# SMART3 PUMP

## User and Maintenance Manual

## Original instructions

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## 1. INTRODUCTION

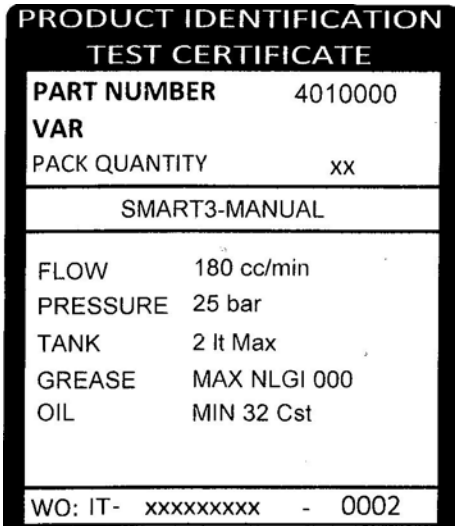
This User and Maintenance Manualrefer to**Dropsa's**"**SMART3** " Oil lubrication Pump for oil and fluid grease.
You can find additional copies and newer revisions of this document from our website http://www.dropsa.com. Alternatively contact one of our Sales Offices.
This manual contains important information on health and safety issues for personnel. It is recommended to attentively read this manual and carefully keep it in good condition so that it is always available to personnel requiring to consult it.

## 2. GENERAL DESCRIPTION

SMART3 is a compact and versatile electric gear pump package particularly suited for machine tool and work centre lubrication systems using 33V injector systems.
The versatility of this product is thanks to a wide range of electric motors and the fact it is available with a Dropsa optical switch that can work with both oil and fluid greases.
The lubrication cycle can be determined either externally by a host PLC or by selecting a model with the built in controller board that will operate and monitor the system accordingly.

## 3. PRODUCT-MACHINE IDENTIFICATION

Machine identification yellow label is located on the front side of the reservoir and contains product serial number, input voltage and details of the operating parameters.



## 4. TECHNICAL INFORMATION

| GENERAL INFORMATION | |
|---|---|
| **Empty weight** | 4.5 Kg |
| **ELECTRIC INFORMATION** | |
| **Motor power supply** | 110V –2p– 50/60 Hz 140/175W- (2800/3500 rpm)<br>230V – 2p– 50 Hz 135 W- (2800 rpm)<br>230V – 2p– 60 Hz 170 W- (3500 rpm)<br>24 V DC - 55 W [(1)] - (2800 rpm) |
| **OTHERS INFORMATION** | |
| **Degree of Pump protection** | IP 55 |
| **Pumping system** | Gear pump |
| **Pump flow rate (free flow)** | 180 cc/min @ 2800 rpm<br>220 cc /min @ 3500 rpm |
| **Maximum working pressure** | 30 bar |
| **Outlet connection** | G1/8” BSP |
| **Reservoir capacity** | 2L/3L |
| **Minimum level – Float switch option, for oil only** | With NC in case of liquid |
| **Minimum level – DropsaOptiLev Optical sensing system for oil and fluid greases.** | NPN or PNP short-circuit protected signal, "off" in case of minimum level |
| **Filter** | 1000 µ filtering degree |
| **By-pass** | Adjustable 0÷30 bar –precalibrated25 bar |
| **Pressure switch** | 10÷20 bar - precalibrated to 18 bar |
| **Working Temperature** | + 5 ÷ + 60 °C |
| **Working Humidity** | 90 % rel. humidity |
| **Permitted lubricants *** | Mineral lubricating oil 32 cSt-320 cSt ;<br>Grease max NLGI000; |
| **Storage temperature** | -20 ÷ +80 °C |
| **Sound Pressure Level** | < 70 dB(A) |
| **Max working time in continuous operation** | 1 min |
| **MIN STANDBY time** | 5 times T-on |

