

# Mini-SUMO Pump

Version in compliance with Directive 2014/34/EU (ATEX)

## User and maintenance manual

### Original instructions

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  II 2GD IIC IIIC T5/T100 °C IP65

The manual has been prepared in compliance with Directive  
CE 06/42

C21971E WK 42/18

## 1. INTRODUCTION

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This user and maintenance manual relates to the **Mini-SUMO Atex Pump**, version in compliance with ATEX standards, for potentially hazardous areas, classified zones 1 and 21 with presence of IIC group inflammable gas and combustible dusts. The maximum surface temperature developed by Mini-SUMO Atex pump in the most extreme conditions is 100°C.

The Mini-SUMO Atex Pump allows grease to be distributed within lubrication systems at high 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>.

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

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The Mini-SUMO Atex lubrication pump series is particularly suited for dual line systems and progressive systems and can be adapted to many needs without making mechanical changes, even after installation is complete. In fact, by selecting from a set of components that are perfectly compatible with each other and easily assembled, it is possible to vary the pressure, the quantity of the delivered lubricant, the type of lubricant and the type of distribution. 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 change-over valve.

There is one load bearing structure for all versions, the dual pumping element constitutes the essential module.

The pump unit has only one outlet.

Two types of grease tanks and two for oil, with different volumes (10 or 30 kg) can be positioned on the pump casing, with spatula and level indicators.

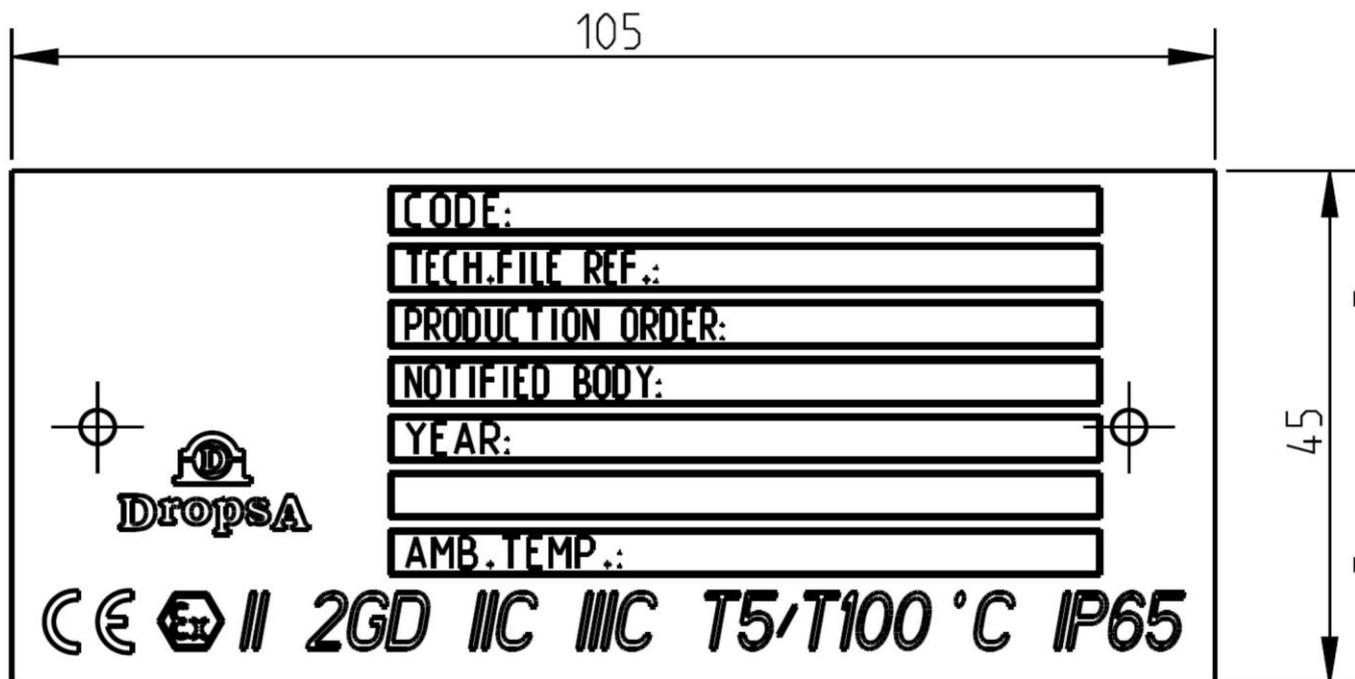
The electric Mini-SUMO Atex pump is fully protected against the external environment and can run without problems in the most severe ambient conditions.

### 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, a reference plate indicates the ATEX marking and certification (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).
IIC	Group of flammable gases allowed by the IIC.
IIIC	Group of electroconductive powders.
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:

GENERAL CHARACTERISTICS	
Empty weight (10 Kg tank)	62 Kg
Empty weight (30 Kg tank)	65 Kg
Empty weight pump without reservoir	42 Kg
ELECTRICAL CHARACTERISTICS	
Motor power supply	3 Ph - 0,25 Kw - 230Δ/400Y 50/60 Hz – Maximum working voltage 690V.
Motor degree of protection	IP 65
Minimum and maximum level	Capacitive-laser-ultrasounds
HYDRAULIC CHARACTERISTICS	
Pumping system	Piston
Flow rate (per pumping element)	25 cc/min
Maximum operating pressures	380 bar
Outlet connection	G3/8" BSP
Tank capacity	10-30 Kg
Loading filter	Degree of filtering 300 μ
By-pass	Adjustable 0÷380 bar – precalibrated 300 bar
Temperature of use	- 5 ÷ + 50 °C
Operating humidity	90 % rel. humidity
Permitted lubricants <sup>(1)</sup>	Mineral lubricating oil min 32 cSt; grease max NLGI2
Storage temperature	-20 ÷ +65 °C
Continuous sound pressure level	< 70 dB (A)

N.b. The specifications refer to the temperature of use of +20°C (+68°F)

