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2 MACHINE AND MANUFACTURER IDENTIFICATION



AVAILABLE MODELS MANUFACTURER	- VISCOMAT 70 - VISCOMAT 90 PIUSI S.p.A. Via Pacinotti 16/a, z.l. Rangavino - 46029 Suzzara - Mantova - Italy
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3 FACSIMILE COPY OF EU DECLARATION OF CONFORMITY

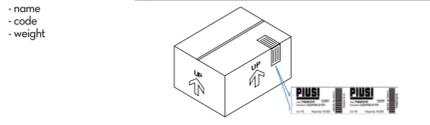
The undersigned Piusi S.p.A. Via Pacinotti 16/a, z.l. Rangavino - 46029 Suzzara - Mantova - Italy HEREBY STATES under its own responsibility that the equipment described below: Description: **Pump for lubricant oil transfer** Model: **VISCOMAT 70 - VISCOMAT 90** Serial number: refer to Lot Number shown on CE plate affixed to product Year of manufacture: refer to the year of production shown on the CE plate affixed to the product complies with the following legislation:
- Machinery Regulations
- Electromagnetic compatibility
The technical file is at the disposal of the competent authority following motivated request at Piusi S.p.A. or following request sent to the e-mail address: doc.tec@piusi.com. THE ORIGINAL DECLARATION OF CONFORMITY IS PROVIDED SEPARATELY WITH THE PRODUCT

4 MACHINE DESCRIPTION

PUMP Self-Priming, volumetric, rotating electric vane pump equipped with by-pass valve.
MOTOR Asynchronous motor, single-phase or three-phase, 2 or 4 pole, closed type (Protection class IP55 according to regulation EN 60034-5-86), self-ventilating, flange-mounted directly to the pump body.

4.1 HANDLING AND TRANSPORT

Foreword Due to the limited weight and dimensions of the pumps, special lifting equipment is not required to handle them. The pumps are carefully packed before dispatch. Check the packing when receiving the material and store in a dry place.
PACKAGING The pump is equipped comes packed suitably for shipment. On the packaging a label shows the following product information:



MODEL	WEIGHT (kg)	PACKAGING DIMENSION (mm)
VISCOMAT 70	14,1	355 x 185 x 280
VISCOMAT 70 T	14,1	350 x 200 x 280
VISCOMAT 90	14,1	350 x 200 x 280

5 GENERAL WARNINGS

Warnings To ensure operator safety and to protect the dispensing system from potential damage, workers must be fully acquainted with this instruction manual before attempting to operate the dispensing system.

The following symbols will be used throughout the manual to highlight safety information and precautions of particular importance.

ATTENTION This symbol indicates safe working practices for operators and/or potentially exposed persons.

WARNING This symbol indicates that there is risk of damage to the equipment and/or its components.

NOTE This symbol indicates useful information.

This manual should be complete and legible throughout. It should remain available to end users and specialist installation and maintenance technicians for consultation at any time.

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6 SAFETY INSTRUCTIONS

ATTENTION You must avoid any contact between the electrical power supply and the fluid that needs to be FILTERED.

Pre-liminary checks before inst Maintenance control Before any checks or maintenance work are carried out, disconnect the power source.

FIRE AND EXPLOSION To help prevent fire and explosion. Use equipment only in well ventilated area.

When flammable fluids are present in the work area, such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode.

Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.

Ground all equipment in the work area. Stop operation immediately if static sparking occurs or if you feel a shock. Do not use equipment until you identify and correct the problem.

Keep a working fire extinguisher in the work area.

ELECTRIC SHOCK This device must be grounded. Improper grounding setup or usage of the system can cause electric shock.

Turn off and disconnect power cord before servicing equipment. Connect only to a grounded electrical outlets.

Electrocution or death Ensure ground prongs are intact on power and extension cords. Outdoors, use only extensions suitable for the specific use, in accordance with the regulations in force.

The connection between plug and socket must remain away from water.

Never touch the electric plug of socket with wet hands.