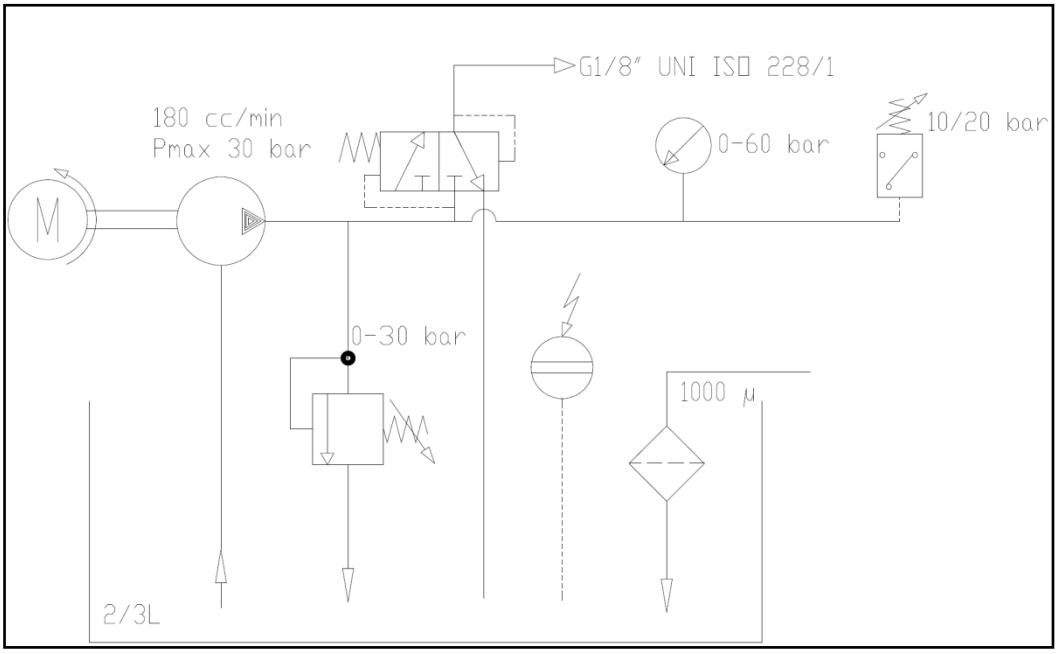
**Note. The informationrefer to the temperature of use of +20°C (+68°F)**
**[(1)]2800 rpmwith no load**
*** If a different or special lubricant product is used, please contact Dropsa to ensure its suitability.**

**Dropsa recommends a 4 AMP overload fuse**

### 4.1 HYDRAULIC SYSTEM

As illustrated, all pumps are equipped with:

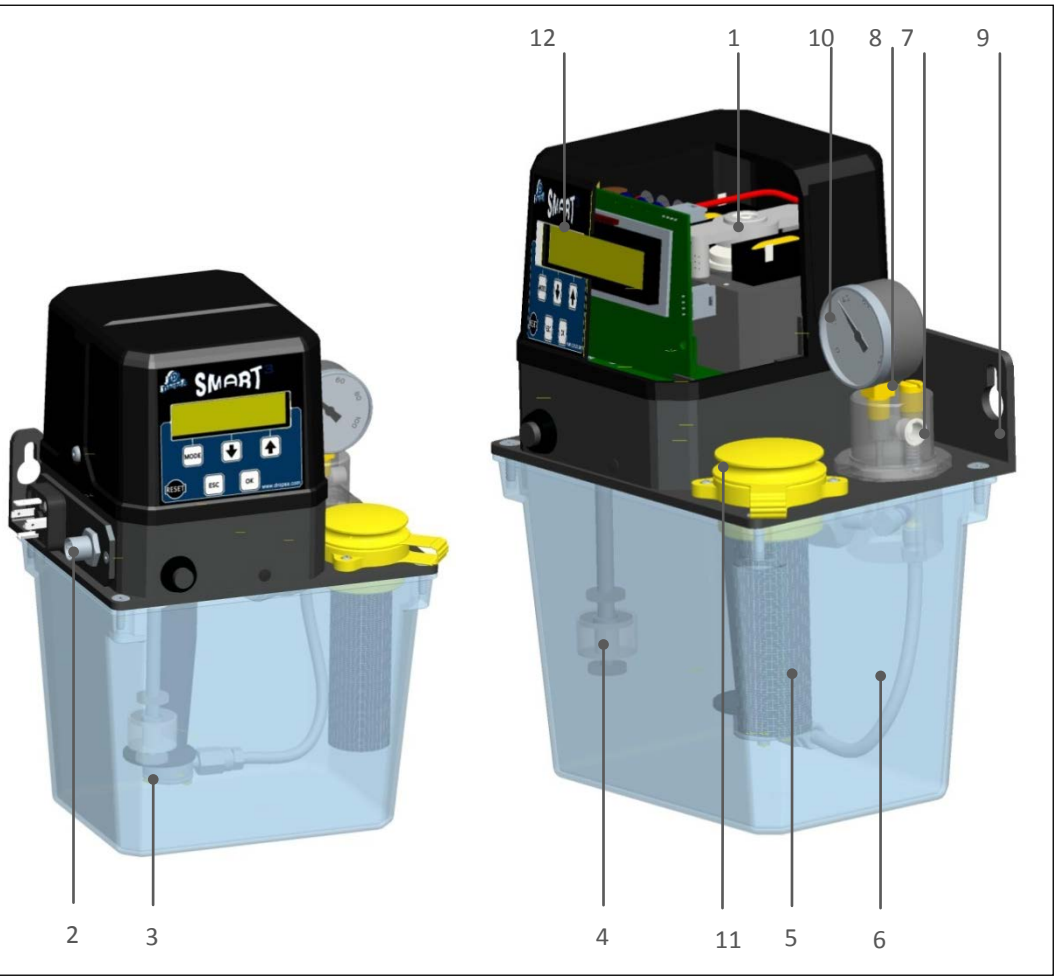
- An integrated by-pass for pressure-regulating
- Arelief valve for pressure
- An electrical minimum level
- A lubricant charging filter
- A pre-calibrated pressure switch
- Apressure gauge.