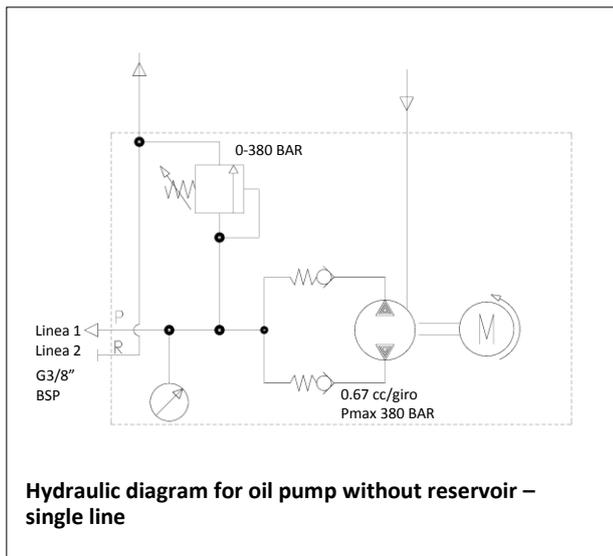
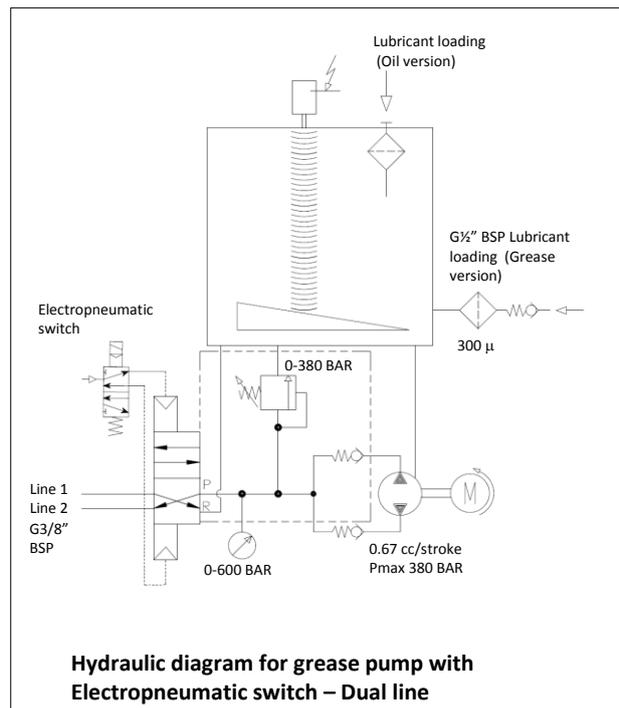
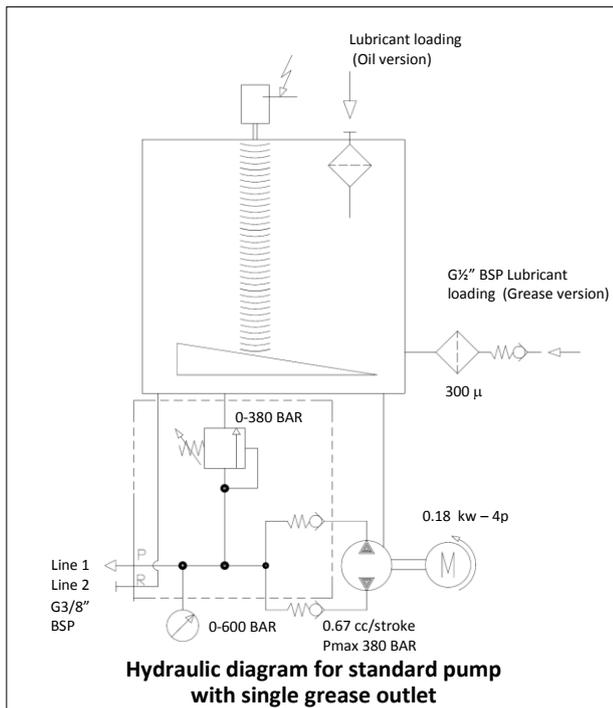
<sup>(1)</sup> If a different product is used, please contact Dropsa S.p.A. to ensure it is suitable for use.



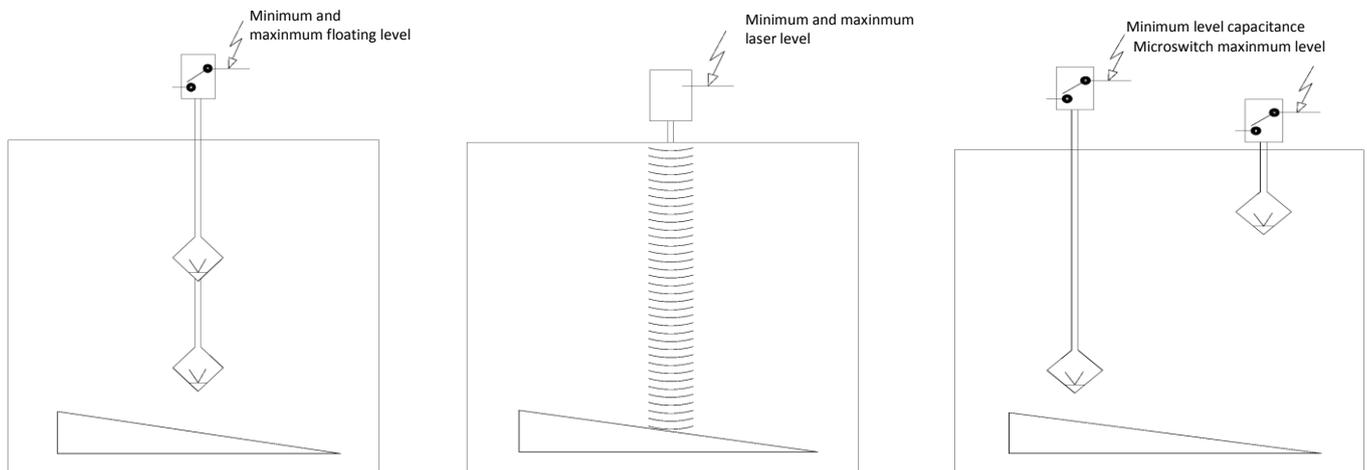
**WARNING:** do not supply the machine with voltages and pressures different from those indicated on the plate.

## 4.1 HYDRAULIC FUNCTION DIAGRAM

The hydraulic diagrams related to the different configurations that can be obtained using the available accessories are shown below (see paragraph 11)



### 4.1.1 LEVELS AVAILABLE



## 5. PUMP COMPONENTS AND ELECTRICAL CONNECTIONS

### 5.1 PUMPING ELEMENTS

The pump has two fixed delivery standard pumping elements (25 cm<sup>3</sup>/ min for each pumping element).

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 380 bar).

The pumping elements are assembled onto the pump body without disconnecting the hydraulic line thanks to a threaded cartridge design, facilitating assembly/disassembling.