Do not turn the device on if the power connection cord or other important parts of the apparatus are damaged, such as the inlet outlet plumbing, dispensing nozzle or safety devices. Replace damaged components before operation.

For safety reasons, we recommend that, in principle, the equipment be used only with a earth-leakage circuit breaker (max 30 mA).

Electrical connections must use ground fault circuit interrupter (GFCI).

Installation operations are carried out with the box open and accessible electrical contacts. All these operations have to be done with the unit isolated from the power supply to prevent electrical shock!

Do not operate the unit when fatigued or under the influence of drugs or alcohol.

Do not leave the work area while equipment is energized or under pressure.

Turn off all equipment when equipment is not in use. Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.

Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.

Do not kink or over bend hoses or use hoses to pull equipment. Keep children and animals away from work area.

Comply with all applicable safety regulations.

Burn Hazard To avoid severe burns do not touch hot fluid or equipment.

Equipment surfaces and fluid that is heated can become very hot during operation

Read MSDS's to know the specific hazards of the fluids you are using.

Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

Prolonged contact with the treated product may cause skin irritation: always wear protective gloves during dispensing.

7 FIRST AID RULES

Electrocution disconnect the unit from the mains, or use a dry insulator as protection while moving the electrocuted person far from any conductor. Do not touch the electrocuted person with bare hands until he/she is far from any conductor. Ask qualified and trained people for help immediately.

When operating the pump and in particular during refuelling, do not smoke and do not use open flame.

8 GENERAL SAFETY RULES

Essential protective equipment characteristics Wear protective equipment that is:
- suited to the operations that need to be performed;
- resistant to cleaning products.

Personal protective equipment that must be worn

DO NOT SMOKE NEAR THE PUMP AND DO NOT USE THE PUMP NEAR FLAMES.

9 TECHNICAL DATA

The data in the table relate to functioning with a oil of viscosity equal to approximately 110cSt (comparable, for example, to oil SAE W80 at a temperature of 22°C). As the viscosity of the oil varies, the variation in the pump's performance will be more noticeable the greater the back pressure against which the pump is working. VISCOMAT pumps can pump oils of very different viscosities, within the limits indicated in the TECHNICAL INFORMATION, without requiring any adjustment of the by-pass.

	VISCOMAT 70					VISCOMAT 90				
	230/50	230/60	10/50	10/60	400/50	230/50	230/60	1400/50	1400/60	400/50
Absorption (A)	5,5	5,1	10	9	5	6,2	5	5		
Power (W)	1200	1100	820	850	2000	1350	1600	2000		
RPM	1470	1650	1700	1700	1450	1400	1600	1450		
Pressure condition bypass with flow rate = 0 (bar)	9	9	7,5	5	6	6	6	6		
Max Back Pressure (bar)	17	23	25	25	25	27	35	50		
Max Flow Rate (l/min)	6	6	3	3	5	3,5	3,5	5		
(bar)	26	31	30	36	25	47	54	55		
(bar)	1	1	1	1	1	1	1	1		

ATTENTION The power absorbed by the pump depends on the functioning point and the viscosity of the oil being pumped. The data for MAXIMUM CURRENT provided in the Table refer to pumps functioning at the point of maximum compression Pmax, with oils of a viscosity equal to approximately 500 cSt.

10 OPERATING CONDITIONS

10.1 ENVIRONMENTAL CONDITIONS

TEMPERATURE min. +10 °C / max. +60 °C
RELATIVE HUMIDITY max. 90%

ATTENTION The temperature limits shown apply to the pump components and must be respected to avoid possible damage or malfunction. It is understood, nevertheless, that for a given oil, the real functioning temperature range also depends on the variability of the viscosity of the oil itself with the temperature. Specifically:

- The minimum temperature allowed (+10°C) could cause the viscosity of some oils to greatly exceed the maximum allowed, with the consequence that the static torque required during the starting of the pump would be excessive, risking overload and damage to the pump.