## 5. PUMP COMPONENTS

Following main components of the pump:

| PUMP COMPONENTS | |
|---|---|
| 1 | Motor |
| 2 | Connector plate |
| 3 | Pump |
| 4 | Level indicator |
| 5 | Filling filter |
| 6 | Reservoir |
| 7 | Pressure/Outlet Manifold |
| 8 | By-pass adjustment screw |
| 9 | Clamping bracket |
| 10 | Pressure gauge |
| 11 | Plug |
| 12 | Control board (for automatic versions) |




## 6. VERSIONS

### 6.1 MANUAL VERSION

This version is not equipped with an integrated control system. All control and monitoring of the pump is done by an external control system or PLC. This is typically the configuration used for Machine Tools factory fit.
The Pump is equipped with connection plate located under the pump cover where all electrical connections are concentrated (motor, minimum level, pressure switch). On the front face of the pump, there is a button to activate a lubrication cycle manually. When pressed, the button closes a contact. This signal is fed back to the external PLC control that will then run a lubrication cycle.
The level and Pressure switch can be wired either in series or in parallel depending on the choice of connector used by the host PLC which will determine alarm or low-level condition that may be present.



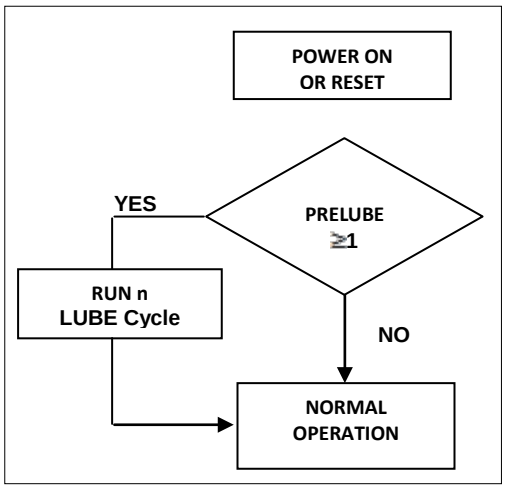
## 6.2 AUTOMATIC VERSION




The Automatic version of the pump is equipped with a built in electronic controller that controls the pump and monitors feedback from the pressure and level switches.
The control system settings and human interface is via the 16x2 character LCD display on the front face and the 5 programming buttons. A Reset button is located on the lower left side.
The Manual cycle button present on the Manual version remains but on the Automatic version will cause the local built in control system to run a lubrication cycle.
SMART3 automatic pumps can be programmed to operate with**intermittent lubrication**cycle that involves the following three phases:

**A) Prelube -> pre- lubrication when system is powered on**
**B) Lube (lube – wait) ->the lubrication cycle**
**C) Standby**

### A)PRELUBE




The ***pre-lube phase***allows the user to run a set number of lubrication cycles (250 Max) when the pump is powered on. This typically is used when a system needs additional quantities of oil on power up.