Figure a – Version with reservoir

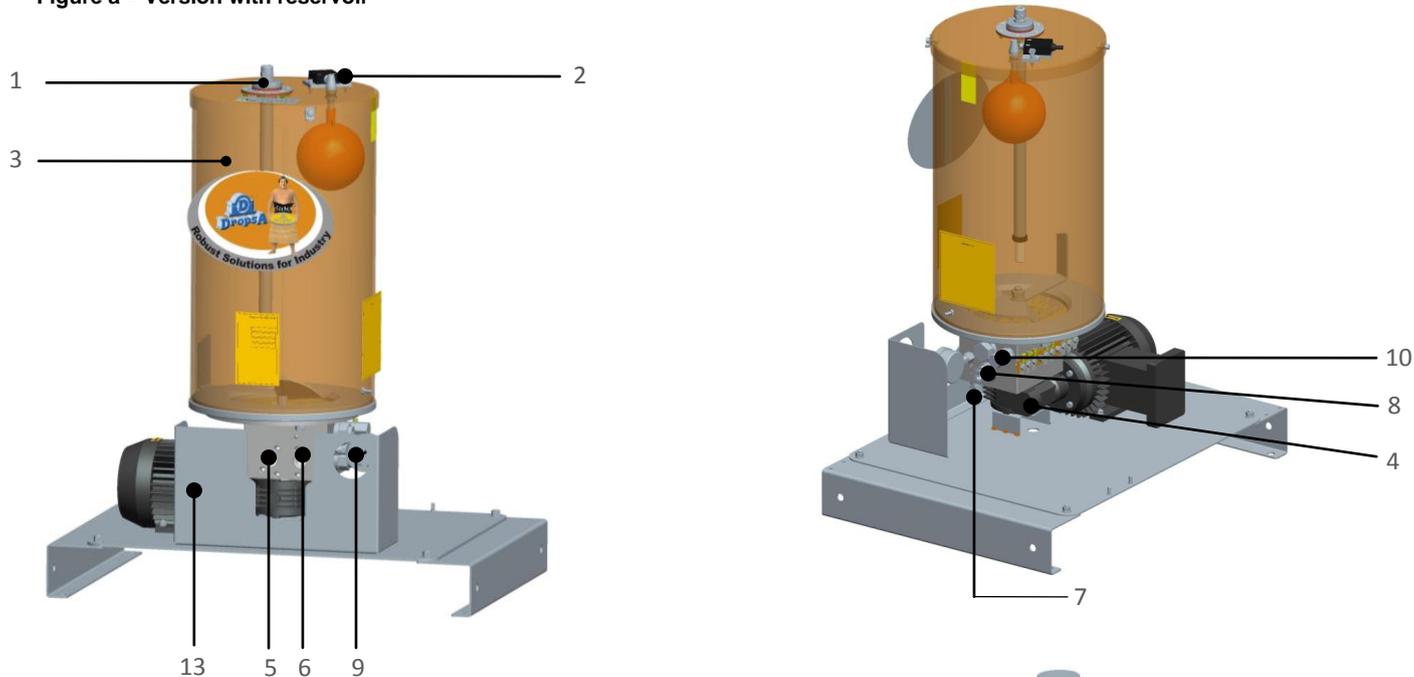
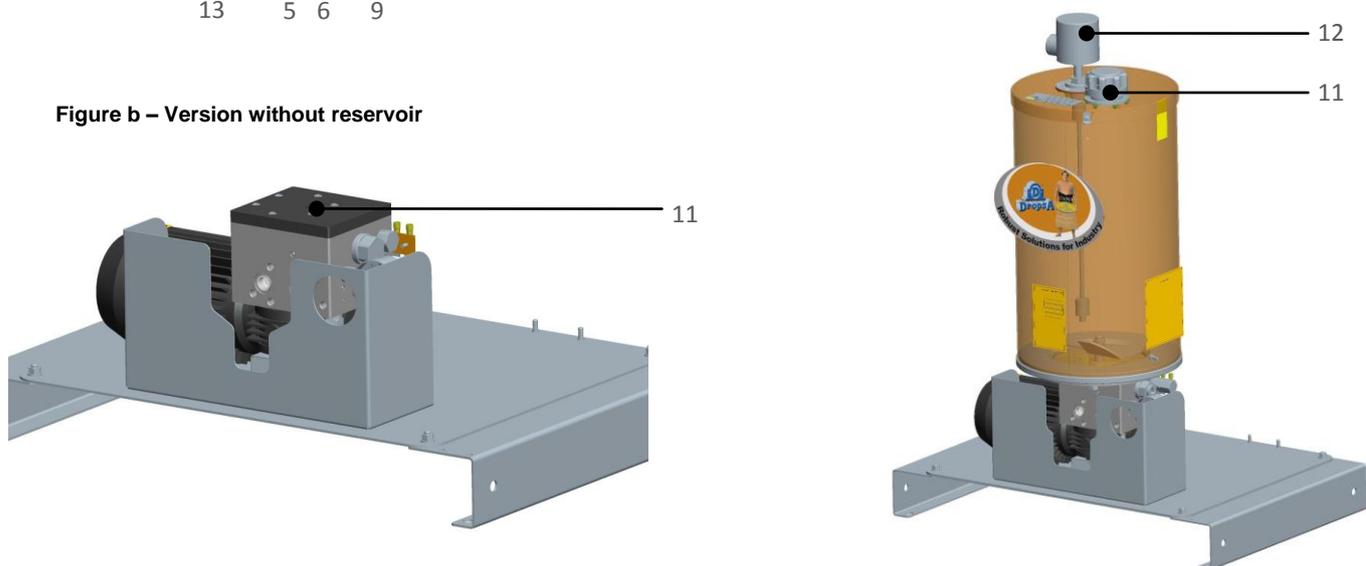


Figure b – Version without reservoir



STANDARD PUMP COMPONENTS			
1	Minimum capacitive level for grease pump	8	Pumping system
2	Microswitch Maximum level for grease pump	9	Pressure gauge
3	Reservoir	10	Loading (for grease pump with reservoir)
4	Ratio motor	11	Loading (for oil pump with reservoir)
5	Return	12	Minimum and maximum level indicators for oil
6	Delivery	13	Protection carter
7	By-pass		

## **5.2 MINIMUM AND MAXIMUM GREASE LEVEL INDICATORS**

The standard grease pumps have two level types:

- Minimum capacitive level (for 10 and 30 Kg tanks);
- Max visible level (floating).

You can install a laser level type as alternative.

Minimum and maximum level are floating switch type in oil version.

### **5.2.1 MINIMUM CAPACITIVE LEVEL (GREASE)**

The minimum level is realised by a capacitive probe that is positioned at the end of a tube mounted on the tank cover. When the minimum level is reached, the probe signals that the lubricant is low. If the capacitive probe is replaced, the capacitive probe must be recalibrated (see calibration procedure – CHAP. 7.2. User instructions).

### **5.2.2 MAX LEVEL WITH MICRO-SWITCH (GREASE)**

The phase that the lubricant is loaded in the tank is realised by the operator, who uses a pump. Once the maximum lubricant level is reached, a rod is activated that indicates that the tank is full.

### **5.2.3 LASER-LEVEL (OIL AND GREASE)**

Inside the Ex d kit case there is a laser range sensor with connector. It has a 4-digit alphanumeric display and a reading distance up to 10 Mt. The device includes the programming buttons.