- The maximum temperature allowed (+60°C) could, on the other hand, cause the viscosity of some oils to drop well below the minimum allowed, causing a degradation in performance with obvious reductions in flow rate as the back pressure increases.

10.2 ELECTRICAL POWER SUPPLY

NOTE Depending on the model, the pump must be fed by three-phase or single-phase alternating current whose nominal values are those indicated in the Table of paragraph ELECTRICAL SPECIFICATIONS.

The minimum acceptable variations from the electrical parameters are:
Voltage: ± 5% of the nominal value
Frequency: ± 2% of the nominal value

ATTENTION Power from lines with values above the indicated limits can damage the electrical components.

10.3 WORKING CYCLE

NOTE The motors are intended for continuous use. Under normal operating conditions they can function continuously with no limitations. For 240V voltage ratings (Australia) the duty cycle is 30' on / 30' off.

10.4 PERMITTED AND NON-PERMITTED FLUIDS

FLUIDS PERMITTED OIL, with a VISCOSITY from 50 to 500 cSt (at working temperature)
- RAPSOLIL
- BIODIESEL B20
- PARAFFINIC HVO/XTL-EN 15940

FLUIDS NON PERMITTED AND RELATED DANGERS

- GASOLINE
- INFLAMMABLE LIQUIDS with PM + 55°C
- WATER
- CORROSIVE CHEMICAL PRODUCTS
- SOLVENTS

- FIRE - EXPLOSION
- FIRE - EXPLOSION
- PUMP OXIDATION
- CONTAMINATION OF THE SAME
- PUMP CORROSION - INJURY TO PERSONS
- FIRE - EXPLOSION - DAMAGE TO GASKET SEALS

11 INSTALLATION

ATTENTION The pump must never be operated before the delivery and suction lines have been connected.

PRELIMINARY INSPECTION - Verify that all components are present. Request any missing parts from the manufacturer.
- Check that the pump has not suffered any damage during transport or storage.

- Carefully clean the suction and delivery inlets and outlets, removing any dust or other packaging material that may be present.
- Check that the electrical data corresponds to those indicated on the data plate.
- Always install in an illuminated area.
- Install the pump at a height of min. 80 cm.

11.1 POSITIONING, CONFIGURATIONS AND ACCESSORIES

REMARQUE In the case of installation in the open air, proceed to protect the pump by providing a protection roof.

The pump can be installed in any position (horizontal or vertical axis pump).

The pump must be secured in a stable way using the holes on the bed of the motor and vibration damping devices.

THE MOTORS ARE NOT OF THE ANTI-EXPLOSIVE-TYPE. DO NOT install them where inflammable vapours could be present.

It is the responsibility of the installer to provide the necessary line accessories to ensure the correct and safe operation of the pump. The accessories that are not suitable to be used with the previously indicated material could damage the pump and/or cause injury to persons, as well as causing pollution.

To maximise performance and prevent damage that could affect pump operation, always demand original accessories.

11.2 CONSIDERATIONS REGARDING DELIVERY AND SUCTION LINES

DELIVERY Foreword The choice of pump model to use should be made keeping in mind the viscosity of the oil to be pumped and the characteristics of the system attached to the delivery of the pump.

The combination of the oil viscosity and the characteristics of the system could, in fact, create back pressure greater than the anticipated maximum (equal to Pmax), so as to cause the (partial) opening of the pump by-pass with a consequent noticeable reduction of the flow rate supplied.

In such a case, in order to permit the correct functioning of the pump equal to the viscosity of the oil being pumped, it will be necessary to reduce resistance in the system by employing shorter hoses and/or of larger diameter. On the other hand, if the system cannot be modified it will be necessary to select a pump model with a higher Pmax.

HOW TO REDUCE EFFECTS ON FLOW RATE

ATTENTION The power absorbed by the pump depends on the functioning point and the viscosity of the oil being pumped. The data for MAXIMUM CURRENT provided in the Table refer to pumps functioning at the point of maximum compression Pmax, with oils of a viscosity equal to approximately 500 cSt.