*Prelube* takes place:

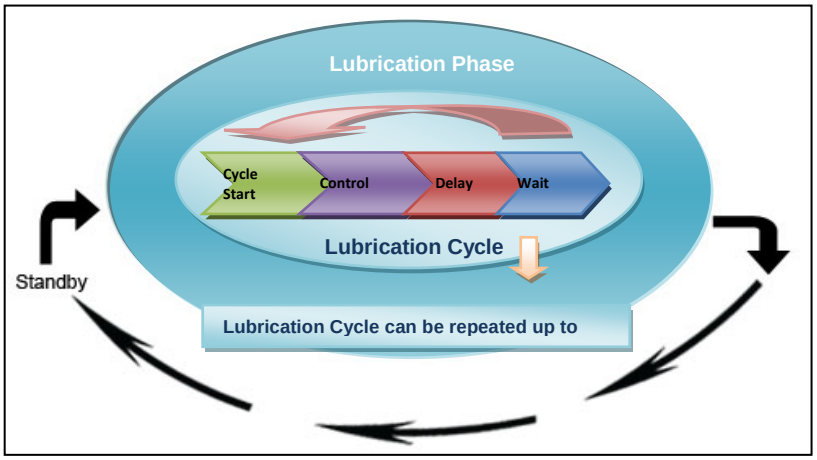
- on POWER-ON;
- on RESET;
- Any time new parameters are set.

When *prelube* is set to "0", the prelube phase is completed skipped and the pump will work just with the normal lube and standby phases.

### B) LUBE

This step is made up of a set of cycles (max 999 cycles) during which lubrication is carried out. Each cycle consists of two sub-cycles (*lube* and *wait*) and involves the monitoring of timers and/or inputs:

- ***Duringlube***, system delivers lubricant to the lubrication points;
- ***Duringwait***, a timer defines the wait time between two or more lube cycles or before the beginning of the standby phase (in case only 1 lube cycle was set).




*Lubrication Phase can comprise of many Lubrication Cycles*

There are two types of lube:

- **TIMER**: The pump will simply run for the On time and then enter standby mode;
- **PS: The pump will run until the pressure switch is made and pressure is maintained for a check period.** Subsequently, the pump will be switched off and the standby phase will commence.

### C) STANDBY

During this step lubrication system is idle until the next lubrication cycle. There are three ways to regulate standby:

- **TIMER:** a timer regulate system idling;
- **PULSE:** a pulse counter regulate system idling;
- **BOTH:** both a timer and a pulse counter regulate system idling. The type of standby will depend on which of these two events will start first.

For conditions of use and programming cycles see chapter 8.

### 6.3 SIMPLIFIED AUTOMATIC VERSION “Smart & Simple”




This version is designed to allow a very simple ON/OFF operation of the pump for use in environments where simplicity is the key. The Smart3 “Smart&Simple” version has + / - keys to set the ON and standby timers of the pump. No cycle monitoring is carried out. The display will indicate the time setting for both ON and STANDBY timers.

The settable range for Cycle and Standby phases are:

| | |
|---|---|
| **ON TIMER**: | 1s – 5min |
| **OFF TIMER:** | 5 times ON TIME – 99H 00min |

