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B MACHINE AND MANUFACTURER IDENTIFICATION

MODEL: VISCOMAT

MANUFACTURER: PIUSI SPA
46029 SUZZARA (MN)

IDENTIFICATION PLATE (EXAMPLE WITH THE FIELDS IDENTIFIED):

PRODUCT CODE	PIUSI SPA 46029 SUZZARA ITALY		CE	PRODUCTION YEAR
	000334000	YEAR 2001		
MODEL	VISCOMAT		TECHNICAL SPECIFICATIONS	MANUAL
	400 V	50 Hz		
	1450 rpm	Condenser: 450 V - 25 µF		
	READ INSTRUCTION M0059			

ATTENTION

Always check that the revision level of this manual coincides with what is shown on the identification plate.

C DECLARATION OF CONFORMITY**DECLARATION OF INCORPORATION**The undersigned **PIUSI S.p.A.**
Via Pacinotti, Z.I. Rangavino
46029 Suzzara (Mantova) – Italy

Declares under its own responsibility that the machine:

VISCOMAT

described below: **Machine for transferring lubricant oil**

is manufactured to be incorporated into a machine or to be assembled with other machinery to build a machine according to the Machine Directive 98/37/CE.

Moreover, we declare that the machinery cannot be put into operation until the machine in which it will be incorporated and of which it will become a component, has been identified and its compliance with the Machine Directive 98/37/CE has been declared.

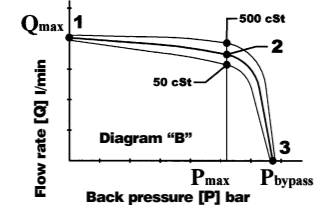
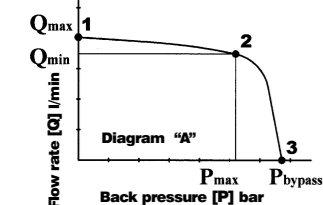
Suzzara 01.09.2005



OTTO VARINI, Chairman
D 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.

E TECHNICAL SPECIFICATIONS**E1 PERFORMANCE SPECIFICATIONS**The performance data provided for the various pump models of the VISCOMAT family can be illustrated with curves that show the relationship between the **flow rate** supplied and the **back**pressure that the pump must overcome. Diagram "A" illustrates a **flow rate/back pressure curve** typical of all of the pumps in the VISCOMAT family.Point "1" is the point at which the pump is functioning with practically no back pressure, in which case the pump supplies the maximum flow rate (Q_{max}).Point "2" is the functioning point characterized by the maximum back pressure (P_{max}) at which the pump supplies the minimum flow rate (Q_{min}). When the back pressure exceeds the value P_{max} , thanks to the special design of the by-pass, there is a sudden opening of the by-pass, with a consequent sudden reduction of the flow rate supplied.At flow rate zero (point "3") the entire flow rate supplied by the pump is recirculated in the by-pass, and the pressure in the delivery line reaches the value of $P_{by-pass}$.VISCOMAT pumps can, therefore, function in the face of any back pressure between zero and P_{max} , supplying a flow rate varying little as a function of the back pressure between the values of Q_{min} and Q_{max} . The values for Q_{min} , Q_{max} and $P_{by-pass}$ are provided for each model of pump in the Table below:

PUMP MODEL	BY PASS Condition		Max. back pressure condition		Max. flow rate condition	
	D (l/min)	P (bar)	D (l/min)	P (bar)	D (l/min)	P (bar)
VISCOMAT 70 M	0	7,5	26	6	30	1
VISCOMAT 90 T	0	6	50	5	55	1
VISCOMAT 70 100/50	0	6,5	28	4,5	30	1
VISCOMAT 70 100/60	0	5	26	3,5	36	1
VISCOMAT 70 110/50	0	7,5	26	6	30	1
VISCOMAT 70 110/60	0	5	26	3,5	36	1
VISCOMAT 90 230/50	0	6,5	35	2,5	40	1
VISCOMAT 90 230/60	0	7,5	40	3	47	1

VISCOMAT pumps can pump oils of very different viscosities, within the limits indicated in the TECHNICAL SPECIFICATIONS, without requiring any adjustment of the by-pass. The characteristic flow rate/back pressure curve illustrated in diagram "A" relates to functioning with oil of a 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. Diagram "B" illustrates how the characteristic curve changes in the case of the maximum and minimum viscosities (respectively equal to 50 cSt and 500 cSt), showing that, at the maximum working back pressure (P_{max}), the flow rate Q_{min} suffers a variation of between 10% and 15% with respect to the value relative to a viscosity of 110 cSt.

