

TRANSFORMER OIL PURIFICATION PLANT CMM-0.6

(Purification capacity 600 l/h)

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1. GENERAL INFORMATION

Transformer Oil Purification Plant model CMM-0.6 purifies insulating oils of mechanical particles and employs thermal vacuum for water and gas removal. Operate the Unit when assembling, servicing and exploiting oil filled equipment. Moisture, solids and gaseous contaminants can seriously affect the function of insulating fluids as a coolant and insulator. Unit is used for installation, repair and maintenance companies which are dealing with transformer oil treatment.

This specification describes the equipment as supplied by *GlobeCore™* for the processing (degasification, dehydration, filtration) of oil. The purifiers are designed for processing of oil in workshops or in the field, in storage tanks, drums. For purification of oil in the field, a mobile type purification plant, mounted on a roadworthy trailer is recommended.

The scope of supply of this specification shall include the design, fabrication and factory testing of Oil Purification Plant CMM-0.6. Equipment will be mounted on a common base or in a trailer and supplied in the form of a pre-piped and pre-wired package and shall provide a fully workable unit in accordance with this specification when received by the purchaser.

Performance through the purifier at a full flow rate shall be as follows:

Water Removal: From 50 ppm down to 10 ppm after several passes.

Gas Removal: From fully saturated with air (10 to 12% by volume) down to less than 0.1% by volume

Particulate Matter Removal: 98% of particles over 5 µm

Dielectric Strength: Improvement in dielectric strength up to 60 kV.

2. TECHNICAL DATA

Parameter		Value
1. Capacity, m ³ /h		0,6
2. Adjustable flow rate, m ³ /h		0,2 ... 0,6
3.* Treated oil parameters (after several passes):		
	- maximum moisture content, ppm	10
	- maximum gas content, %, max.	0,1
	- filtration rating, µm	5
	- maximum mechanical impurities content, ppm	8
	- ISO 4406 industrial purity class	-/14/12
4. Maximum oil output temperature in heating mode, °C		65
5. Oil heater mean power, W/cm ²		1,1
6. Oil heater power, kW		5
7. Total Vacuum pump capacity, m ³ /h		20
8. Operating vacuum, mbar		9...2
9. Ultimate vacuum, mbar		0,01
10. Outlet pressure, bar		2
11. Delivery head, m		20
12. Maximum power consumption, kW		8
13. Electric current supply parameters (3 Ph + N):		
	- voltage, V	400 / as required
	- AC frequency, Hz	50 / as required
14. Maximum dimensions, mm		
	- length	750
	- width	525
	- height	1350
15. Weight, kg		200

Note! * With initial oil parameters as follows:

- moisture content by weight – no more than 0,005% (50 ppm)
- oil heating temperature up to +55±5 °C within 30 minutes of heating
- gas content – no more than 10%

3. Technical description of equipment.

The oil purification plant CMM-0,6 is designed for removal of solids, water and gasses from insulation oils, with viscosity not exceeding 70 mm/s² (cSt) at 50 C.

The plant is used during mounting, maintenance and operation of oil-filled high voltage equipment (power transformers, high-voltage switchgear, etc.).

3.1. Design and configuration of equipment

The CMM-0,6 unit consists of the following components (see Fig. 1):

- metal frame and containment tray on castor wheels;
- vacuum chamber with built-in oil heater 2;
- output positive displacement gear pump 3;
- vacuum pumps 4;
- cartridge filters 5;
- electric control cabinet 6.

All process equipment is connected by pipelines. The equipment and Control cabinet equipment can be enclosed and protected against climatic conditions (to be discussed separately).

