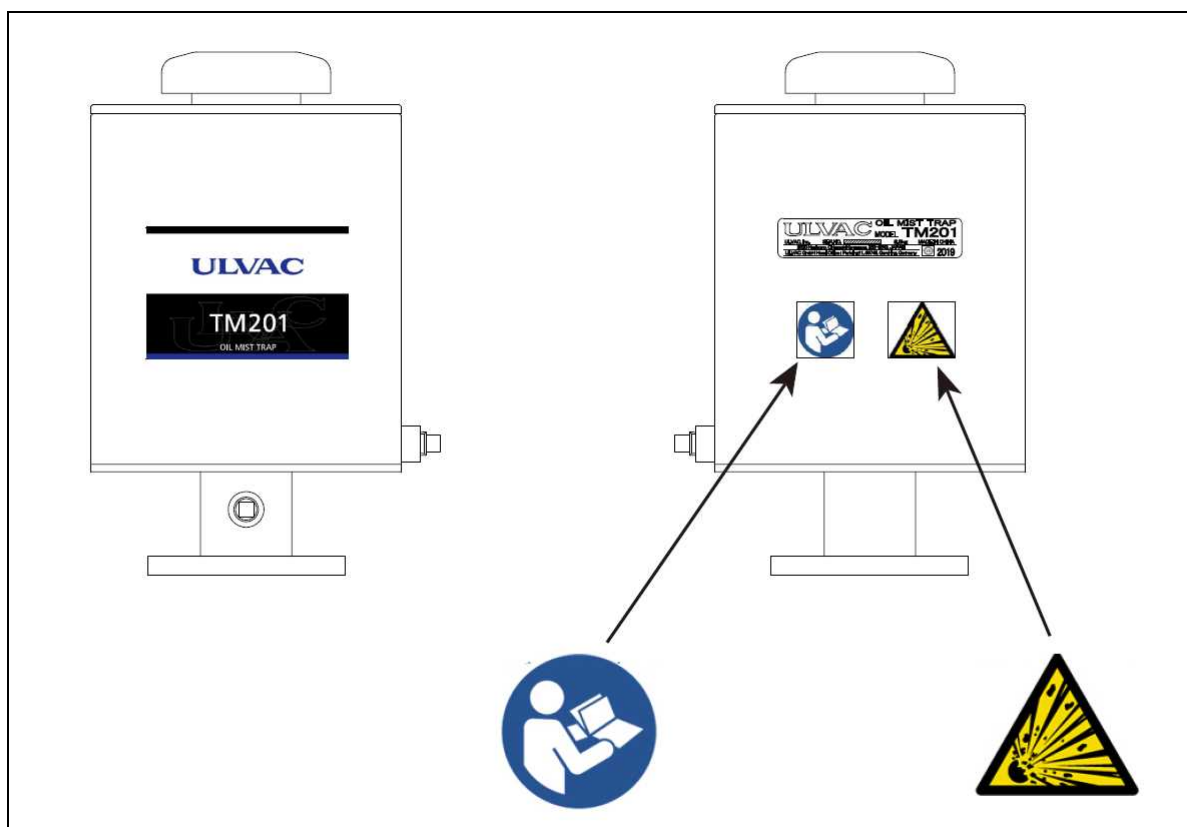


Fig.1 Warning label display positions

2. General Description

2.1 Features

(1) Removal of oil mist with high efficiency

Approx. 90% of the oil mist discharged from an oil sealed rotary vacuum pump can be removed, allowing the work environment to be kept free from contamination with oil mist.

(2) Employment of cartridge type filter element

The cartridge type filter element can be easily replaced when it is clogged or corroded.

(3) Pump internal pressure relief valve

If the filter element is clogged, the pressure in the pump will rise at start-up of the pump or during pumping operation, which can be dangerous.

If the pressure in the pump rises above 0.03 MPa (0.3 kg/cm²) (gauge pressure), the pressure relief valve will be activated to prevent the pump and oil mist trap from being damaged.

