Sumo Pump

Modular electric pump

Version in compliance with Directive CE 94/9 (ATEX)

User and Maintenance Manual

Original text translation

CONTENTS

CE Ex II 2GD ck IIC T100 °C IP65

Manual compiled in accordance with Directive CE 06/42

C2137IE – WK 15/19

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1. INTRODUCTION

This user and maintenance manual relates to the **Sumo Pump,** version in compliance with ATEX standards. The Sumo Pump allows oil and grease to be distributed within lubrication systems at pressures of up to 400 bar (5880 psi). The latest version may be obtained from Dropsa Sales Office, or by consulting our web site http://www.dropsa.com**.**
The instructions in this manual must be studied and carried out by qualified personnel basic hydraulic and electrical knowledge. A detailed understanding of concepts and working practices for ATEX systems and hazardous area is necessary.
This user and maintenance manual contains important information about protecting the health and safety. You must read and look after it carefully, making sure that it is available at all times for any operators that may need to consult it.

2. GENERAL DESCRIPTION

The Sumo series of lubrication pumps offers flexible configuration options and is therefore well suited to many uses in lubrication systems. This can be achieved easily, by adding a number of accessories and components which can be assembled at any time onto the pump unit.
This Pump consists of the following:

- Electric motor
- Pump body manifold with integrated pressure adjustment (bypass) and instrumentation
- Two pumping elements
- Reservoir
- Dual Line Pressure inverter valve

There is only one bearing and cam structure for all versions that operate the dual pumping modules.
The pump unit possesses one single output, because the deliveries from the two pumping elements flow into a manifold unit that sums the output from both pump modules. This offers redundancy should one pumping module fail, for example due to contamination in the grease damaging the pump bore.
Two types of tank for grease and oil with different volumes (of 30 or 100 kg) with stirring paddle and level indicators are available.
The pump can be controlled manually, via customer PLC or with the addition of a Dropsa Control system according to the system in use.
Custom designed units are available included built in electronic or electrical control systems (eg see fig.2.2). If you have such a unit you should refer to the Pump drawing supplied with the unit that will outline the customization and the wiring information if required.
The Sumo electric pump is fully protected against the external environment and can operate without difficulty under the most severe environmental conditions. The SUMO Atex Pump has been designed for use in particularly harsh environments (such as off-shore and marine applications) and can be operated in hazardous areas subject to verification of correct zone classification and requirements. The Pump manifold body, pump modules and directional reversing valves are made in Stainless Steel 316L . Other external parts exposed to corrosive atmosphere are painted with high grade paint typically used on marine applications. The pump is shipped on a stainless steel base structure which is also used to connect terminal wiring box support and lifting lugs.

Figure 2.1

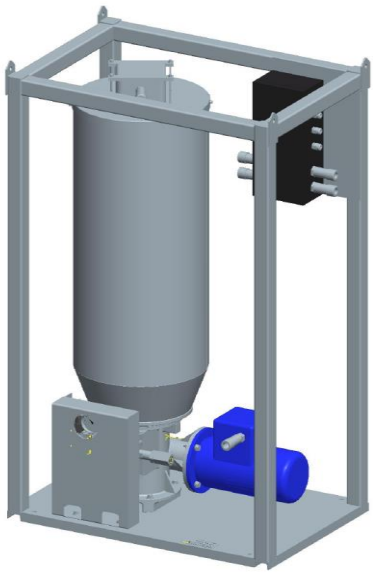
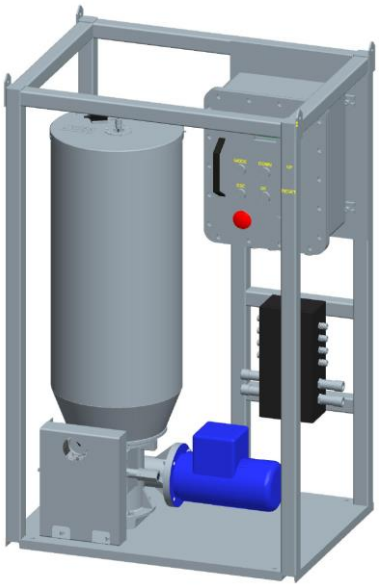