### **5.2.4 MINIMUM AND MAXIMUM LEVEL WITH A FLOAT (OIL)**

The level is made with two floats at the ends of metal shaft. Lower float acts as a minimum level by closing a contact when the low position is reached. The Upper floats acts as a maximum level by closing another contact at high position.

## **5.3 SPATULA FOR GREASE**

Two tanks have been foreseen with capacities of 10 and 30 kg. (22 – 66.1 Lb) two for oil and two for grease. The tanks are supplied standard with a spatula and a scraper, which must not be disassembled during their assembly or replacement. Under the spatula, there is a standard electrogalvanised steel mesh with 0.5 mm holes (0.02 in.). The pump is protected from possible foreign bodies that could be inadvertently present while the tank is being loaded.

## **5.4 PRESSURE GAUGE**

The pressure gauge is glycerine type, so as protect it from any pressure spikes that may create damage. It is assembled directly in the manifold group (placed in front of the pump).

## **5.5 BY-PASS**

Pressure gauge is pre-calibrated to 300 bar but it can be adjustable from 0 to 380 bar.

## **5.6 ELECTRICAL CONNECTIONS**

On the structure of the base is possible to mount a safety terminal box that contains a terminal board to connect the electrical components of the Mini-SUMO Atex assembly (Motor, valves, level indicators, etc).

Choosing this option the pump will be supplied with wirings already connected to the terminal strip.

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

⊕	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	⊕	⊕	17	18	19	⊕
EARTH	SOLENOID VALVE				MAXIMUM LEVEL			FREE TERMINAL							MINIMUM LEVEL		EARTH	EARTH	MOTOR			EARTH
	1	2	3	4	NC Brown	NO Black	C Grey								L+ Brown	L- Blu			R1	R2	R3	
⊕	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	⊕	⊕	17	18	19	⊕

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

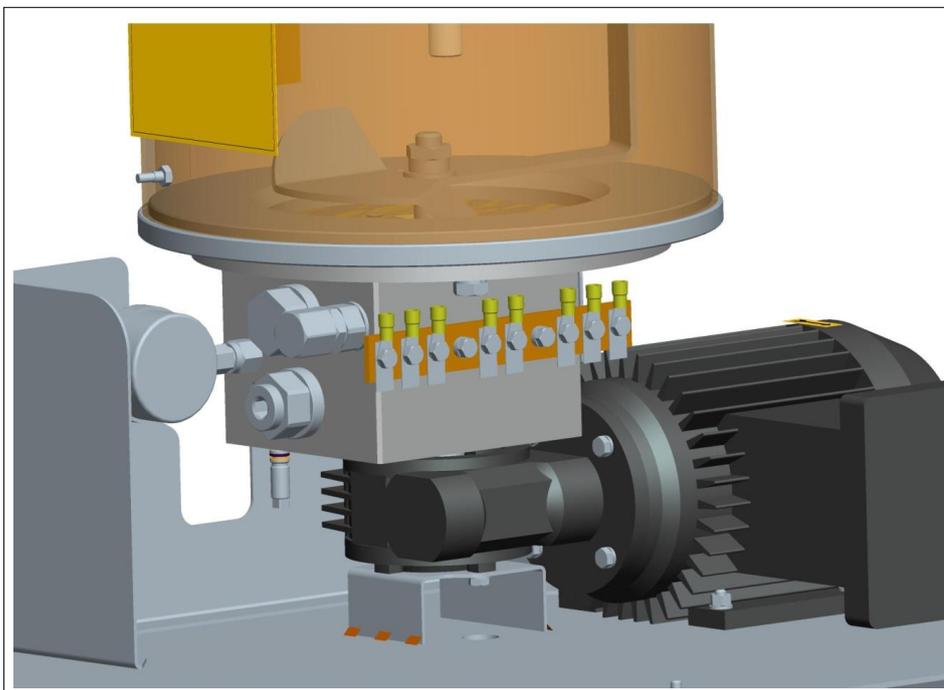
⊕	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	⊕	⊕	17	18	19	⊕
EARTH	SOLENOID VALVE		MAX AND MIN LEVEL LASER			FREE TERMINAL							EARTH	EARTH	MOTOR			EARTH				
	1	2	L+ OUT 2	OUT 1	L-													R1	R2	R3		
⊕	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	⊕	⊕	17	18	19	⊕

### 5.7 EARTH CONNECTIONS

In figure below is underline the positioning of the bar of grounding. For a complete vision refer to assembly design. Mini-SUMO Atex pump must be connected to a good earth safety system.



**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.

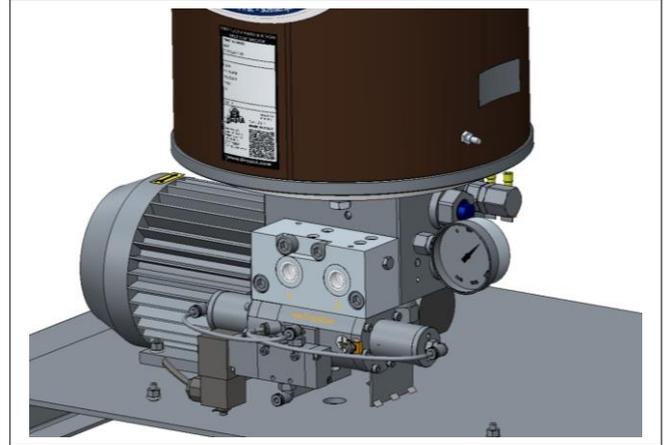


## 5.7 ELECTROPNEUMATIC CHANGE-OVER (optional)

The pump can be equipped with a pneumatic change-over valve piloted by a hazardous area certified solenoid.

The main change-over parts are:

- A casing with a central lapped hole that makes it possible to make a dry seal connection with the inversion piston, which is facilitated by a balancing system;
- A ground piston with a dual coupling surface, with grooves that improve lubrication and the seal at high pressures;
- The inversion phase is facilitated by a balancing system;
- Sealing gaskets that can support high pressure levels, by means of a pressurized chamber, optimizing the change-over function;
- Two single acting pneumatic actuating cylinders, controlled by an 5/ 2 type solenoid valve.