2.2 Specifications

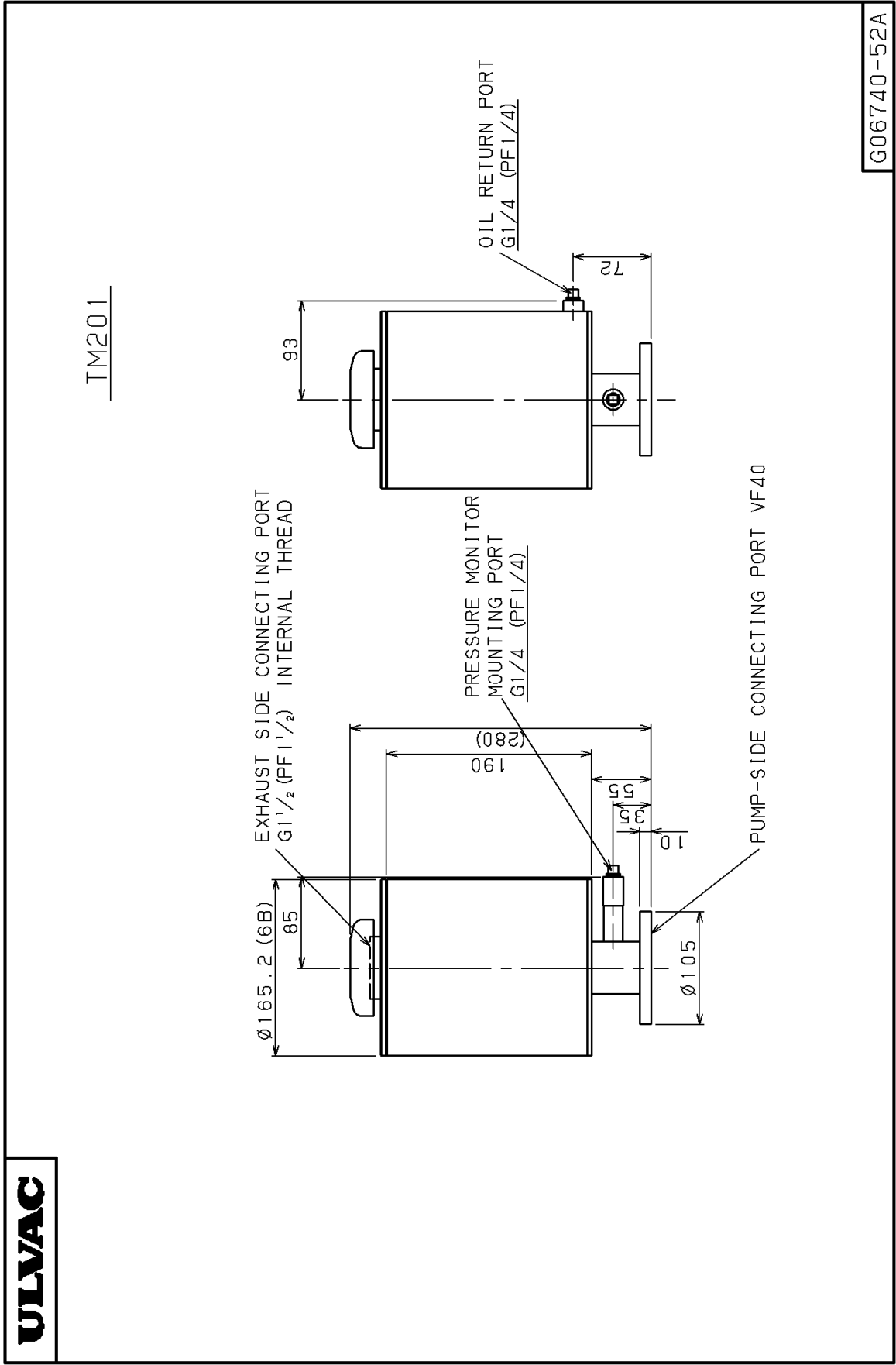
Table.1 Specifications

Model		TM201	TM401
Item			
Filter element		TM201E	TM401E
Displacement m ³ /h *1 (L/min)		24 (400)	48 (800)
Connecting part dia.	Pump side	VF40 *2	
	Exhaust side	G1·1/2 internal thread *3	
Outside dimensions (mm)	Overall height	280	350
	Overall width	181	181
	Diameter	φ165	φ165
Weight (kg)		8.5	10

*1) Throughput under atmospheric pressure.

*2) The flange is the JIS vacuum flange (JIS B 2290).

*3) Same as PF1·1/2.



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Fig.2 TM201 dimensional drawing