PUMP MODEL	ELECTRICAL POWER			POWER (Watt)	CURRENT (Amp)	SPEED (rpm)
	Current	Voltage (V)	Frequency (Hz)			
VISCOMAT 70 M	AC	230	50	750	4,6	1400
VISCOMAT 70 T	AC	400	50	750	2,2	1450
VISCOMAT 90 T	AC	400	50	2000	5	1450
VISCOMAT 70 100/50	AC	100	50	300	10,5	1450
VISCOMAT 70 100/60	AC	100	50	1100	13	1700
VISCOMAT 70 110/50	AC	110	50	1200	12,7	1450
VISCOMAT 70 110/60	AC	110	50	1200	12,6	1700
VISCOMAT 90 230/50	AC	230	50	1200	6	1400
VISCOMAT 90 230/60	AC	230	60	1500	7,7	1650

ATTENTIONThe 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 P_{max} with oils of a viscosity equal to approximately 500 cSt.**F OPERATING CONDITIONS****F1 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.

F2 ELECTRICAL POWER SUPPLY

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 E2 - ELECTRICAL SPECIFICATIONS.

The maximum 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 outside the indicated limits can damage the electrical components.

F3 WORKING CYCLE*The motors are intended for continuous use.*

Under normal operating conditions they can function continuously with no limitations.

ATTENTION

Functioning under by-pass conditions is only allowed for brief periods of time (2-3 minutes maximum).

Whenever a particular installation carries the risk of functioning in by-pass mode for longer periods of time, it is necessary that the by-passed flow not be recirculated inside the pump, but be returned to the suction tank.

F4 FLUIDS PERMITTED / FLUIDS NOT PERMITTED**PERMITTED:**

- OIL with a VISCOSITY from 50 to 500 cSt (at working temperature)

NOT PERMITTED:

- GASOLINE
- INFLAMMABLE LIQUIDS with PM < 55°C
- WATER
- FOOD LIQUIDS
- CORROSIVE CHEMICAL PRODUCTS

RELATED DANGERS:

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

G MOVING AND TRANSPORTGiven the limited weight and size of the pumps (see paragraph R - DIMENSIONS AND WEIGHTS), **moving the pumps does not require the use of lifting devices.**

The pumps were carefully packed before shipment. Check the packing material on delivery and store in a dry place.

SUCTION

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.

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

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).

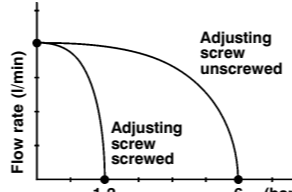
ATTENTION

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.

H6 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 pre-set in the factory for operating at a maximum pressure that is equal to the maximum counter-pressure conditions indicated

in the table under paragraph E1 - 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:

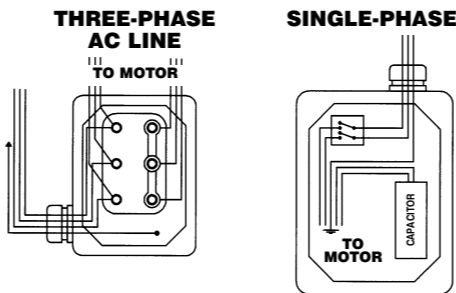


As a result, plant specifications being equal, due to the earlier opening of the by-pass valve, the flow rate of the pump will be decreased.

H7 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 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.

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.

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

- 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 E2 - ELECTRICAL SPECIFICATIONS and the installation environment.
- For three-phase motors, ascertain the correct rotation direction by referring to paragraph R - DIMENSIONS AND WEIGHTS.
- All motors are equipped with a ground terminal to connect to the ground line of the electrical network.
- Always close the cover of the terminal strip box before turning on the electric power, after checking the integrity of the gasket seals that ensure protection grade IP55.