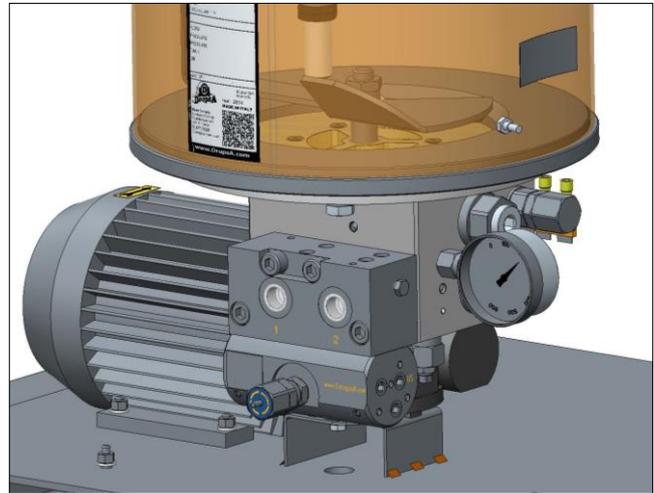


## 5.8 HYDRAULIC CHANGE-OVER (optional)

The pump can also be equipped with a hydraulic change-over valve that activates when the pressure is made on each line.

The pressure indicators are equipped with a pin that allows the operator to visualize the operation of the valve.

The valve can also be equipped with cycle sensor (certified for hazardous areas) to monitor the inversion phases of the valve.



## 6. UNPACKING AND INSTALLATION

### 6.1 UNPACKING

Once the suitable location for installation has been identified, open the package and remove the pump. Check that it was not damaged during transport or storage. The packaging material does not require special disposal precautions as it is not in any way dangerous or polluting. Refer to the local regulations for disposal.

### 6.2 INSTALLATION

Pump assembly operations are not required. The pump is fixed on a metal pallet that permits safe handling with a transpallet or fork lift truck. The pallet was designed to be installed in the plant. It has four Ø 14 mm holes suitable for fixing to the floor. Suitable space must be provided (as shown in the installation diagram) to prevent abnormal positions or the possibility of impacts. Then, as described above, the pump must be connected hydraulically to the machine and then the connection to the control panel must be made.



### Special conditions for safe use

- Install in a place protected against impacts
- Check whether the installation has a lubricant level continuous monitoring system

## 7. INSTRUCTIONS FOR USE

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### 7.1 STARTING THE PUMP

Before using the Mini-SUMO Atex pump, a few preliminary checks must be performed:

- Check the integrity of the power supply cable and the unit prior to use.
- If there is damage to the power supply cable or the unit, do not start operations!
- Replace the damaged power supply cable with a new one.
- The unit may only be opened and repaired by specialised personnel.
- In order to prevent the danger of electrocution due to direct or indirect contact with live parts, the electric power supply line must be suitably protected by a specific differential magnetothermal switch, according to regulations, with rated breaking capacity at list equal to prospective fault current at installation point.
- It is prohibited to use the pump if submersed in fluids or in a particularly aggressive or explosive/inflammable environment if not previously prepared for that purpose by the supplier.
- Use safety gloves or glasses as specified in the safety sheet for the lubricating oil
- DO NOT use aggressive lubricants with NBR gaskets. In the case of doubt, contact the Dropsa SpA technical office to receive a detailed card about the recommended oils.
- Do not ignore the hazards to health and comply with the health regulations.



**ATTENTION:** All components must be ground connected. This applies both to electric components as well as to control devices. For this purpose, make sure that the ground wire is directly connected. For safety reasons, the ground conductor must be approx. 100 mm longer than the phase conductors. If the cable is accidentally disconnected, the ground terminal must be the last to be disconnected.

- Check the integrity of the pump.
- Check that the pump is at the operating temperature and that there are no air bubbles in the pipes.
- Check that the electric connection was carried out correctly.
- Once the pump has started, check that the direction of rotation of the electric motor is as indicated by the arrow on the motor's protective casing; if it rotates backward, reconnect it as shown in the wiring diagram provided with the motor.

### 7.2 INSTRUCTIONS FOR USE

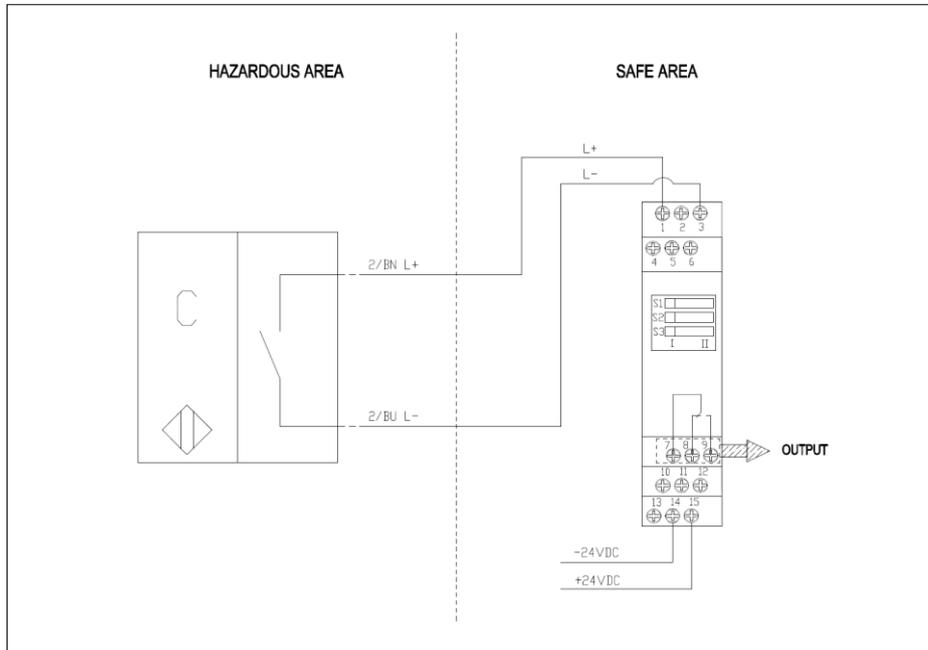
- 1) Press the start button on the machine to which the pump is connected or start it;
- 2) Check that the pump starts;
- 3) To change the pressure value, turn the adjustment screw (see Chap. 5). Turn it clockwise to increase the pressure or counter clockwise to decrease it;
- 4) Check that the machine lubrication is suitable (if there are doubts about correct operation, the Dropsa SpA technical office can be contacted to request the inspection procedure).

## 7.3 CONNECTION / SETTING OF THE LEVEL PROBES

### 7.3.1 CAPACITIVE PROBE

The capacitance level probe has a Namur NO Type Intrinsically safe capacitance sensor:  $\text{Ex II 1G EEx ia IIC T6}$ . It must be connected to the system by a certified isolated intrinsic safety barrier [EEx ia]. Following a secure connection example.