TM401

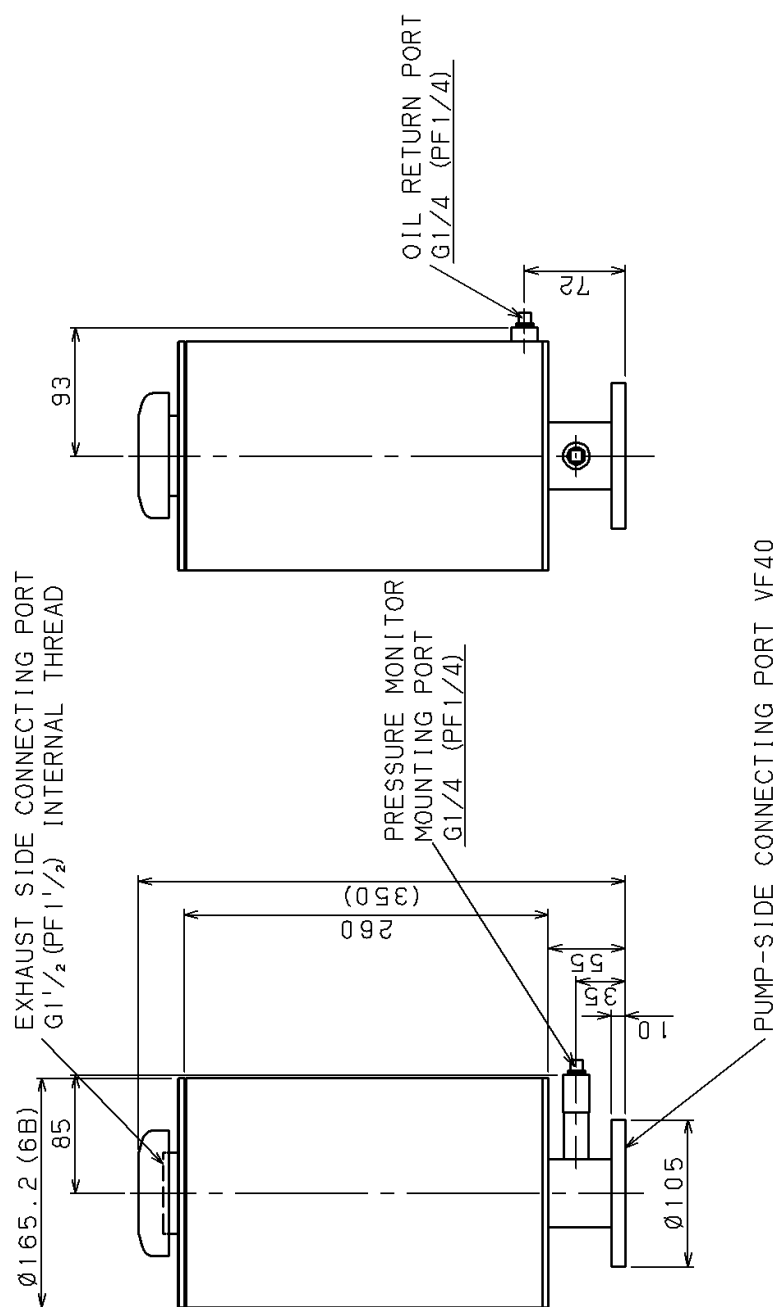


Fig.3 TM401 dimensional drawing

2.4 Structure

The gas discharged from the oil sealed rotary vacuum pump (air, nitrogen gas, etc.) blows up the oil in the pump and is introduced to the oil mist trap along with fine particles of oil blown up. These fine particles of oil (oil mist) are trapped by the filter element when they pass through it and the condensed large oil particles gather between the oil mist trap and the filter element and are discharged through the oil return port.

Gas from which most part of the oil mist has been removed is discharged through the exhaust port of the oil mist trap (Refer to Fig.4).