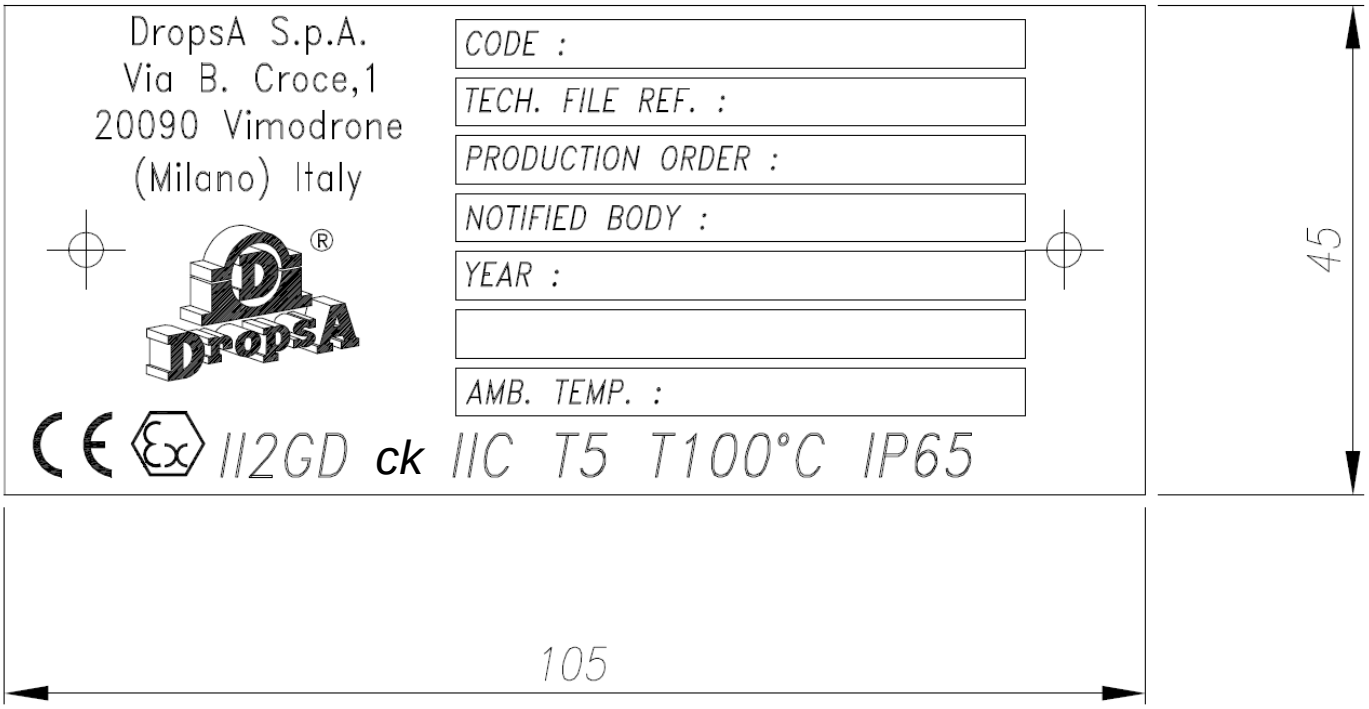
Figure 2.2



3. IDENTIFICATION OF THE MACHINE AND MARKING

On the front part of the pump tank there is a plate which indicates the product code, the supply voltage and basic characteristics.
On the pallet there is the plate refers at the ATEX marking (Figure 3.1)

Figure 3.1



3.1 ATEX Information

II	Group of equipment for surface (not for mines or underground)
2GD	equipment for explosive atmosphere due to flammable gas and combustible dust. 2GD Category is appropriate for zones classified as 1 zone (2 zone included) and 21 zone (22 zone included).
c	Protection mode designed for the method of construction (EN 13463-5 normative).
k	Protection mode designed by oil immersion (EN 13463-8 normative).
IIB+H2	Group of flammable gas allowed IIB with hydrogen (IIA group gas included)
T5	Max. surface temperature for flammable gas

T 100 °C Max. surface temperature for combustible dust

IP65	Protection grade (view note)

Note : IP65 protection grade is referred to electric parts. Not electric parts are protected from combustible dust by the type of process that provides for the continued presence of oil and grease on the mechanical ignition sources.

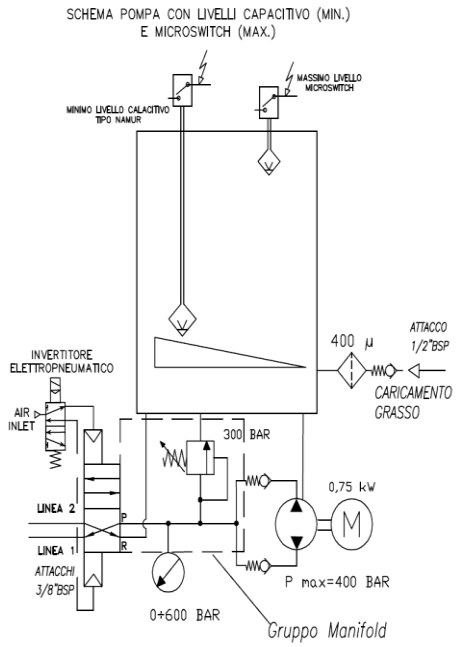
4. TECHNICAL CHARACTERISTICS

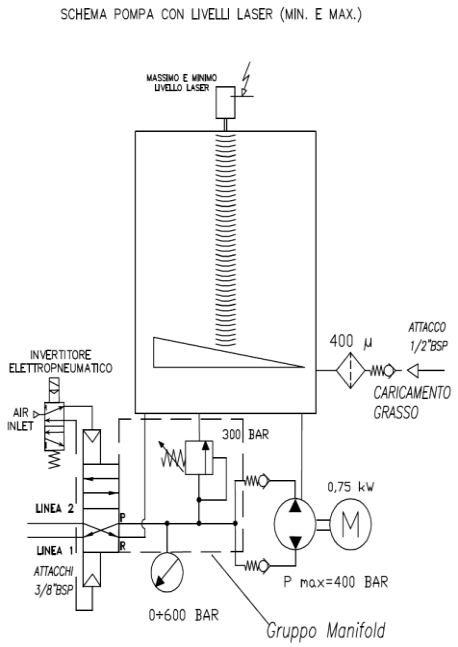
The pump consists of a series of components with the following characteristics:

Technical characteristics	
Max. pressure	400 bar
Outlet delivery	400 cm^3 / min (24 cu. in/min) (2 x 200 cm^3 (12 cu. in) pumping modules)
Working temperature	from - 5° C to + 50° C (from 23° F to +122° F)
Working humidity	90% max
	Grease Lubricants
Viscosity at working temperature	NGLI 2 Max.
Degree of protection	IP65
Electric motor	Three phase Power 0.75kW Protection IP55 class B Voltage: 230-400 Volt ± 5% 50 Hz 240-440Volt ± 5% 60 Hz S1 continuous service.

WARNING: **do not supply the machine with voltages and pressures different from those indicated on the plate.**

4.1 HYDRAULIC FUNCTION DIAGRAM





5. PUMP COMPONENTS AND ELECTRICAL CONNECTIONS

5.1 FIXED DELIVERY PUMPING ELEMENTS

The pump has two fixed delivery standard pumping elements (200 cm^3/ min for each pumping element). A piston slides inside the body of the pumping element that is matched by a high precision honing process. The seal between the piston and the pumping body is of a dry type, with no gasket provided between the two. The pumping element retention valve is of the tapered seal type. This solution is able to guarantee an optimum seal for the system at high operating pressures (max. pressure of 400 bar). The pumping elements are assembled on the manifold unit with a threaded attachment, which facilitates its assembly/ dismantling.

5.2 WORM WHEEL UNIT

The pump has endless screw-worm wheel kinematic mechanism with a transmission ratio of 1/40. The screw is made from special steel with high mechanical resistance, which gives it optimum flexible rigidity. To guarantee high resistance to wear, the screw has been subjected to Tenifer wear-resistant treatment. The screw is supported by oblique contact ball bearings, duly preloaded, to reduce working clearance. The worm wheel is made of bronze alloy for gear systems, particularly suitable for making the pump run quietly. The worm wheel shaft is made of special high resistance steel which gives the pump better reliability and durability.