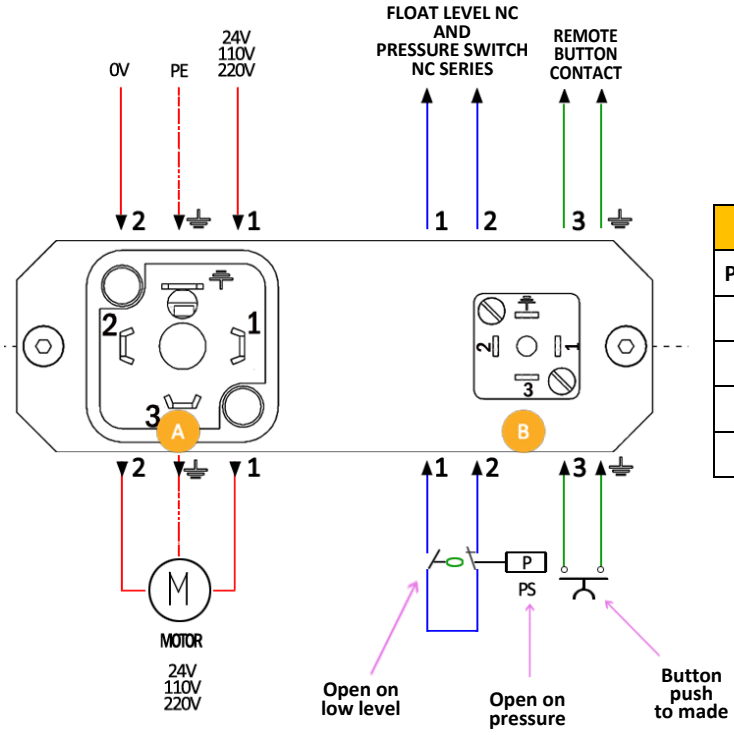
## 6.4 ELECTRICAL CONNECTIONS

### 6.4.1 Manual version

Following are different type of connectors and available signals:

➢ **TYPE 1**

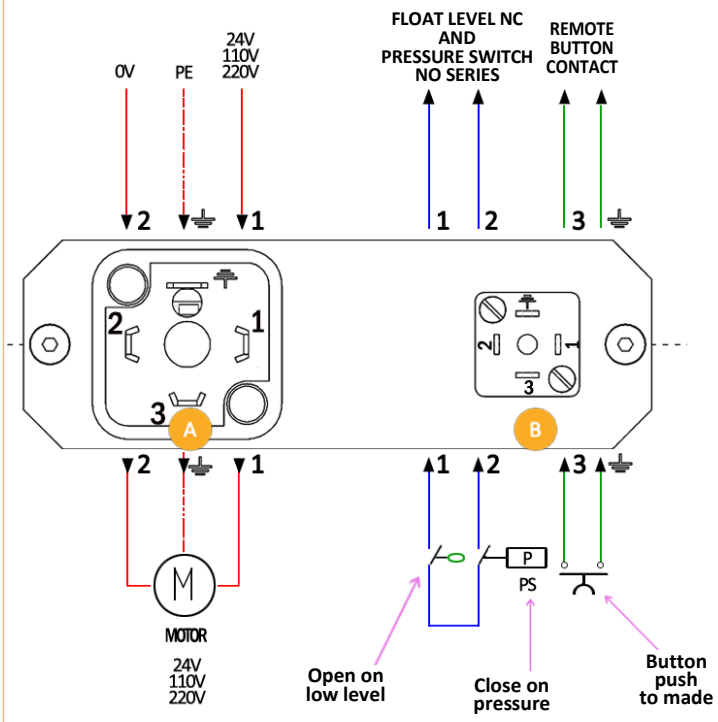
**- FOR MANUAL VERSIONS WITH NC SERIES PRESSURE SWITCH ALARM*- 3133800**




| A (DIN43650) | | B (DIN40050) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Voltage Free NC contact alarm Pressure switch and Level switch wired in Series |
| 2 | | 2 | |
| 3 | NOT USED | 3 | Push Button Contact (Voltage Free) |
| 4 | Earth | 4 | |