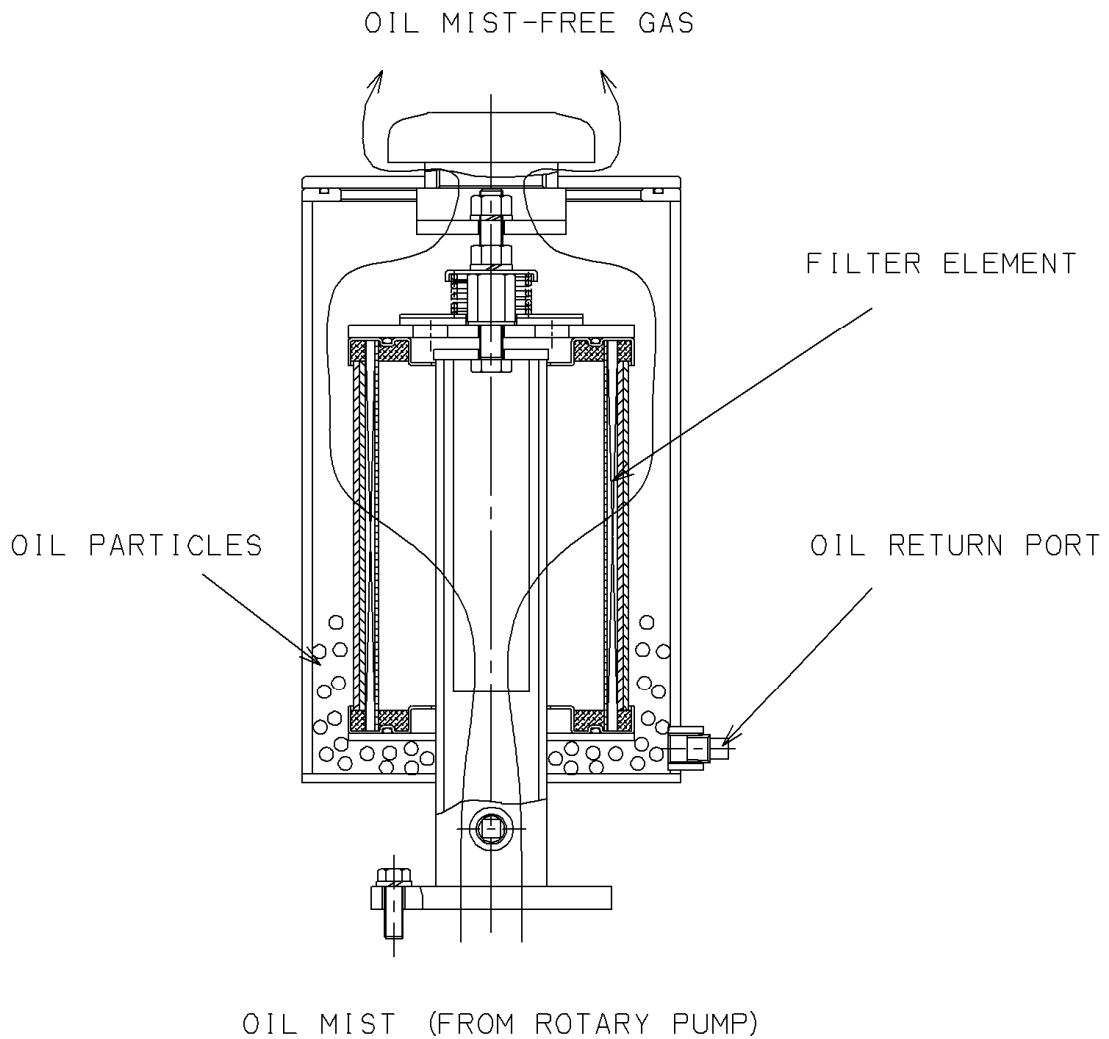


Fig.4 Schematic diagram

3. Operation

3.1 Check

The oil mist trap has been shipped after rigorous inspection at the factory, but check upon the following unpacking it.

- (1) Is the unit the correct model you ordered?
- (2) Are accessories (instruction manual, parts you ordered) supplied with the unit?
- (3) Is any part damaged or missing and any screw or nut loosened in transit?

If you find any problem, contact your local ULVAC organization or representative.

3.2 Mounting on Pump (Refer to Fig.5)

To mount the oil mist trap on the pump, proceed as follows.

- (1) Verify that the exhaust port, O-ring groove and oil mist trap (TM) flange are free from scars and dust.
- (2) Mount the O-ring (V55) to the exhaust port of the pump and tighten the TM flange using an Allen screw (M8).

3.3 Duct Piping

The exhaust port of the oil mist trap has a cap as standard, but has a flange (RF-11) for duct piping as option. Use it depending on your application.

CAUTIONS:

- ① The flange for the duct piping (RF-11) is equivalent to VG40.