5.3 INVERTORS

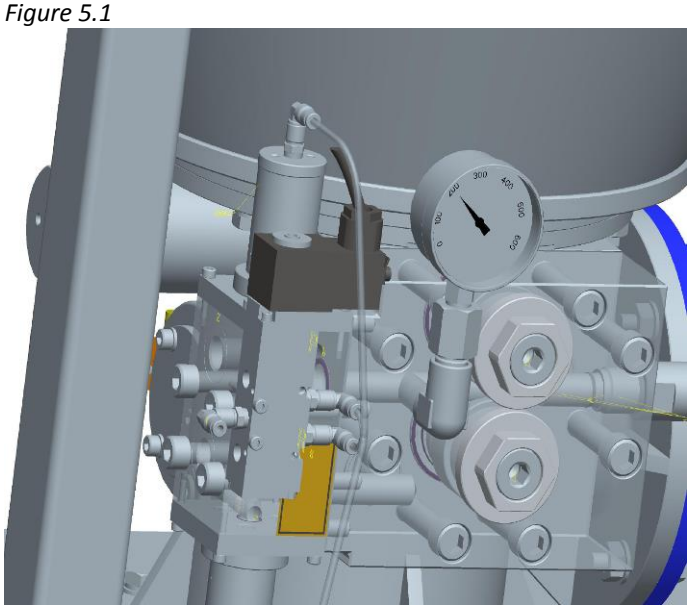
Code	Description
0083470	Electro pneumatic inverter 24V DC
0083471	Electro pneumatic inverter 24V AC
0083472	Electro pneumatic inverter 110V AC
0083473	Electro pneumatic inverter 230V AC

Spare parts	
Code	**Description**
3150108	ATEX coil EExm 24 V DC
3150109	ATEX coil EExm 24 V AC
3150110	ATEX coil EExm 110 V AC
3150111	ATEX coil EExm 230 V AC

GENERAL NOTE FOR ALL INVERTERS: It is advisable to plan a delay in the de-energizing of the electromagnets from 2 ÷ 5 sec. to allow complete inversion in relation to the closing time of the pressure gauge at the end of the line.

5.3.1 General characteristics

Figure 5.1



The main parts of the device are:

- An AISI 316L distribution central body with a steel piston with antiwear treatment.
- two simple effect pneumatic actuation cylinders, controlled by a 5/ 2 type electro valve with certificate explosive environment coil..
- electro valve with air inlet Ø4 tube. Inlet air pressure must be:5÷7 bar.

Spare electro valves	
Code	**Description**
3155222	Solenoid 5/2

5.4 PRESSURE CONTROL VALVE MOUNTED ON THE PUMP

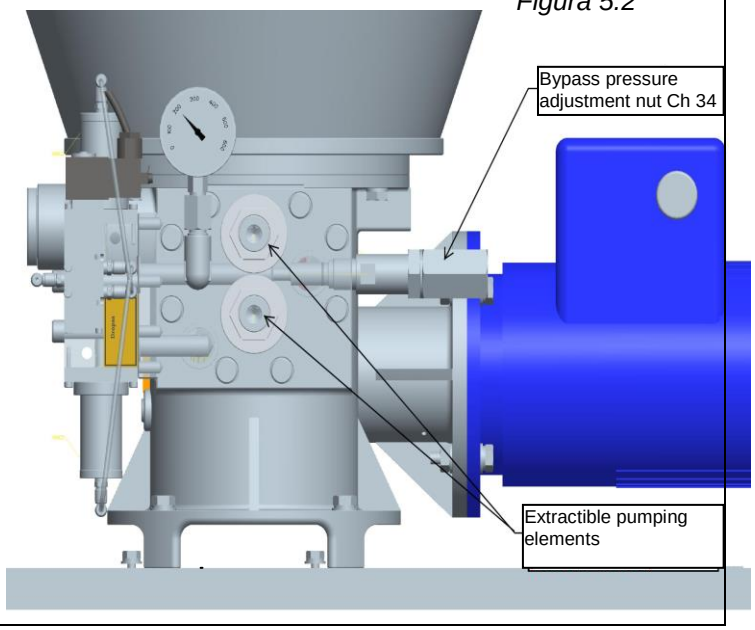
Pump group unit

The pump has a AISI 316L pressure control valve, mounted on the manifold unit on the right side of the pumping elements. The valve can be easily dismantled for inspection if required. It is calibrated by turning the bypass pressure adjustment nut:

- clockwise (increase of pressure)
- anticlockwise (decrease of pressure)

Once the bypass has been calibrated, the position of the pressure adjustment nut is locked using a lock nut. It is important to bear in mind that line inversion is controlled by closing the contacts of the pressure switch. Adjusting the pressure switch provides an operating pressure which is lower than the maximum pressure controlled by this valve.

Figura 5.2



Code	Description
3191323	Pressure 100 ÷ 450 bar (1470 ÷ 6615 psi)
3191324	Pressure 50 ÷ 200 bar (735÷ 2940 psi) on request

5.5 MAXIMUM AND MINIMUM GREASE LEVEL INDICATORS

Standard pumps have two types of level:

- Laser (for minimum and max level) on the standard version

In alternative

- capacitive level (for the minimum level)
- Float with microswitch (for the maximum level)

Code	Description
0295145	Laser level kit , 30 kg tank, cover Exd (Minimum and Maximum)
0295105	Laser level kit ,100 kg tank, cover Exd (Minimum and Maximum)
0295165	Exi Capacitive level kit (Minimum)+Microswitch Exd (Max) 30 Kg
0295155	Exi Capacitive level kit (Minimum)+Microswitch Exd (Max) 100 Kg

5.5.1 Laser Probe

Located inside the ExD enclosure the laser level kit optical sensor with connector provides a distance readout that equates to the quantity of grease in the reservoir. It has a alphanumeric display with four positions and can be programmed to read a distance of up to 10m using the four programming keys.

5.5.2 Minimum capacitive level

The minimum level is produced by a capacitive probe, positioned on the end of a pipe mounted on the tank cover. The capacitive probe is normally closed. When it reaches the minimum level the probe indicates a lack of lubricant. To make the solution valid for NLGI2 grease as well, the capacitive probe interfaces with the scraper whose function is to clean the lower face of the grease probe. If the capacitive probe is replaced then it must be recalibrated (see calibration procedure).
The minimum level contact is indicated by a light signal on the control panel. In addition it controls any command for the pump to automatically refill the tank.