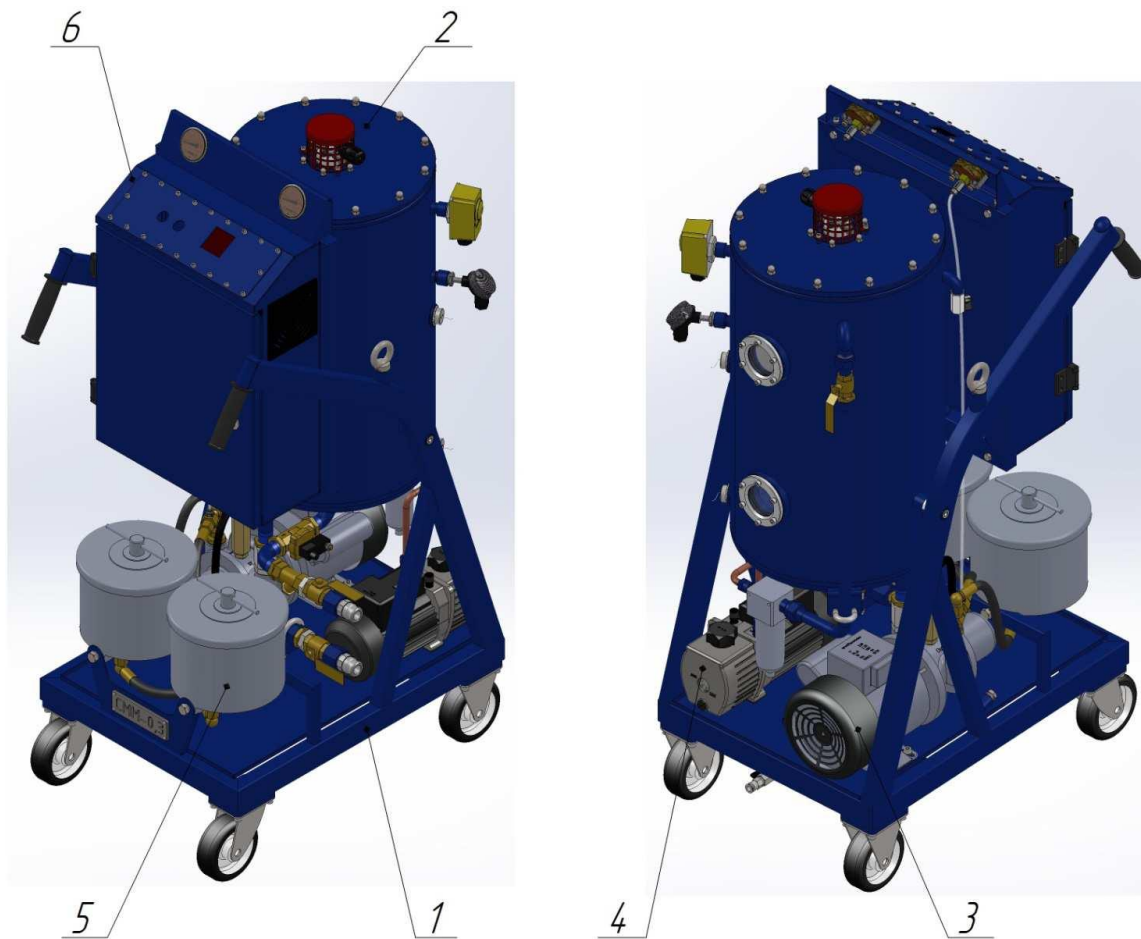


Figure 1 – CMM-0.6 general view (movable type)

(picture for reference only, may vary from ordered unit)

3.1.1. The vacuum chamber is a cylindrical heat-insulated vessel equipped with set of Raschig rings installed in its upper part. Raschig rings section design allows for oil intensively exhaling gases and moisture. Sight windows allow making visual control of unit operation and oil presence inside the vacuum chamber.

Lower-upper level sensors control outlet pump.

The vacuum chamber is connected to the atmosphere by air inlet valve.

To prevent oil spillage CMM-0.6 unit is equipped with a floating oil spillage sensor interlocking the system if any emergency occur.

Oil heater (see figure 2) is a cylindrical vessel installed inside the vacuum chamber, which contains ceramic electrical heater (capacity 2,2 kW) and equipped with drainage valve. Automation system devices are installed in heater: temperature sensor and thermostat. These devices show oil temperature and protect heater from overtemperature, as well as allow to adjust oil heating temperature as required. Heater is equipped with separate thermostat for extra-control and protection against overheating interlocked with heating elements and all electric devices of the unit.