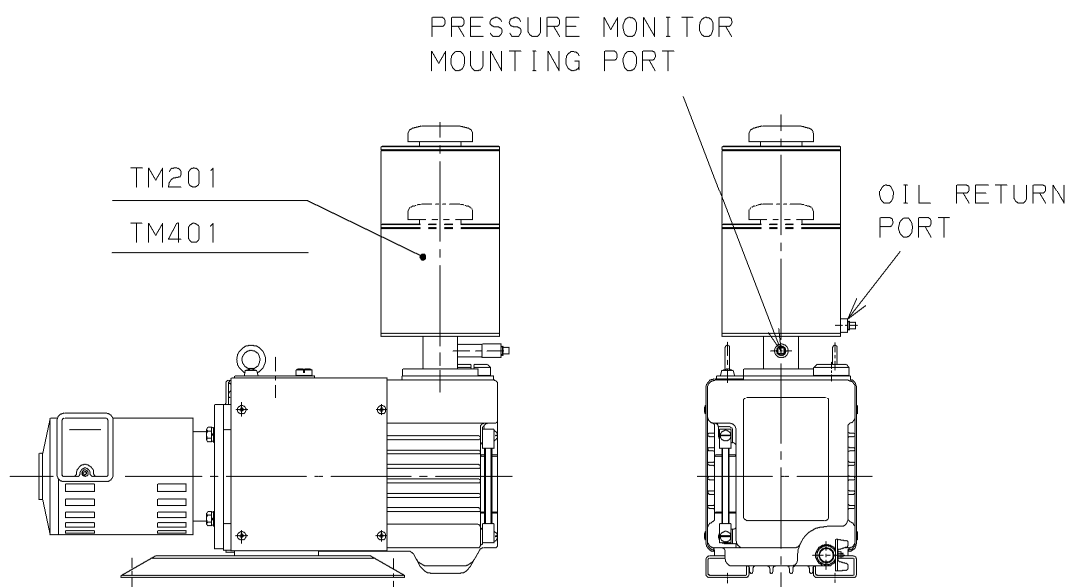


Fig.5 TM201/401 mounted in position

- ② When ducting, be careful not to put too much force on the main body of the trap. Too much force may damage the trap.

3.4 Treatment of Trapped Oil

The TM201/401 is designed to discharge the trapped oil to outside through the oil return port. Recover the discharged oil in a container and return it to the pump when the pump is operated under no load or at stop.

However, do not return the oil to the pump if the oiliness of the recovered oil is lower than the new oil used in the pump or if the oil contains water, dust or the like or if chemicals like acid is used.

It can be a cause of trouble of the pump.

CAUTIONS:

- ① If you do not dispose of the trapped oil, oil will stay between the filter element and the oil mist trap and oil mist will come out.
- ② It is recommended to replace a filter element once immersed in oil because clogging tends to occur.
- ③ Do not connect the oil return port and the pressure monitor mounting port by means of a vinyl hose or the like. Oil mist will not be trapped.

3.5 Oil return mechanism (Option)

Oil return mechanism is designed to return the trapped oil in oil mist trap to the pump. 3 models of oil return mechanism are available according to the operating pressure and conditions.

Table.2 Oil return mechanism models

	Details	Recovery method	Effect on ultimate pressure	Recommended pressure range				
Oil return mechanism A	Oil returns into the pump case through the check valve when the pump stops.	Semi-auto	Low					
Oil return mechanism B	Oil returns from the gas ballast port through the needle valve.	Manual	Some					
Oil return mechanism C	Oil returns from the inlet port side through the needle valve.	Manual	High					
				Atmospheric pressure	[Pa] 1	10	100	1000
					[Torr / mbar] 0.01	0.1	1	10
				Continuously-workable pressure range				
				Repeatable working pressure range				

Oil return mechanism A

Oil returns into the pump case through the oil filling plug. The oil back to the oil mist trap is prevented by the check valve.

CAUTION: The oil doesn't returns to the pump when the gas flows in the pump case. Only when the pump is operated under no load or at stop.

Oil return mechanism B

Oil returns into the pump compression process through the gas ballast port.

CAUTION: Oil return mechanism B shall cause to rise the ultimate pressure. The gas ballast cannot be performed unless the oil is completely recovered since using the gas ballast port. On the other hand, the ability of oil returns is reduced because the pump compression process time is increased for the operation under the high pressure.

Oil return mechanism C

Oil returns into the inlet port.

CAUTION: At the oil recovery, Oil return mechanism C causes to rise the ultimate pressure because the same as a leak at the inlet port.