5.5.3 Maximum level with microswitch

The phase for loading the lubricant into the tank is carried out by the operator, with an appropriate pump. Once the maximum level of lubricant has been reached, the small rod which indicates that the tank is full intervenes.

5.6 STIRRING PADDLE FOR GREASE

Two tanks are provided with capacity of 30 and 100 kg. (66.1 – 220.4 lb).
The tanks have a stirring paddle and scraper as standard, and they must not be dismantled when they are being assembled and replaced. Under the stirring paddle a galvanized steel mesh with 0.5 mm holes (0.02 in.) is provided as standard. In this way the pump is protected from any foreign bodies which might be inadvertently present during the tank refilling process.

5.7 PRESSURE GAUGE

The pressure gauge is of the glycerine filled type, so it is protected from any pressure leaks which might damage its functioning. It is mounted directly in the manifold group (positioned on the front of the pump).

Code	Description
3292154	Pressure gauge 0÷600 bar (0÷8820 psi) Ex II 2 GD c

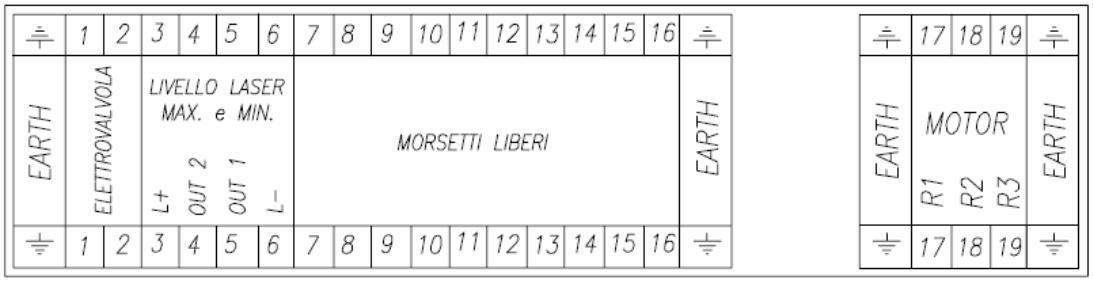
5.8 ELECTRICAL CONTROL PANEL

On the pallet structure is a increased safety terminal box that contains a terminal board to connect the electrical components of the Sumo Atex assembly (Motor, valves, level indicators, etc)

Code	Description
1525267	Polyester Cover Exe with terminal board

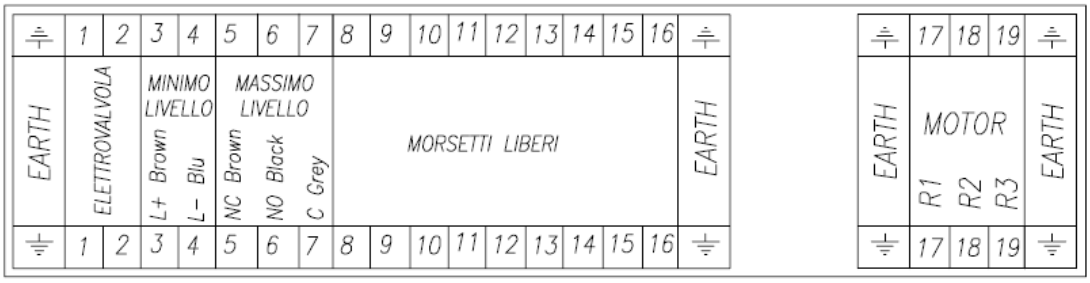
In figure 5.3 you can see the electrical connections of the standard model. (See Cap.11 Information about ordering)

Figure 5.3



In figure 5.4 you can see the electrical connections of the alternative model. (See Cap.11 Information about ordering)