Heater has a demountable structure to provide easy heating elements replacement.

For oil vacuum chamber overview watch figure 2.

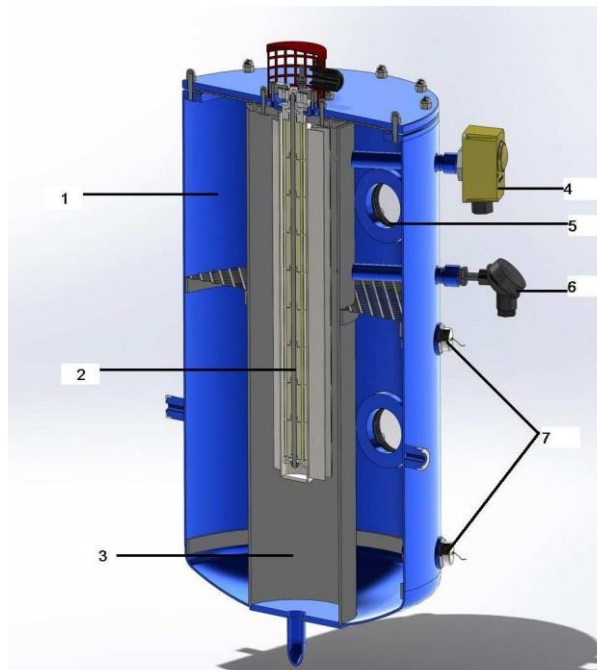


Figure 2. Vacuum chamber with Oil heater

- 1** –vacuum chamber;
- 2** –heating element;
- 3** – oil heating block;
- 4** – Thermostat;
- 5** – Sight window;
- 6** – Temperature sensor;
- 7** – Oil level capacitive sensors;

3.1.2. Mesh filter is installed at the unit inlet and is designed for mechanical contaminants release. Filtration fineness is influenced by a 200 micron brass mesh mounted inside the case. It can be easily removed and cleaned.

3.1.3. Outlet pump is installed under the vacuum chamber and facilitate oil transferring from the vacuum chamber to the filters. Outlet pump is a progressing cavity pump M range (by Mono Pumps) with electric drive. Power consumption – up to 0.75 kW, Flow rate – up to 3000 LPH, Outlet pressure – 3,45 bar. Pumps are controlled from the control panel.

3.1.4. Outlet pipeline is equipped with two fine cartridge filters (5 mkm filtration fineness), which also contain magnet block. The magnets should be cleaned when filter elements (cartridges) are cleaned or replaced. To eliminate air within oil gain as well as to swallow it within oil drainage, filter uses air relieve plug.

The filtering elements (cartridges) are easy to replace and cleanable.

3.1.5. Vacuum pump system consists of one dual voltage (110-120/220-240V, 50/60 Hz) two stage vacuum pump equipped with gas ballast valve. Power consumption of the pump is up to 0,5 kW, suction capacity 56 LPM. Moisture separator filter AF1 is installed on the pipeline between vacuum chamber and vacuum pump to prevent moisture and contaminants inlet inside the vacuum pump. The moisture separator filter is an MC 202-FB0 coalescing drying filter.

3.1.6. Control cabinet is designed for placement of electrical components to facilitate Unit operation. It is a metal cabinet with lockable door. Electrical control and commutation circuits are panel located inside. Control buttons and light signaling devices are installed on the cabinet. The unit is equipped with electronic temperature indicator Autonics, that allows setting and controlling oil heating temperature. Optionally it can be equipped with different automation and monitoring devices, moisture sensor, flow meter (to be discussed additionally).

The unit is also equipped with sound and light alarm.

3.1.7. For ultimate pressure (vacuum) indication, vacuum gauge is installed in the vacuum vessel. Measurement range -1...0 bar (kgs/cm²).