Oil return mechanism installation

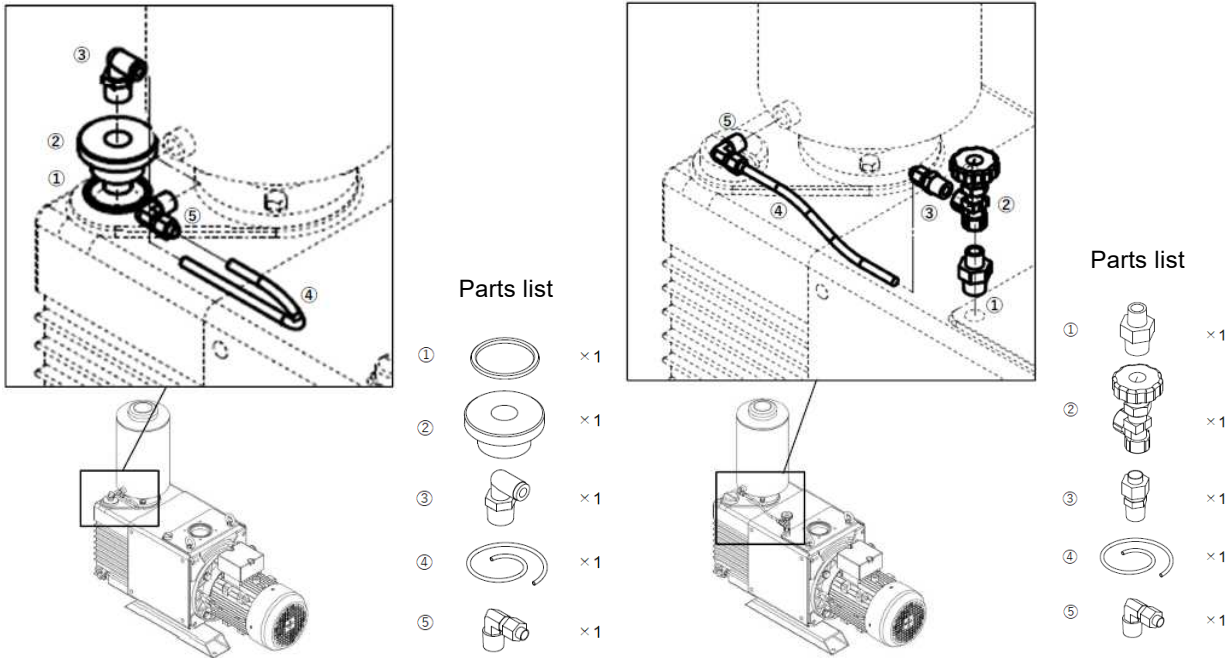


Fig.6 Oil return mechanism A installation

Fig.7 Oil return mechanism B installation

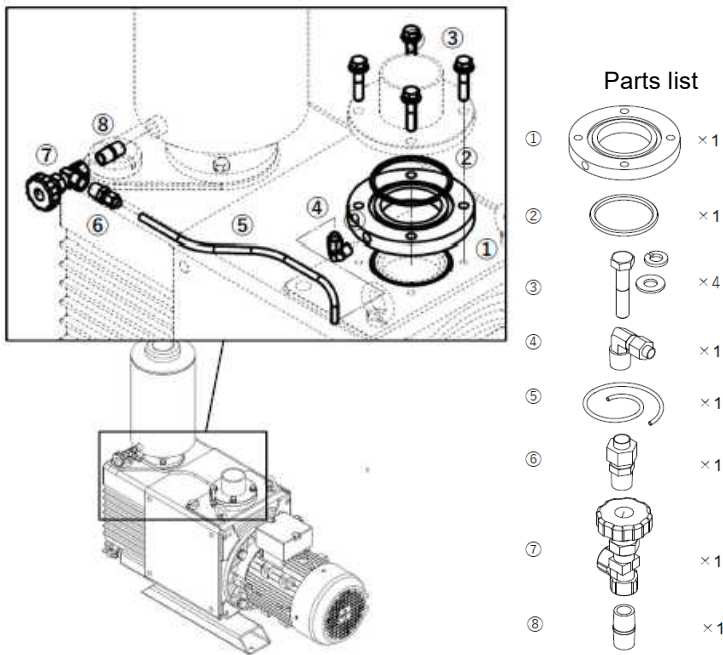


Fig.8 Oil return mechanism C installation

4. Inspection

4.1 Scheduled Inspection

Periodically measure the pressure in the pump with the optional pressure monitor mounted to the pressure monitor mounting port.

Verify that the pressure at start of the oil sealed rotary vacuum pump or immediately after evacuation of the vacuum chamber from atmospheric pressure is 0.03 MPa (0.3 kg/cm²) (gauge pressure). If it is always higher than 0.03 MPa (0.3 kg/cm²) (gauge pressure), it is necessary to replace the filter element and check the pressure relief valve.

4.2 Replacing the Filter Element (Refer to Fig.9)

If the filter element is clogged, replace it, as a rule.

4.2.1 Remove the filter element

- (1) Stop the pump or put the pump under no-load operating condition and loosen the Allen screw (M8) that fixes the oil mist trap to the pump to remove the oil mist trap. (If piping is connected to the exhaust side, remove it.)
- (2) Loosen the hex nut (M10) at the center of the exhaust port to remove the flange.
- (3) Loosen the hex nut (M10) to remove the parts of the pressure relief valve.
- (4) Loosen the spacer nut to remove the filter keep plate.
- (5) Remove the filter element.

This completes the removal of the filter element.

CAUTIONS:

- ① Before replacing the filter element, check if the interior of the oil mist trap or the pressure relief valve is contaminated with dust or foreign matter. If so, remove it by cleaning.
- ② The seal washer can not be reused.