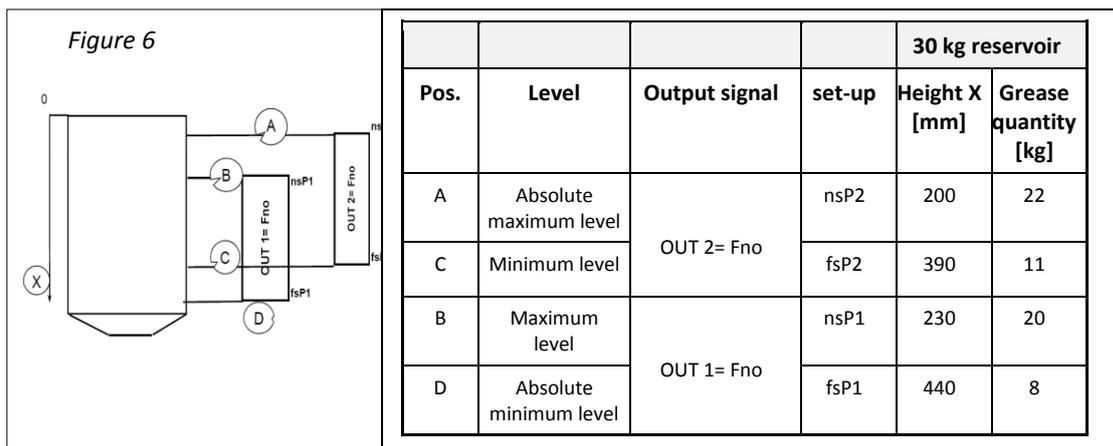
Figure 7.2 (Electric connection)



### 7.3.2 PROCEDURE FOR CALIBRATING THE LASER PROBE

The laser probe has an on-board viewing and programming display. It is possible to work in analogue (with a 4 to 20 mA signal) or digital (two outputs and four intervention thresholds) mode.

The table with the laser probe calibration parameters is shown below.



**WARNING:** 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



**ATTENTION:** The machine may only be opened and repaired by authorized Dropsa personnel.

A diagnostics table is provided below that indicates the main anomalies, the probable causes and the possible solutions. If you were not able to solve the problem after consulting the diagnostics table, do not try to find the fault by disassembling machine parts but contact the Dropsa technical office and report the anomalies that have been discovered, with a detailed description.

Problem	Cause	Solution
Pump does not delivery lubricant	<p>The electric motor is not operating.</p> <p>The tank is empty.</p> <p>The pump does not prime. Cause for the pump not priming:</p> <ul style="list-style-type: none"> <li>• The motor is rotating in the inverse direction (clockwise);</li> <li>• The motor is rotating in the correct direction, but the spatula is not rotating;</li> <li>• Air bubbles in the lubricant.</li> </ul> <p>The pressure control valve (bypass) was calibrated at a value that is too low Presence of dirt in the non-return valve</p>	<p>Check the connection between the motor and the electric power supply line.</p> <p>Check the motor windings.</p> <p>Check that the motor terminal board connection plates have been positioned according to the power supply voltage.</p> <p>Fill the tank. Attention: if the tank emptied itself and the electric signal indicating that the minimum level was reached was not given, check the minimum level contact.</p> <p>Remove the tank cover and check that the spatula rotates clockwise and moves the lubricant; otherwise, invert two of the three motor phases. See above.</p> <p>Disconnect the pump delivery pipe and bleed the lubricant until the air bubbles have been eliminated.</p>
The pump does not pressurise.	There may be dirt on the pumping element check valve cone.	Clean the pumping element check valve cone and seat, bleeding the lubricant.

Problem	Cause	Solution
No minimum level signal when there is no lubricant in the tank.	Minimum level incorrectly regulated.	<p>Check the correct operation of the level probe as follows:</p> <p>disassemble the minimum level assembly and recalibrate the capacitive probe.</p>
Minimum level selection, with lubricant below the minimum and pump operating.	Minimum level incorrectly regulated.	The control panel lamp always remains on: check the electric connection and replace the capacitive probe if necessary.

## 9. MAINTENANCE PROCEDURES

The pump was designed and built in order to minimise maintenance requirements. To simplify maintenance, it is recommended to install it in an easy to reach position.

- Periodically check the pipe joints to detect any leaks. Furthermore, always keep the pump clean to be able to quickly detect any leaks or defects.
- Check if the loading filter is clean after every 2000 hours of operation.
- Check Cables and wiring integrity (where it is present) every 4000 hours worked.
- Check Secure connection to ground every 4000 hours worked.

The machine does not require any special equipment for any control and/or maintenance activity. It is recommended to use tools and personal protective devices suitable for use (gloves) and that are in good condition according to current regulations to prevent damage to people or machine parts.



**ATTENTION:** Make sure that the electric and hydraulic power supplies are disconnected before carrying out any maintenance work.

In the case of doubts and/or problems that cannot be solved, do not try to discover the reason by disassembling machine parts, but contact the DROPSA S.p.A technical office.

## 10. DISPOSAL

During machine maintenance, or if it is demolished, do not dispose of the polluting parts in an improper manner. Refer to the local regulations for their correct disposal. When demolishing the machine, the identification plate and all other documents must be destroyed.