Figure 5.4

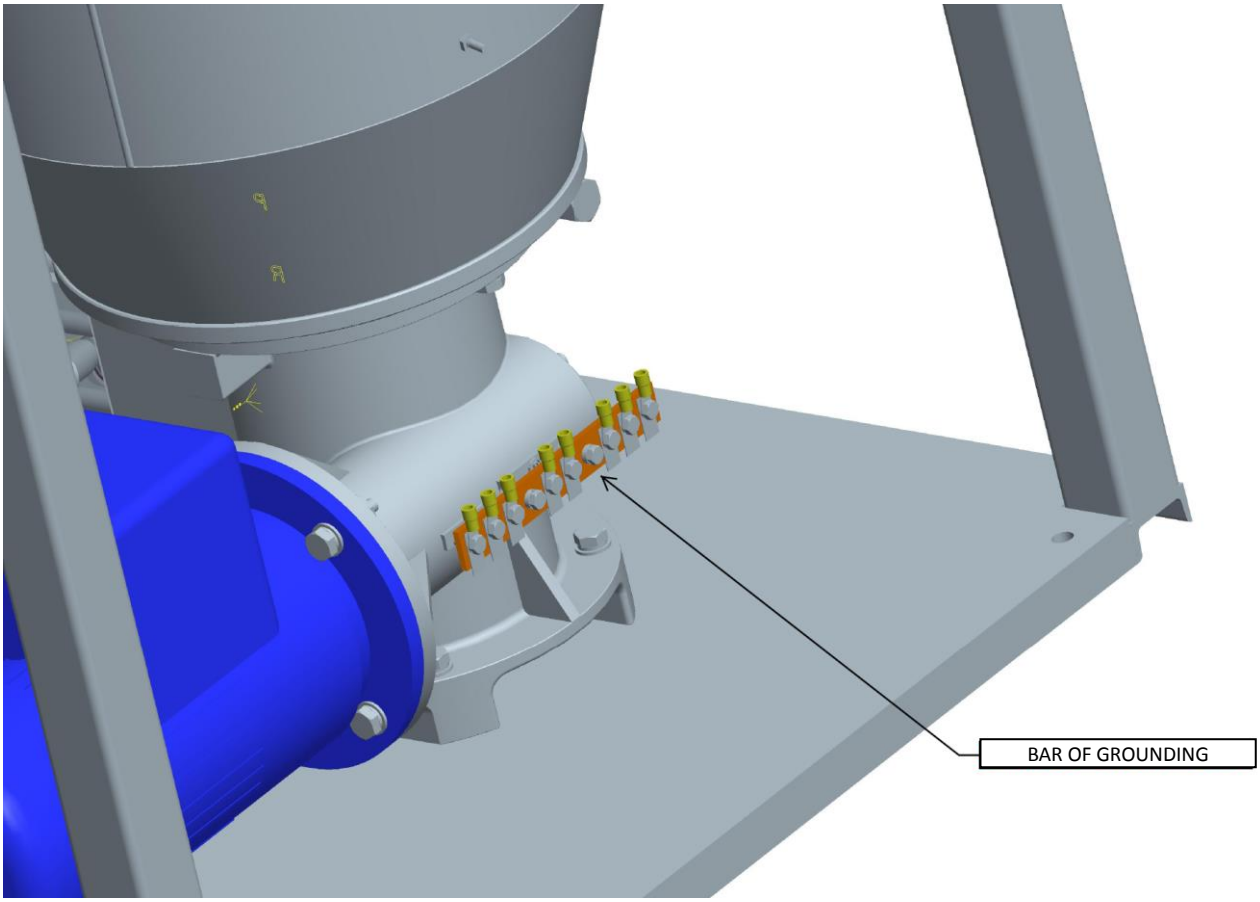


WARNING: the distance of path in air trough terminal insulating surfaces at 15 and 16 Intrinsic Security (capacitance sensor at Intrinsic Security) must be greater than 50mm from other terminals/circuits.

5.8 EARTH CONNECTIONS

In the 5.5 figure is underline the positioning of the bar of grounding
For a complete vision refer to assembly design

Figure 5.5



6. UNPACKING AND INSTALLATION

WARNING: **The unit is only to be opened and repaired by specialist personnel.**

No pump assembly operations are envisaged. The pump is fixed on a metal pallet, which allows safe handling using a transpallet or forklift truck. This pallet has been designed so that it can be installed in the installation, being equipped with 4 (four) holes of Ø 14 mm suitable for fixing to the floor. Provide adequate space (as shown on the installation diagram) to avoid abnormal posture or possible impact. Then, as described previously, the pump must be connected hydraulically to the machine and then connected to the control panel.

7. INSTRUCTIONS FOR USE

7.1 GOING INTO OPERATION

Damage to the supply cable and housing may involve contact with live parts at high voltage and consequently fatal danger:

- Check the integrity of the supply cable and the unit prior to use;
- If the supply cable or the unit is damaged, do not start up the system!
- Replace the damaged supply cable with a new one;
- The unit can be opened and repaired only by specialist personnel;
- In order to prevent the danger of electrocution due to direct or indirect contact with live parts the electric supply line must be adequately protected by an appropriate magneto thermal differential switch with threshold of intervention of 0.03 ampere and max intervention time of 1 second;
- The *interruption power of the switch must be* $\leq$ 10 *kA and rated current In = 6 A.*
- The pump must not be used when submerged in fluids or in a particularly aggressive or explosive/inflammable atmosphere unless prepared in advance for this purpose by the supplier;
- to fix the pump correctly check the pitch dimensions shown in the figures in chapter 12;
- Use safety gloves and goggles as indicated in the safety sheet for the lubrication oil;
- Do NOT use lubricants which are aggressive towards NBR gaskets, and if in doubt consult the Dropsa SpA technical office which will supply a detailed list of the recommended oils;
- Do not ignore dangers to health and comply with health and safety regulations;
- Warning! All the electric components must be earthed. This applies to both the electric components, and to the control devices. To this end make sure that the earth wire is connected correctly. For safety reasons the earth conductor must be approximately 100 mm longer than the phase conductors. If the cable is accidentally removed, the earth terminal must be the last one to be removed.

7.2 ACTION TO BE TAKEN BEFORE START-UP.

- Check the integrity of the pump.
- Refill the tank with suitable lubricant.
- Check that the pump is at working temperature and that there are no air bubbles in the pipes.
- Check that the electric connection has been carried out correctly.

7.3 USE.

- check the data sets imposed.
- press the start button on the machine to which the Sumo pump is connected.
- check pump start-up.
- check that the machine is adequately lubricated (if there are still some doubts about its correct functioning you can contact the Dropsa S.p.A Technical Office and request a test procedure).
- check that the direction of rotation of the electric motor is the one indicated by the indicator arrow, positioned on the protective housing of the motor fan;
- check that the hydraulic connection is correct.

7.4 ADJUSTMENT/ CALIBRATION OF LEVEL PROBES

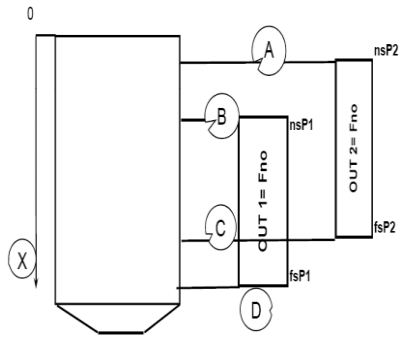
7.4.1 Pressure

It is possible to adjust working pressure by rotating the bypass screw clockwise to increase pressure or anticlockwise to reduce pressure. During this operation pay attention to the pressure gauge positioned on the edge of the pump.

7.4.2 Procedure for calibrating the laser probe

The laser probe possesses a representative and programming display mounted on board. It is possible to operate in analogue mode (with signal from 4 to 20 mA) or in digital mode (two outputs and four intervention thresholds).
We attach a table showing the calibration parameters for the laser probe, for 30 and 100 kg tank

Figure 3



LASER PROBE CALIBRATION							
				Serbatoio 30 kg		Serbatoio 100 kg	
Pos.	**Level**	**Output signal**	**set-up**	**height X [mm]**	**Quantity of grease [kg**	**height X [mm]**	**Quantity of grease [kg]**
A	Maximum absolute level	OUT 2= Fno	nsP2	200	22	200	81
C	Minimum level		fsP2	370	11	700	25
B	Maximum level	OUT 1= Fno	nsP1	230	20	230	78
D	Minimum absolute level		fsP1	420	8	800	14