I INITIAL START-UP

VISCOMAT series pumps are self-priming and, therefore, able to draw oil from the tank even when the suction 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.

ATTENTION

Wetting the Pump. Before starting the pump, wet the inside of the pump body with oil through the inlet and outlet openings.

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 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:

- that under conditions of maximum back pressure, the power absorption of the motor stays within the values shown on the identification plate
 - that the suction pressure does not exceed the limits indicated in paragraph H5 - CONSIDERATIONS REGARDING SUCTION & DELIVERY LINES.
 - that the back pressure in the delivery line does not exceed the values indicated in paragraph H5 - CONSIDERATIONS REGARDING SUCTION & DELIVERY LINES.
- For a complete and proper verification of points 2) and 3), the installation of vacuum and air pressure gauges at the inlet and outlet of the pump is recommended.

L DAILY USE

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

MANUAL OPERATION

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.

- turn the on-switch present on some pump models (single-phase) or the start/stop switch installed on the electrical power line.
- make sure that the tank is filled with a quantity of oil greater than the quantity to be supplied (running dry could damage the pump).

ATTENTION

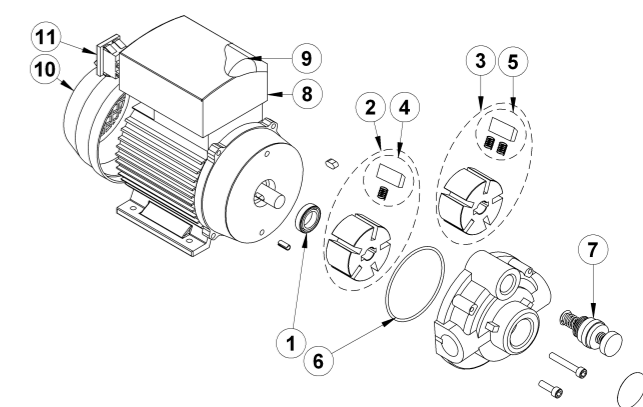
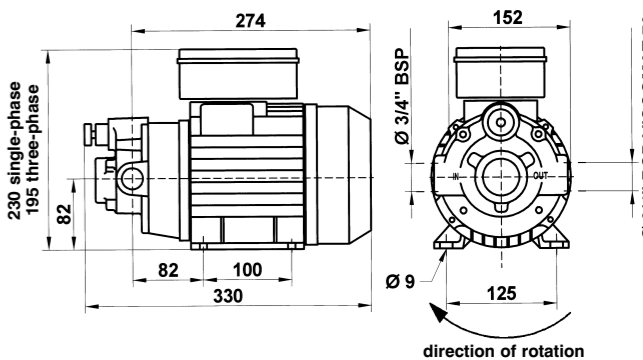
Never start the pump by simply inserting the plug in the outlet

- Open the delivery valve or activate the delivery gun, gripping it securely.

ATTENTION

Fluid exits at high pressure from a delivery gun fed by a VISCOMAT pump. Never point the outlet of the gun towards any part of the body.

- Close the delivery gun or the line valve to stop delivery. The pump will immediately enter by-pass mode.

ÜBERSICHTSBILDTAFELN**S DIMENSIONS****RAUMBEDARF****ATTENTION**

Running in by-pass mode with the delivery closed is only allowed for brief periods (2 to 3 minutes maximum).

When the thermo-protector trips, turn-off the electric power and wait for the motor to cool.

- Stop the pump.

AUTOMATIC OPERATION

In certain applications it can be advantageous to provide for the automatic starting/stopping of the pump by means of a pressure switch that monitors the pressure of the delivery line. The functional logic of this type of installation is as follows:

- the pump is stopped, the delivery gun is closed and the delivery line is under pressure.
- the delivery gun is then opened, with the consequent sudden lowering of pressure in the delivery line.