## 11. ORDERING INFORMATION

### 11.1 VERSIONS

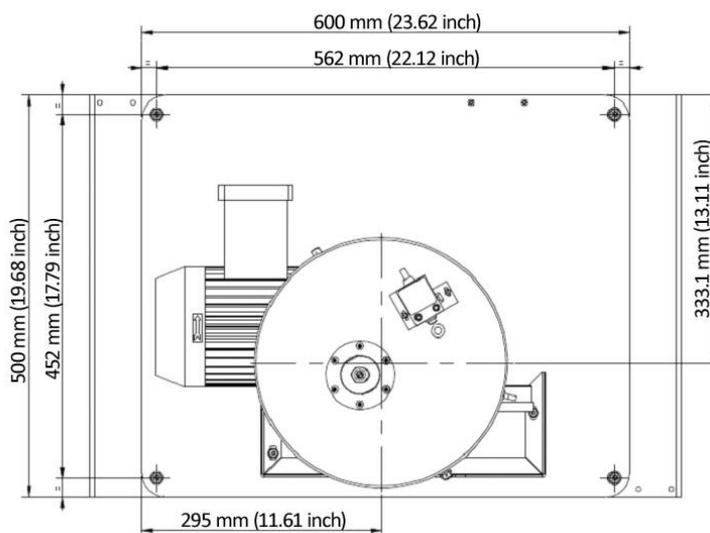
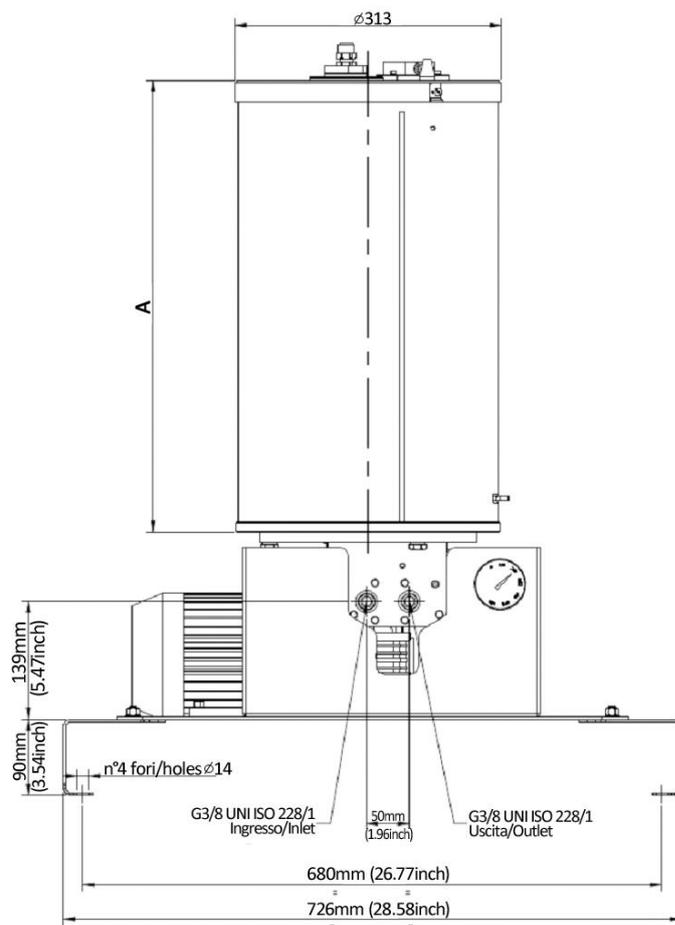
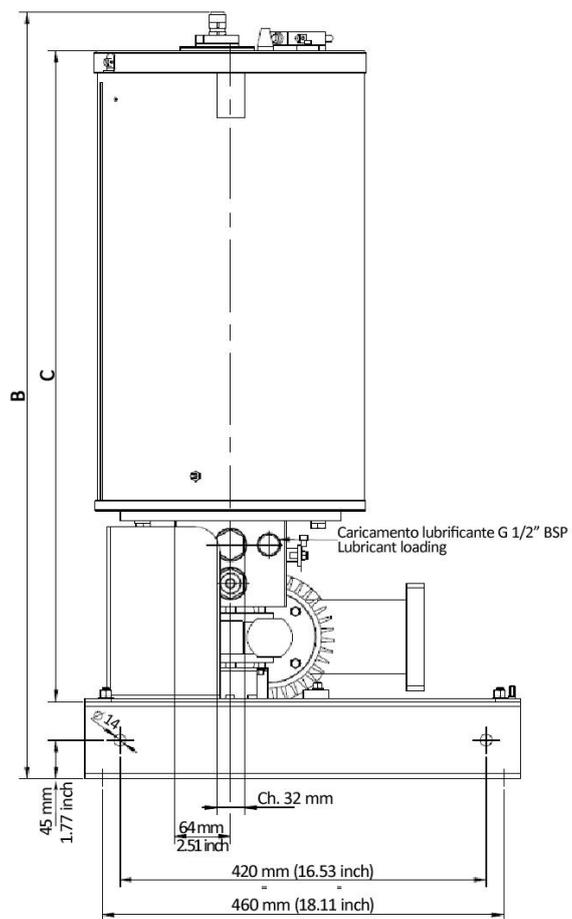
<b>"MINI-SUMO ATEX" ATEX Pump</b>				<b>Ordering PUMP CODE</b>			
<b>STANDARD VERSIONS</b>	Mini-SUMO Atex GREASE pump from 10kg - 3ph-0.25kW			2487200	0	0	0
	Mini-SUMO Atex GREASE pump from 30kg - 3ph-0.25kW			2487201	0	0	0
	Mini-SUMO Atex OIL pump without reservoir - 3ph-0.25kW			2487220	0	0	0
	Mini-SUMO Atex OIL pump from 10kg - 3ph-0.25kW			2487250	0	0	0
	Mini-SUMO Atex OIL pump from 30kg - 3ph-0.25kW			2487251	0	0	0
<b>Components</b>		<b>Description</b>	<b>DROPSA Code</b>	<b>CODE</b>	from 0 to 9	from 0 to 9	from 0 to 9
<b>Maximum and Minimum level</b>		Grease standard version - Capacitive Exi (minimum)+Micro switch Exd (Max)	0297075 (for 10kg) 0297061 (for 30kg)	0			
	<b>Variants</b>	Oil standard version - Exd floating level	0295152 (for 10kg) 0295153 (for 30kg)				
	<b>Variants</b>	30 kg Pump laser level kit - Exd case	0295145	2			
<b>Change-over</b>		Standard not available	-	0			
<b>Electro pneumatic Change-over</b>	<b>Variants</b>	Electro pneumatic 24 V DC	0083570	1			
		Electro pneumatic 24 V AC	0083571	2			
		Electro pneumatic 110 V AC	0083572	3			
		Electro pneumatic 230 V AC	0083573	4			
<b>Hydraulic Change-over</b>			0086450	5			
<b>Terminal board</b>		Standard - without terminal board	-	0			
	<b>Variants</b>	Terminal board with wiring	1525722	1			

## 11.2. SPARE PARTS

SPARE PARTS DESCRIPTION	Part Number
Motor - 3 Ph - 0,25 Kw - 230Δ/400Y 50Hz - 1350 rpm	0297040
Capacitive Exi level kit (minimum)+Microswitch Exd (Max) 10 Kg	0297075
Capacitive Exi level kit (minimum)+Microswitch Exd (Max) 30 Kg	0297061
Laser pump kit level 30 kg cover Exd	0295145
Kit floating level 10 Kg Exd	0295152
Kit floating level 30 Kg Exd	0295153
Flow rate pumping 0.67cc/turn	0297010C
Electric pneumatic change-over 24V DC	0083570
Electric pneumatic change-over 24V AC	0083571
Electric pneumatic change-over 110V AC	0083572
Electric pneumatic change-over 230V AC	0083573
ATEX EExm 24 V DC Coil	3150108
ATEX EExm 24 V AC Coil	3150109
ATEX EExm 110 V AC Coil	3150110
ATEX EExm 230 V AC Coil	3150111
5/2-1/8" NC solenoid valve	3155222
Cycle sensor	1655332
Grease loading filter	0297007
Hydraulic change-over	0086450
by-pass	0234496
Tank - pump casing gasket	3190485
Pressure gouge 0 - 600 Bar	3292154
Gland Exd	0075052