SUCTION Foreword

VISCOMAT series pumps are characterized by excellent suction capacity. In fact, the characteristic flow rate/back pressure curve remains unchanged even at high pump suction pressure values. In the case of oils with viscosity not greater than 100 cSt the suction pressure can reach values on the order of 0.7 - 0.8 bar without compromising the proper functioning of the pump.

Beyond these suction pressure values, cavitation phenomena begin as evidenced by accentuated running noise that over time can cause pump damage, not to mention a degradation of pump performance. As viscosity increases, the suction pressure at which cavitation phenomena begin decreases. In the case of oils with viscosities equal to approximately 500 cSt, the suction pressure must not exceed values of the order of 0.3 - 0.5 bar to avoid triggering cavitation phenomena. The values indicated above refer to the suction of oil that is substantially free of air.

ATTENTION If the oil being pumped is mixed with air, the cavitation phenomena can begin at lower suction pressures.

HOW TO PREVENT CAVITATION It is important to ensure low vacuums at suction mouth by using:
- Short pipes with larger or identical diameter to that recommended
- Reduce bends to the utmost
- Use large-section suction filters
- Use foot valves with minimum possible resistance
- Keep the suction filters clean because, when they become clogged, they increase the resistance of the system.

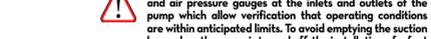
WARNING In any case, for as much as was said above, it is important to guarantee low suction pressures (short hoses and possibly of larger diameter than the inlet opening of the pump, fewer curves, filters of wide cross-section and kept clean).

ATTENTION It is a good system practice to immediately install vacuum and air pressure gauges at the inlets and outlets of the pump which allow verification that operating conditions are within anticipated limits. To avoid emptying the suction hose when the pump is turned off, the installation of a foot valve is recommended.

11.3 MAXIMUM PRESSURE DECREASE

VISCOMAT series pumps are equipped with an adjusting screw to adjust the by-pass valve pressure (pos. 10 in the exploded view). The screw is present in the factory for operating at a maximum pressure that is equal to the maximum counter-pressure conditions indicated in the table under paragraph E - Performance specifications. Should it be necessary to decrease the maximum pressure, unscrew the adjusting screw until you reach the desired value. The flow rate curve will be modified as follows:

As a result, plant specifications being equal the flow rate of the pump will be decreased due to the earlier opening of the by-pass valve.



12 CONNECTIONS

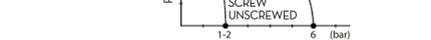
12.1 ELECTRICAL CONNECTIONS

All motors come with a short cable used for production testing. To connect the motor to the line, open the terminal strip cover, remove the above mentioned cable and connect the line according to the following chart.

SINGLE-PHASE MOTORS



THREE-PHASE MOTORS



12 CONNECTIONS

ATTENTION IT IS THE INSTALLER'S RESPONSIBILITY TO CARRY OUT THE ELECTRICAL CONNECTIONS IN COMPLIANCE WITH THE RELEVANT STANDARDS.

WARNING Comply with the following (not exhaustive) instructions to ensure a proper electrical connection:

Single-phase motors are supplied with a bipolar switch and capacitors wired and installed inside the terminal strip box (see chart). The capacitor characteristics are those indicated on the pump label. The switch has the function of starting/stopping the pump and cannot in any way replace the main power switch required by the applicable regulations.

During installation and maintenance make sure that power to the electric lines has been turned off.

- Employ cables characterized by minimum cross-sections, rated voltages and installation type adequate to the characteristics indicated in paragraph ELECTRICAL SPECIFICATIONS and the installation environment.

- For three-phase motors, ascertain the correct rotation direction by referring to paragraph - DIMENSIONS.

- All motors are equipped with a ground terminal to connect to the ground line of the electrical network.

- Always close the cover of the terminals trip box before turning on the electric power, after checking the integrity of the system gasket seals that ensure protection grade IP55.

The capacitor characteristics are those indicated on the pump label. The switch has the only function of starting/stopping the pump and cannot in any way replace the main power switch required by the relevant standards.