- the pressure switch, at the moment that the pressure drops below the value "Pm" automatically starts the pump allowing delivery.
- during delivery the pump delivers against a back pressure that, depending on the conditions of the delivery line, could turn out to be higher or lower than the pressure "Pm".
- at the moment the delivery gun is closed, the pressure will increase rapidly and the pressure switch, at the moment in which the pressure exceeds the value "Pa" will automatically stop the pump.

The values of "Pa" and "Pm" are characteristics of the pressure switch used and are often adjustable within a certain range.

For the safe and proper functioning of the pump in these types of applications it is absolutely indispensable to make sure that:

- "Pa" is sufficiently lower than the by-pass pressure, to assure that the pump will stop as soon as the gun is closed and that the pump will not run a long time in by-pass mode.
- "Pm" is several bar lower than "Pa" to avoid the pump starting when not wanted due to small pressure drops not caused by opening the gun.
- the foot valve guarantees an effective seal, to avoid frequent unwanted cycling on and off caused by its leakage.
- whenever the system is entirely composed of metal tubing, or, at any rate, of highly rigid tubing, one should consider installing an accumulator capable of preventing small leaks (from the foot valve, for example) from causing a pressure drop sufficient to automatically start the pump.

ATTENTION

Failure to comply with the above can damage the pump.

M PROBLEMS AND SOLUTIONS

Problems	Possible cause	Corrective action
THE MOTOR IS NOT TURNING	Lack of electric power	Check the electrical connections and the safety systems.
	Rotor jammed	Check for possible damage or obstruction of the rotating components.
	The motor protecting thermal switch has tripped	Wait until the motor cools, verify that it starts again, look for the cause of overheating.
THE MOTOR TURNS SLOWLY WHEN STARTING	Motor problems	Contact the Service Department
	Low voltage in the electric power line	Bring the voltage back within the anticipated limits
	Excessive oil viscosity	Verify the oil temperature and warm it to reduce the excessive viscosity
LOW OR NO FLOW RATE	Low level in the suction tank	Refill the tank
	Foot valve blocked	Clean and/or replace the valve
	Filter clogged	Clean the filter
	Excessive suction pressure	Lower the pump with respect to the level of the tank or increase the cross-section of the tubing
	High loss of head in the delivery circuit (working with the by-pass open)	Use shorter tubing or of greater diameter
	By-pass valve blocked	Dismantle the valve, clean and/or replace it
	Air entering the pump or the suction tubing	Check the seals of the connections
	A narrowing in the suction tubing	Use tubing suitable for working under suction pressure
	Low rotation speed	Check the voltage at the pump. Adjust the voltage and/or use cables of greater cross-section
	The suction tubing is resting on the bottom of the tank	Raise the tubing
INCREASED PUMP NOISE	Excessive oil viscosity	Verify the oil temperature and warm it to reduce the excessive viscosity
	Cavitation occurring	Reduce the suction pressure (see paragraph H5)
	Irregular functioning of the by-pass	Dispense fuel until the air is purged from the by-pass system
LEAKAGE FROM THE PUMP BODY	Presence of air in the oil	Wait for the oil in the tank to settle
	Damage to the mechanical seal	Check and replace the mechanical seal

N MAINTENANCE

VISCOMAT series pumps are designed and constructed to require a minimal amount of maintenance.

- On a weekly basis, check that the tubing joints have not loosened, to avoid any leakage.
- On a monthly basis, check the pump body and keep it clean of any impurities.
- On a monthly basis check and clean the filters placed at the pump inlet.
- On a monthly basis, check that the electric power supply cables are in good condition.

O NOISE LEVEL

Under normal operating conditions noise emission for all models does not exceed the value of 70 dB "A" at a distance of 1 Meter from the electric pump.

P DISPOSING OF CONTAMINATED MATERIALS

In the case of maintenance or destruction of the machine, do not disperse contaminated parts into the environment. Refer to local regulations for their proper disposal.

Q DISPOSAL

The components must be given to companies that specialise in the disposal and recycling of industrial waste and, in particular, the DISPOSAL OF PACKAGING. The packaging consists of biodegradable cardboard which can be delivered to companies for normal recycling of cellulose.

DISPOSAL OF METAL COMPONENTS