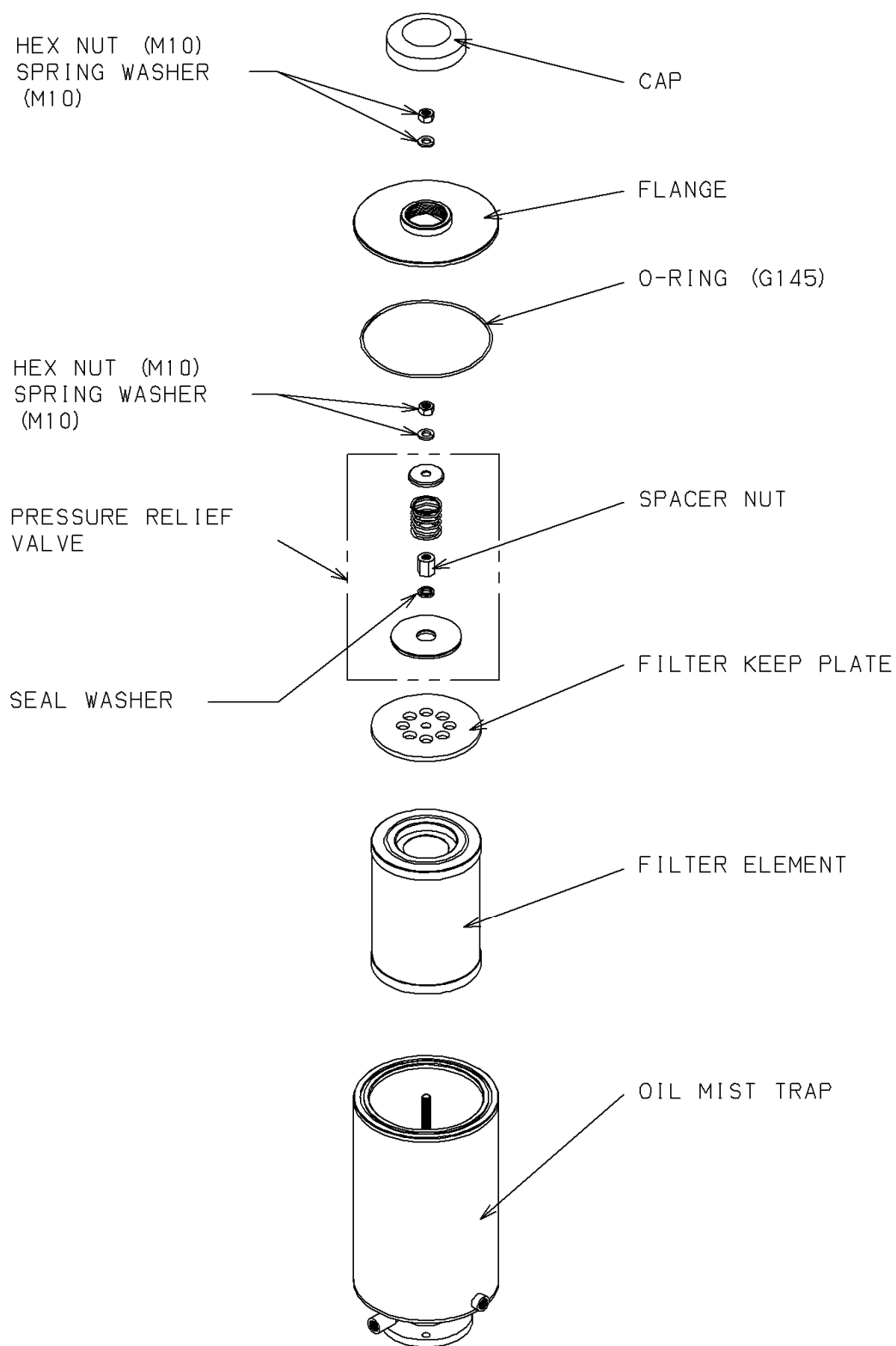


Fig.9 Exploded view of filter element

4.2.2 Reassembling the filter element

- (1) Ensure that the mounting surface of the filter element in the oil mist trap is free from foreign matter and scars.
- (2) Mount the filter element in the oil mist trap.
- (3) Mount the filter keep plate in position.
- (4) Mount the seal washer (M10) and fix the filter element using the spacer nut. Tighten with torque 20 N·m.
- (5) Mount the parts of pressure relief valve.

CAUTIONS:

- ① Tighten the hex nut (M10) until it comes into contact with the spacer nut. Tighten with torque 4.4 N·m. (The pressure relief valve is activated at a pressure below 0.03 MPa (0.3 kg/cm²) (gauge Pressure).
- (6) Mount the O-ring in the O-ring groove of the oil mist trap. (Apply a thin uniform coat of vacuum grease until the luster of the O-ring surface changes.)
- (7) Mount the flange in position and tighten it with the hex nut (M10). Tighten with torque 20 N·m.

This completes the mounting of the filter element.

5. Precautions

5.1 Clogging of Filter Element

Clogging of the filter element will raise the pressure in the pump and may damage the pump parts or the filter element. Therefore, when using the filter element in the following application, be sure to mount a pressure monitor (optional) to monitor the pressure.