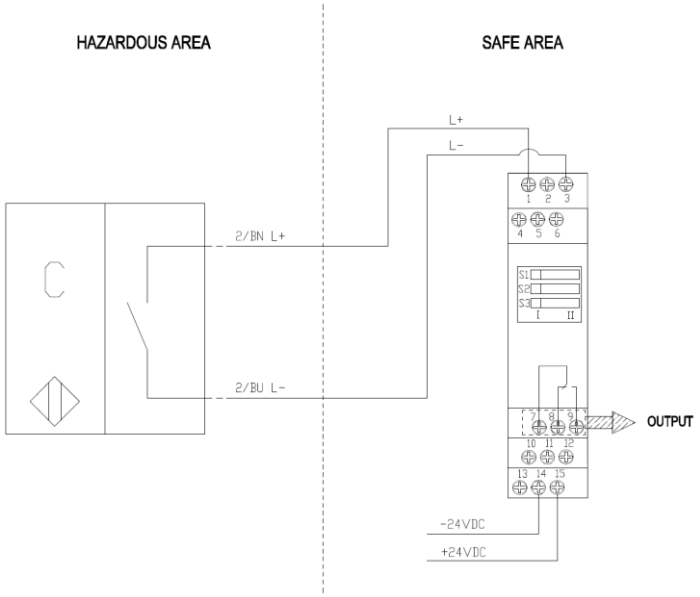
NOTE: **In the 30 kg pump tank at minimum absolute level there is still a reserve of 7 kg**.

In the 100 kg pump tank at absolute minimum level there is still a reserve of 15 k.g

7.4.3 Capacitive probe

The capacitance level probe has a Namur NO Type Intrinsically safe capacitance sensor : II 1G EEx ia IIC T6.

Figure 4 (electric connection)



WARNERING: The level probes do not have to be in some way tampered with from the user. They are not therefore possible repairs or variations of calibration of the same probes. For any information, to contact the technical office/trades them of the Dropsa SpA.

8. PROBLEMS AND SOLUTIONS

Below is a diagnostic table showing the main faults, the probable causes and the possible solutions.
In the event of doubts and/or problems which cannot be solved, do not proceed to look for the fault by dismantling parts of the machine, but contact the Dropsa Technical Office.

Fault	Cause	Solution
The electric pump is not delivering any lubricant.	The electric motor is not functioning.	Check the connection between motor and electric supply line. Check the motor winding. Check that the connection plates for the motor terminal box are positioned in accordance with the supply voltage.
	The tank is empty.	Fill the tank. N.B.: If the tank was emptied without the electric signal for reaching the minimum level being given, the minimum level contact must be checked.
	The pump is not triggered. Causes of the pump's failure to trigger: • The motor is turning in an inverted direction (clockwise); • The motor is turning in the right direction but the stirring paddle is not turning; • Presence of air bubbles in the lubricant.	Remove the cover from the tank and check that the stirring paddle is turning anticlockwise and that the lubricant is moving; if not invert two of the three motor phases. See above. Remove the pump delivery pipe and drain off the lubricant until the air bubbles have been eliminated.
	The pressure adjustment valve (bypass) has been calibrated at too low a value Presence of dirt in the non-return valve.	
The pump will not go under pressure.	Possible dirt on the cone of the pump stop valve	Clean the cone and the pumping element stop valve housing, draining off the lubricant.
	Internal gasket between pumping element and manifold unit broken.	Replace the gasket (code 3190489).

Fault	Cause	Solution
No signal indicating minimum level when there is no lubricant in the tank.	Incorrect adjustment of minimum level.	Check the correct functioning of the level probe in the following way: Dismantle the minimum level unit and recalibrate the capacitive probe.
Selection of minimum level, with lubricant below the minimum and pump working.	Incorrect adjustment of minimum level.	The light on the control panel is still on: check the electric connection and, if necessary, replace the capacitive probe.
Lubrication installation accessories		
METERING UNIT AG6 Alarm signal indicating non-delivery of lubricant. The small rods visible inside the metering unit turrets must move sequentially up and down and activate the control microswitch when the pump is working. If this is not the case the two outlets or the single outlet of that metering unit will not deliver lubricant.	Metering unit small piston jammed. Piping between metering unit outlet and point requiring lubrication obstructed. Pressure on the line too low (the lubricant is not delivered by any outlet or only by a few outlets). Metering unit arranged for two outlets by used for only one outlet.	Replace the metering unit with another one having the same characteristics. However it is advisable to make sure that the metering units have been correctly assembled, particularly with regard to fixing. Over-locking of the fixing screws may damage the metering unit and cause the small piston to jam. Remove the outlet pipe and check to see if the metering unit is delivering lubricant. Change the pressure control valve adjustment (bypass) or the adjustment of the control pressure gauge (and of line). Check that, when one single outlet is used, the right pad is assembled and that the other outlet is sealed. See instruction sheet for AG6 metering units.
END OF LINE PRESSURE GAUGE The pressure gauge is not sending the signal to the electric command and control panel. The pressure gauge sends the signal before the end of the lubrication cycle.	Electrical connection incorrect. Incorrect adjustment of the control pressure gauge. The pressure value set is too high and the pressure adjustment valve (bypass) intervenes before the pressure gauge can be activated. Incorrect adjustment of the control pressure gauge. The pressure value set is too low.	Check the electrical connection. Reduce the pressure gauge calibration pressure until an electrical contact is obtained. Increase the pressure gauge calibration valve. The optimum calibration value is the one which allows a pressure of 50-70 bar (735 – 1029 psi) at the end of the lubrication line.

9. MAINTENANCE PROCEDURES

Use the individual protective devices needed to avoid contact with mineral oil or grease.

Regular inspection
The following regular checks must be carried out:

Check	
the lubrication status	1000 hours
Cleanliness of the loading and suction filter	4000 hours
Clamping cable gland *	4000 hours
Cables and wiring integrity	4000 hours
Secure connection to ground	4000 hours
Bearing s motor	3 years

*For M16x1.5 cable gland (Cod. 39384), clamp to 10 Nm.
For M20x1.5 cable gland (Cod. 75053), clamp to 12 Nm.

The machine does not require any special equipment for any checking and/or maintenance activity, however the recommendation is to use suitable equipment which is in a good condition in order to avoid causing damage to persons or machine parts (according to current regulation).
If necessary clean the tank paying due attention (when the machine is off and without it being possible to restart it).
Remember to reseal the tank once the operation has been completed.