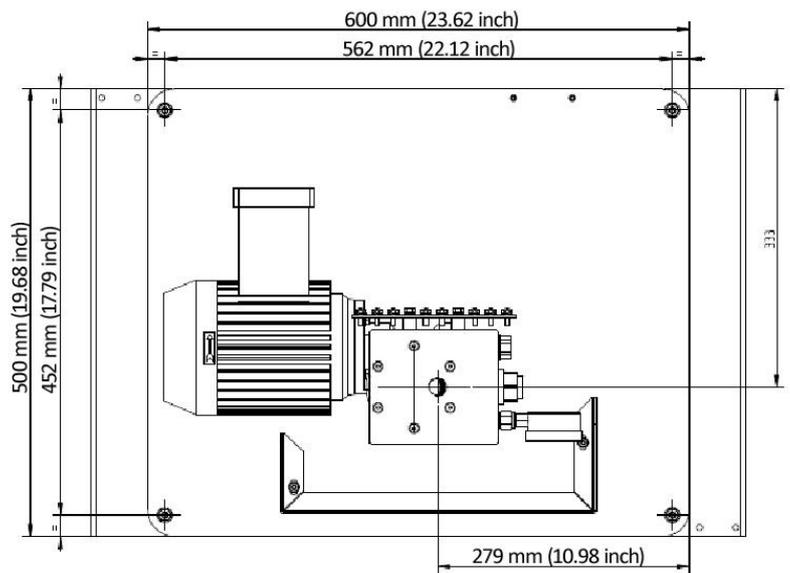
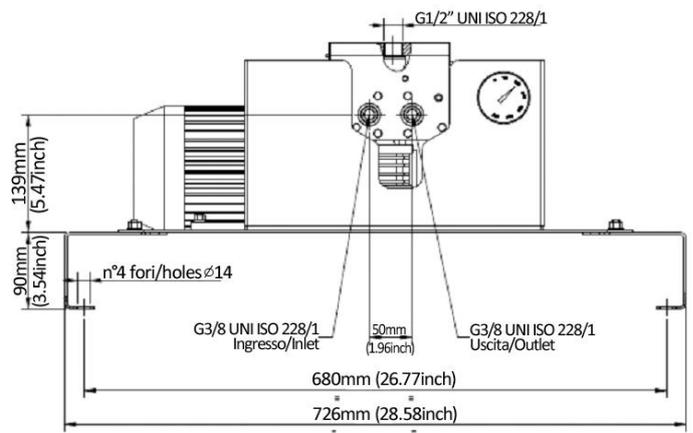
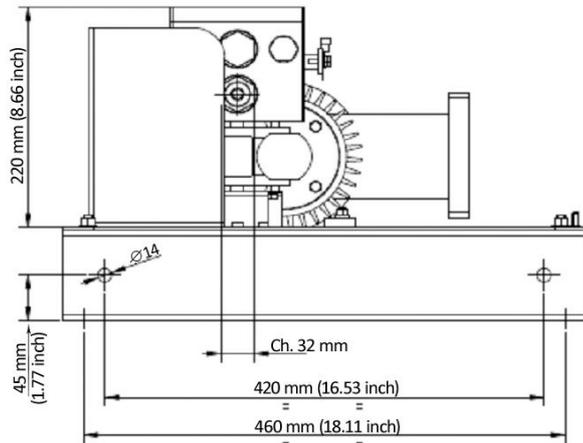
## 12. DIMENSIONS

### 12.1. VERSION WITH RESERVOIR



	10 Kg	30 Kg
<b>A</b>	344,5	533,5
<b>B</b>	699	888
<b>C</b>	565	754

## 12.2. VERSION WITHOUT RESERVOIR



## 13. HANDLING AND TRANSPORT

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Transport and storage are carried out using a metal pallet with packaging on the side and a wood cover.

The pump is fixed on a metal pallet that permits safe handling with a transpallet or fork lift truck. The metal pallet was designed to be installed in the plant. It has four  $\varnothing$  14 mm holes suitable for fixing to the floor.



**Lift the equipment according to the direction shown on the cardboard package.**

**The machine components can support storage temperatures between**

**-20 to + 65 °C; however, to prevent damage, the machine must only be started up after the machine has reached a temperature of +5 °C.**

## 14. PRECAUTIONS

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The warnings about the risks involved in using a pump for lubricants must be read.

The operator must understand its operation and clearly understand the hazards connected to pumping pressurised grease.

Therefore we recommend the following:

- Check the chemical compatibility of the material with which the pump is built with the fluid to be pumped (see chap. 4). An incorrect selection could cause, in addition to damaging the pumps and pipes, serious risks for people (spillage of irritating products that are harmful to health) and for the environment.
- Never exceed the maximum operating pressure permitted for the pump and the components connected to it. In the case of doubt, refer to the data specified on the machine plate.
- Only use original spare parts.
- If components must be replaced with others, make sure they are suitable for operating at the pump's maximum operating pressure.



**ATTENTION!**

**Never try to stop or deviate any leaks with your hands or other body parts.**

**Note:** Personnel must use protective devices, garments and tools in compliance with current standards with regard to the location and the use of the pump both during work as well as during maintenance operations.



**ATTENTION: The warnings about the risks involved in using a pump for lubricants must be read. The user must understand its operation using the user and maintenance manual.**

### ***Electric current***

Do not carry out any work on the machine before disconnecting it from the electrical power supply and making sure that no one can reconnect it during the operation. All the installed equipment (electric and electronic), tanks and basic structures must be connected to the ground line.

### ***Inflammability***

The lubricant used in the lubrication circuits is normally not an inflammable liquid. It is however necessary to adopt all the possible measures to prevent that it comes into contact with very hot parts or open flames.

### ***Pressure***

Before each operation, make sure there in every branch of the lubrication circuit that there is no residual pressure that could cause oil to spray when disassembling fittings or components. After long periods of inactivity, check the seal of all the parts subject to pressure. Do not subject the fittings, pipes and pressurised parts to violent impacts. Damaged flexible pipes or fittings are DANGEROUS and must be replaced.

Only original spare parts should be used.

### ***Noise***

Under normal operating conditions, noise emission **does not exceed 70 dB "A"** at a distance of 1 metre (39.3 inches) from the pump.

**NOTE:**

The pump was designed to operate with lubricants with a maximum rating NLGI 2. Use lubricants that are compatible with NBR gaskets. Any internal residual lubricant used for assembly and testing purposes is NLGI 2 oil

A comparison table is provided between the classification of NLGI lubricants (National Lubricating Grease Institute) and the ASTM classification (American Society for Testing and Materials) for greases for the values that concern the pump.

GREASES	
NLGI	ASTM
000	445 – 475
00	400 – 430
0	355 – 385
1	310 – 340
2	265 – 295

For further information about the technical specifications and the safety measures to adopt, refer to the product safety sheet (Directive 93/112/EEC) relative to the type of lubricant selected and supplied by the manufacturer.

## 15. CLEANING

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

## 16. TRAINING

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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.