- (1) When the pump is used for continuous evacuation at a high suction pressure or continuous pumping of high temperature gas.

The pump temperature rises and the oil viscosity lowers, tending to cause clogging. In this case, a large volume of oil, discharged from the exhaust port of the pump, will be trapped by the filter, but if the pump is operated under the above operating conditions for an extended time, the oil deposited on the fine fiber of the filter element will form oil film, leading to clogging.

- (2) When the pump is used to pump liquid with high viscosity or fine powder at ambient temperature, it will be deposited on the fiber of the filter element, leading to clogging.
- (3) When reaction products are generated.

5.2 Pressure Relief Valve

This device is designed to operate when the pressure in the pump exceeds the maximum continuous operating pressure of 0.03 MPa (0.3 kg/cm²) (gauge pressure). If this valve is activated, the oil mist discharged from the pump will not be trapped by the filter element, but will be discharged directly through the exhaust port of the oil mist trap.

If this happens, replace the filter element with a new one.

5.3 When the pump is used continuously at high intake pressure

If the pump is operated continuously at a high intake pressure (, 00 Pa or more) for an extended time, the pump temperature will rise and the oil viscosity will lower. This increases the amount of oil mist (including fine oil drops) discharged through the exhaust port of the pump and tends to clog the filter element. Foreign matter sucked into the pump during evacuation and the sludge generated by deteriorated oil can also be a cause of the clogging of the filter element.

If the filter element is clogged and the pressure in the pump exceeds the maximum continuous operating pressure of 0.03 MPa (0.3 kg/cm²) (gauge pressure), the pressure relief valve will operate to lower the internal pressure, but it is necessary to replace the filter element.

If it is necessary to replace the filter element frequently, the use of an oil mist trap one class larger than the current one is recommended.

5.4 When using Oil Mist Trap for a Pump that exceeds Maximum

Do not operate the pump continuously at a high intake pressure of , 00 Pa or more when the TM201 is used for a pump with a throughput of 20 m³/h or more (30 m³/h, 40 m³/h) or when the TM401 is used for a pump with a throughput of 40 m³/h or more (60 m³/h, 80 m³/h).

The pressure relief valve will operate and oil mist be generated even with a new filter element. Also the life of the filter element will be extremely shortened.

For more information, please contact our nearest sales office or dealer.

5.5 Checkup after storage for a long period

Long term storage of the vacuum pump without operation might possibly cause trouble in operation caused by rust, degradation of rubber and stickiness of rubber. If you kept the pump long time without operating it, ask a closest Service Center for the check.

6. Warranty

- (1) The warranty period of this oil mist trap is one year from the date of delivery.
- (2) Should the oil mist trap fail under normal operating condition during this warranty period, its repair will be carried out free of charge.

The normal operating conditions are as follows.

- a) Ambient temperature: 10°C to 40°C
 - b) Suction gas: Dry air or dry nitrogen (0°C to 40°C)
 - c) Operation in conformity with instruction manuals.
- (3) Troubles caused by the following are out of warranty.
- a) Acts of God and force majeure.
 - b) Special atmosphere, such as pollution or the like.
 - c) Operation not in conformity with the instruction manual.
(Specifications, maintenance, inspection and others.)
 - d) Troubles judged by ULVAC engineer to be attributable to operating conditions
 - e) Replacement of consumables (filter element).

7. Major Replacement Parts

Table.3 Major replacement parts list

No.	Description	Material	Q'ty	Remarks
1	Filter element	Glass wool	1 set	TM201 : TM201E TM401 : TM401E
2	O-ring (G145)	NBR	1	JIS B 2401
3	Seal washer (M10)	SS NBR	1	DT-1-10

The exhaust port of the TM201 and TM401 are provided with the following.

Standard type : Cap

Option : RF-11 (equivalent to VG40)



This mark is applied to the electronic information product sold in the People's Republic of China. The figure at the center of the mark is the validity date of environmental protection. This product does not influence the environment, the human body and the property during the period reckoning the manufacturing date as long as the caution for safe use regarding the products are observed.

*The environmental protection validity date is not the product warranty period.

Table.4 Making format for names and contents of hazardous substances or elements

Name of parts	Hazardous substances or elements					
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
Body	○	○	○	○	○	○
Element	○	○	○	○	○	○

○: indicating that content of the hazardous substance or element in all homogeneous materials of the part does not exceed the requirements for concentration limits specified by SJ/T11363-2006.

× : indicating that content of the hazardous substance or element in, at least one kind of, homogeneous materials of the part exceeds the requirements for concentration limits specified by SJ/T11363-2006. Producer may further explain the technical excuse to the items marked with “X” perspecific conditions here.