Make sure that the electric and hydraulic supply has been disconnected before carrying out any maintenance intervention.

WARNING: **In case of motor broking is necessary send it to Dropsa for repairing. For further information contact Dropsa technical/sales office .**

10. DISPOSAL

In the course of machine maintenance, or if the machine is scrapped, do not dispose of polluting parts into the environment. Refer to local regulations with regard to their correct disposal. When scrapping the machine the identification plate and any other documents must be destroyed.

11. INFORMATION ABOUT ORDERING

Standard equipment		
Equipment	**Description**	**Code**
Sumo Pump	ATEX 400 cm³/min. grease pump 30 Kg (66 lb) tank Electric pneumatic inverter cod. 0083470 24V DC Maximum Minimum levels with laser probe in cover Exd cod. kit 0295145	2477200A000
	ATEX 400 cm³/min. grease pump 100 Kg (220 lb) tank Electric pneumatic inverter cod. 0083470 24V DC Maximum Minimum levels with laser probe in cover Exd cod. kit 0295105	2477201A000
Alternative Equipment		
Sumo Pump	ATEX 400 cm³/min. grease pump 30 Kg (66 lb) tank Electric pneumatic inverter cod. 0083470 24V DC Capacitive level kit (minimum)+Microswitch Exd (Max) cod. kit 0295165	2477200A100
	ATEX 400 cm³/min. grease pump 100 Kg (220 lb) tank Electric pneumatic inverter cod. 0083470 24V DC Capacitive level kit (minimum)+Microswitch Exd (Max) cod. kit 0295155	2477201A100
Sumo Pump	As the 2477200A000 standard version + Electric pneumatic inverter 24V AC	2477200A010
Sumo Pump	As the 2477200A000 standard version + Electric pneumatic inverter 110V AC	2477200A020
Sumo Pump	As the 2477200A000 standard version + Electric pneumatic inverter 230V AC	2477200A030
Sumo Pump	As the 2477201A000 standard version + Electric pneumatic inverter 24V AC	2477201A010
Sumo Pump	As the 2477201A000 standard version + Electric pneumatic inverter 110V AC	2477201A020
Sumo Pump	As the 2477201A000 standard version + Electric pneumatic inverter 230V AC	2477201A030

11.1 SPECIAL VERSION WITH CONTROLLER

Dropsa is able to provide customized versions of the SUMO ATEX Pump that include control equipment, for example the Vip5ATEX system (shown in photo 11.1.1) .
The equipment is controller by VIP5 Dropsa Controller in explosion configuration (see Figure 11.1.2 standard version).
The Controller functions, modality and parameters working are explained in the relative manual.
For more information contact the Dropsa sales- technical office or see our website www.dropsa.com

Photo 11.1.1

Photo 11.1.2

11.2 SPARES

Spares description	Code
Laser pump kit level100 kg cover Exd	0295105
Laser pump kit level 30 kg cover Exd	0295145
Capacitive Exi level kit (minimum)+Microswitch Exd (Max) 100 kg	0295155
Capacitive Exi level kit (minimum)+Microswitch Exd (Max) 30 kg	0295165
Electric pneumatic inverter 24V DC	0083470
Electric pneumatic inverter 24V AC	0083471
Electric pneumatic inverter 110V AC	0083472
Electric pneumatic inverter 230V AC	0083473
Three phase electric motor	3301531
Pneumatic motor	3301539
Pressure gauge	3292154
Pumping unit	0296070
Grease loading filter	0295009
Assembly loading valve	3093053
Tank flange gasket	3190487
Manifold gasket (pump body)	0018863
Manifold gasket (pumping)	3190489
295009 Filter gasket	3190487
Filter cover gasket	0061135
Worm screw assembly cover gasket	3190488
Body-pump reservoir gasket	3190485

Figure 11.2.1 (Detail of Wormskrew assembly cover)