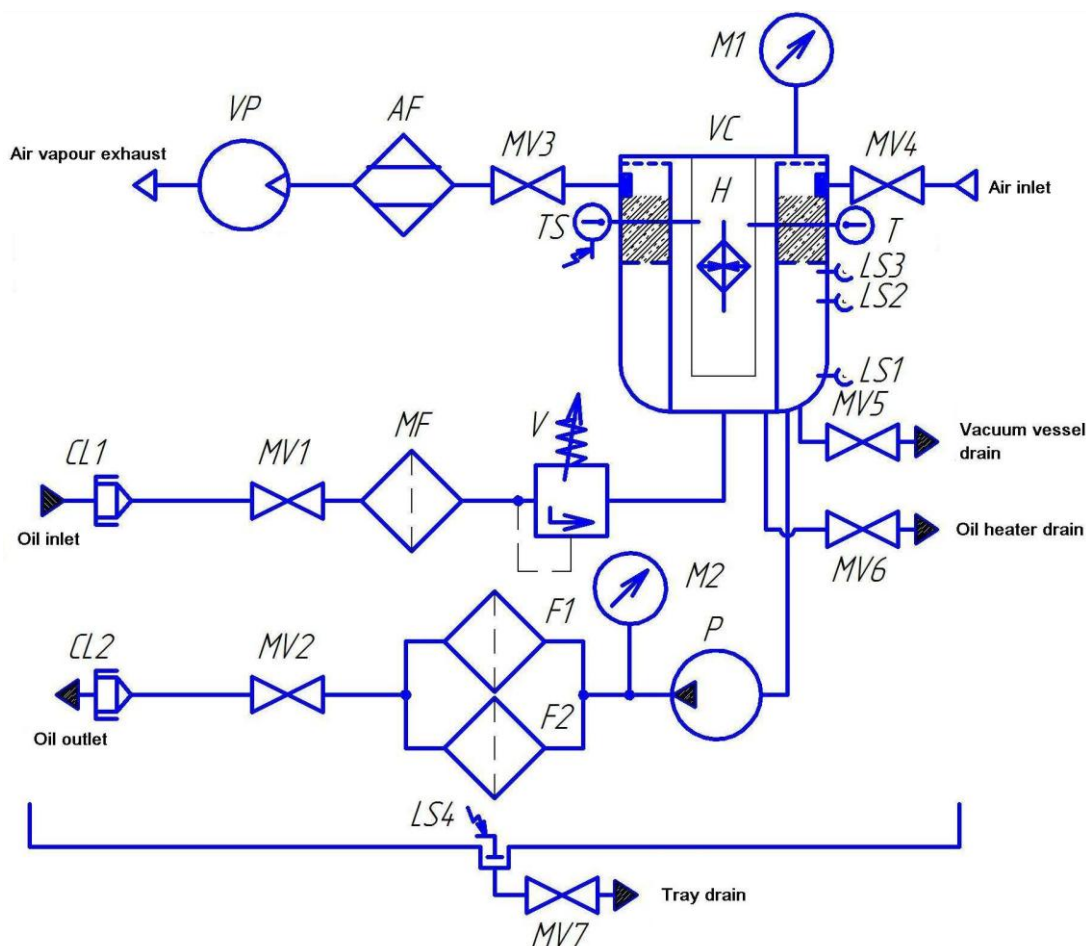


Figure 3 – CMM-0.6 flow diagram

CL1, CL2 – Camlock quick coupling connections; **H** – heater; **VC** – vacuum chamber; **MF** – mesh filter; **V** – solenoid valve; **P** – outlet pump; **M1-M2** – manifold pressure gauges; **F1, F2** – fine cartridge filter 5 micron; **TS** – thermostat; **T** – temperature sensor; **LS1-LS3** – level sensors; **LS4** – floating oil spillage sensor; **AF** – air filter; **VP** – vacuum pump; **MV1** – inlet valve; **MV2** – outlet valve; **MV3** – vacuum line valves; **MV4** – air inlet valve; **MV5, MV6** – drain valves.

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Big transformer and small 600 l/h transformer oil purification plant.