ATTENTION Pumps are supplied without electrical safety devices such as fuses, motor protectors, and systems to prevent accidental restarting after periods of power failure or any other kind. It is the installer's responsibility to carry out the electrical connection with respect to the applicable regulations.

12.2 PIPING CONNECTIONS

FOREWORD Before carrying out any connection, refer to the visual indications i.e. arrow on the pump head to identify suction and delivery.

ATTENTION Wrong connection can cause serious pump damage.

PRELIMINARY INSPECTION - Check that the machine has not suffered any damage during transport or storage.
- Clean the inlet and outlet openings, removing any dust or residual packing material.
- Make sure that the motor shaft turns freely.
- Check that the electrical specifications correspond to those shown on the identification plate.

CONNEXION - Make sure that the hoses and the suction tank are free of dirt and filth residue that might damage the pump and accessories.
- Always install a metal mesh filter in the suction hose.
- Before connecting the delivery hose, partially fill the pump body with oil to avoid the pump running dry during the priming phase.

- When connecting pump models with BSP threading (cylindrical gas) do not use joints with a conical thread. Excessive tightening of these could cause damage to the pump openings.

The MINIMUM recommended characteristics for hoses are as follows:

SUCTION HOSE - Minimum nominal diameter: 1"
- Nominal recommended pressure: 10 bar
- Use tubing suitable for functioning under suction pressure.

DELIVERY HOSE - Minimum nominal diameter: 3/4"
- Nominal recommended pressure: 30 bar

ATTENTION The use of hoses and/or line components that are inappropriate for use with oil or have inadequate nominal pressures can cause damage to objects or people as well as pollution. The loosening of connections (threaded connections, flanges, gasket seals) can likewise cause damage to objects or people as well as pollution. Check all of the connections after installation and on a regular on-going basis with adequate frequency.

13 INITIAL STARTUP

AVANT-PROPOS VISCOMAT series pumps are self-priming and, therefore, able to draw oil from the tank even when the delivery hose is empty on start-up. The priming height (distance between the surface of the oil and the inlet opening) must not exceed 2.5 meters.

- Check that the quantity of fluid in the suction tank is greater than the amount you wish to transfer.
- Make sure that the residual capacity of the delivery tank is greater than the quantity that you wish to transfer.
- Make sure that the piping and line accessories are in good condition.

ATTENTION Fluid leaks can damage objects and injure persons. Wetting the Pump. Before starting the pump, wet the inside of the pump body with oil through the inlet and outlet openings.

REMARQUE - Never start or stop the pump by connecting or cutting out the power supply.
- Prolonged contact with some fluids can damage the skin. The use of goggles and gloves is recommended.

The priming phase may last from several seconds to a few minutes, depending on the characteristics of the system. If this phase is excessively prolonged, stop the pump and verify:

- That the pump is not running completely "dry".
- That the suction hose guarantees against air infiltration. And it is correctly immersed in the fluid to be drawn.
- That any filters installed are not blocked.

- That the delivery hose allows for the easy evacuation of the air.
- That the priming height is not greater than 2.5 meters.

When priming has occurred, after reattaching the delivery gun, verify that the pump is functioning within the anticipated ranges, possibly checking:

1 That under conditions of maximum back pressure, the power absorption of the motor stays within the values shown on the identification plate

2 that the suction pressure does not exceed the limits indicated in paragraph CONSIDERATIONS REGARDING SUCTION & DELIVERY LINES.

3 that the back pressure in the delivery line does not exceed the values indicated in paragraph CONSIDERATIONS REGARDING SUCTION & DELIVERY LINES.

14 EVERY DAY USE

FOREWORD No particular preliminary operation is required for every day use of VISCOMAT pumps.

MANUAL OPERATION 1 Before starting the pump, make sure that the ultimate shut-off device (delivery nozzle or line valve) is closed. If the delivery has no shut-off device (free delivery) make sure that it is correctly positioned and appropriately attached to the delivery tank.