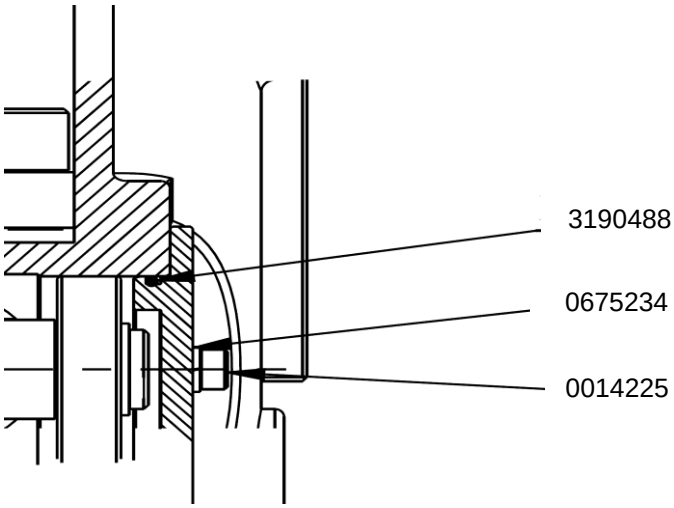


Figure 11.2.2 (Detail of Manifold gasket pump body

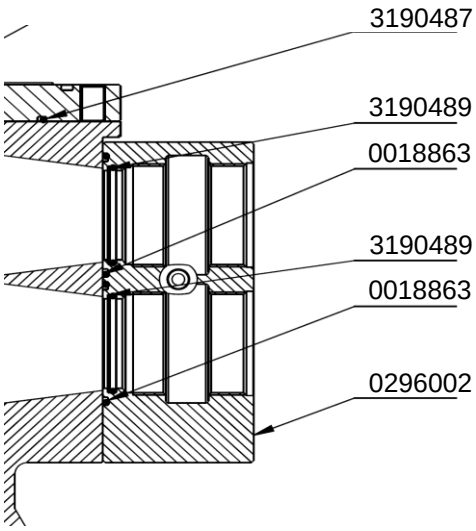
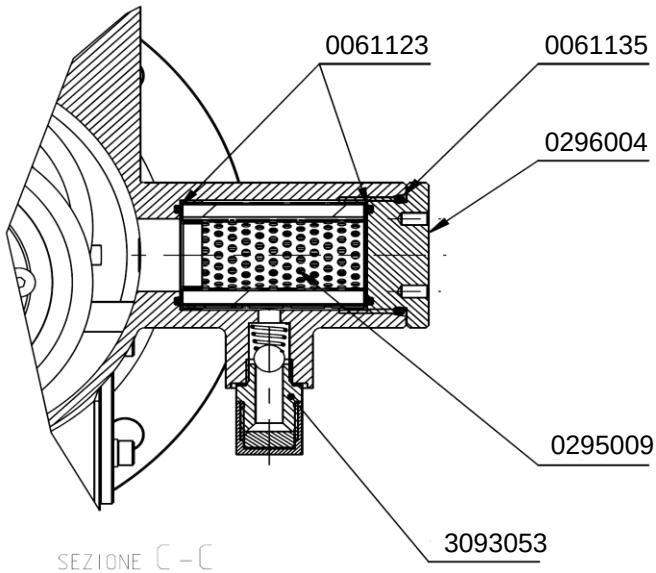
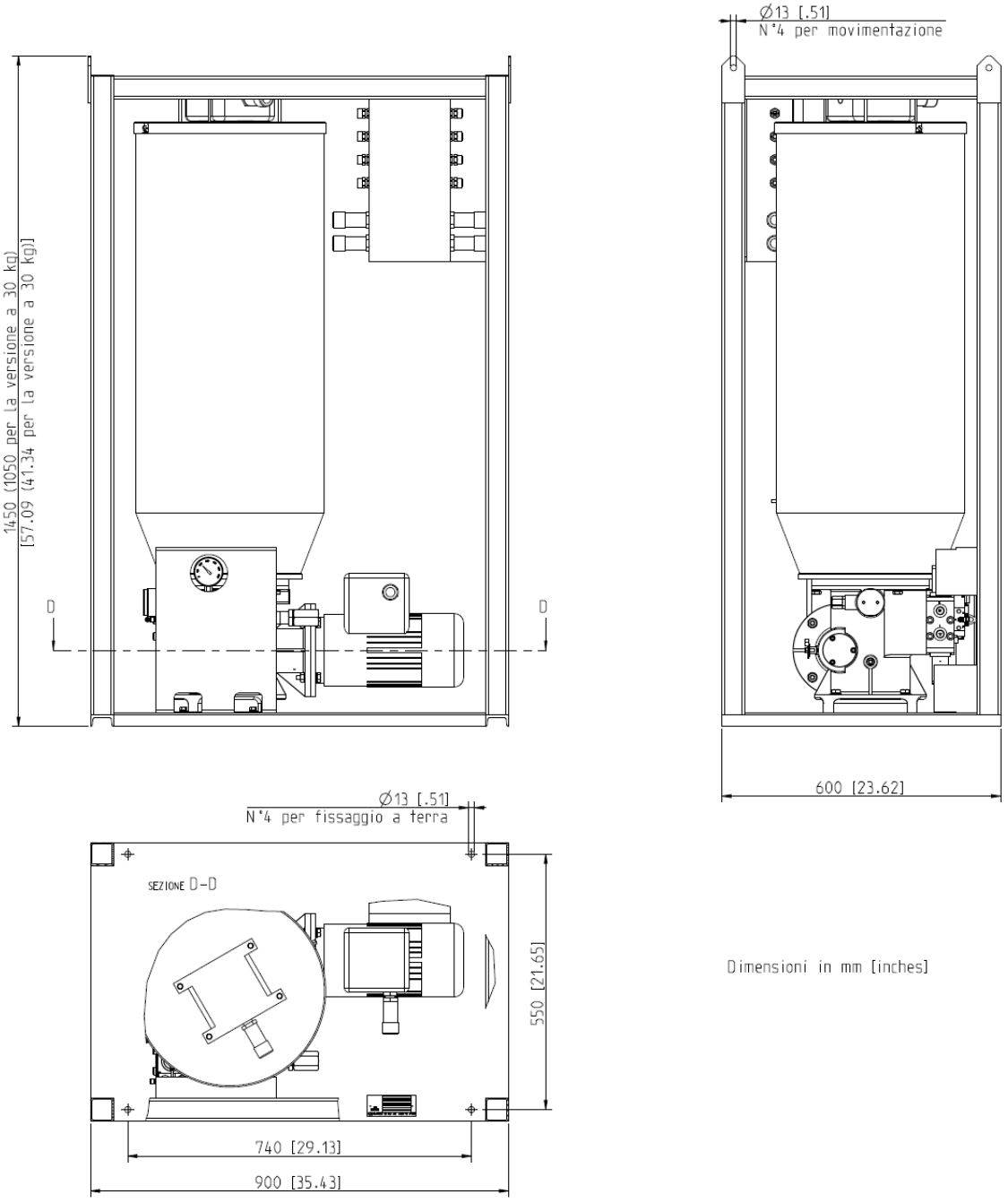


Figure 11.2.3 (Detail login filter gasket)



12. DIMENSIONS

To facilitate future maintenance, increase the spaces indicated by at least 500 mm (19,68 in.).



13. HANDLING AND TRANSPORT

A metal pallet is used for transport and storage with packing at the side and a wooden cover.
The pump is fixed on a metal pallet, which allows safe handling using a transpallet or forklift truck. The metal pallet has been designed so that it can be installed in the installation, being equipped with 4 (four) holes of Ø 14 mm suitable for fixing to the floor.
The machine components can withstand temperatures, during storage, from -20 to + 50 °C (-4°F - 122°F)*; it is therefore necessary, in order to avoid damages, for the machine to be started up when the machine has reached a minimum temperature of +5 °C (+41°F).*

14. PRECAUTIONS FOR USE

It is necessary to carefully read the warnings and risks associated with using a lubricant pump. The operator must understand how it works and must clearly understand the dangers by studying the user manual.

15. CLEANING

It is necessary to remove periodically dust from Atex 999 pump avoiding the spread in the air.
For this operation refers to Safety Officer

16. TRAINING

Personnel assigned to installation, electrical connections and ordinary and special maintenance of the pump, must have at least 8 hours of specific training by an appropriate organism on equipment for explosive atmospheres caused by the inflammable gases and combustible dusts.