***APPLICABLE TO PUMP CODES:**
4010000/4010100/4010200/4010300/4010400/
4010500/4010600/4010700

**- FOR MANUAL VERSIONS WITH NO SERIES PRESSURE SWITCH ALARM*- 3133800**

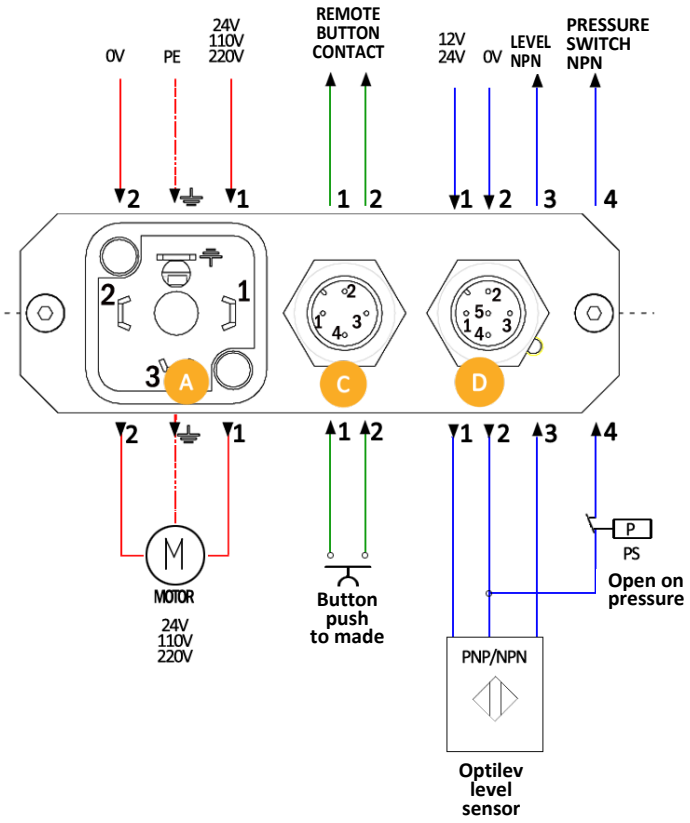



| A (DIN43650) | | B (DIN40050) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Voltage Free NC contact alarm Pressure switch and Level switch wired in Series |
| 2 | | 2 | |
| 3 | NOT USED | 3 | Push Button Contact (Voltage Free) |
| 4 | Earth | 4 | |

***APPLICABLE TO PUMP CODES:**
4010020/4010120/4010220/4010620/4010320/
4010420/4010520/4010720

## ➢ TYPE 2

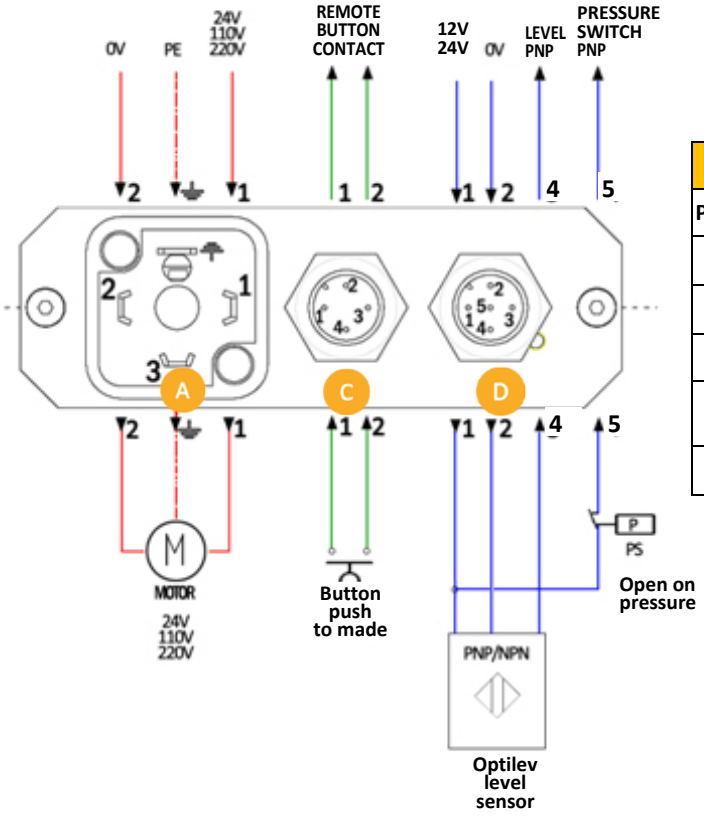
### - FOR MANUAL VERSIONS WITH PRESSURE SWITCH SIGNAL AND OPTICAL LEVEL (N) *- 3133803




| A (DIN43650) | | C (M12X1) | | D (M12X1) | |
|---|---|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Push Button Contact (Voltage Free) | 1 | Level Sensor Power supply + |
| 2 | | 2 | | 2 | Level Sensor Power supply - |
| 3 | NOT USED | 3 | NOT USED | 3 | NPN Alarm Output of level |
| 4 | Earth | 4 | | 4 | NPN signal of pressure switch |
| | | | | 5 | NOT USED |

***APPLICABLE TO PUMP CODES:**
4010013/4010113/4010213/4010313/4010413/
4010513/4010613/4010713

### - FOR MANUAL VERSIONS WITH PRESSURE SWITCH SIGNAL AND OPTICAL LEVEL (P)* - 3133805



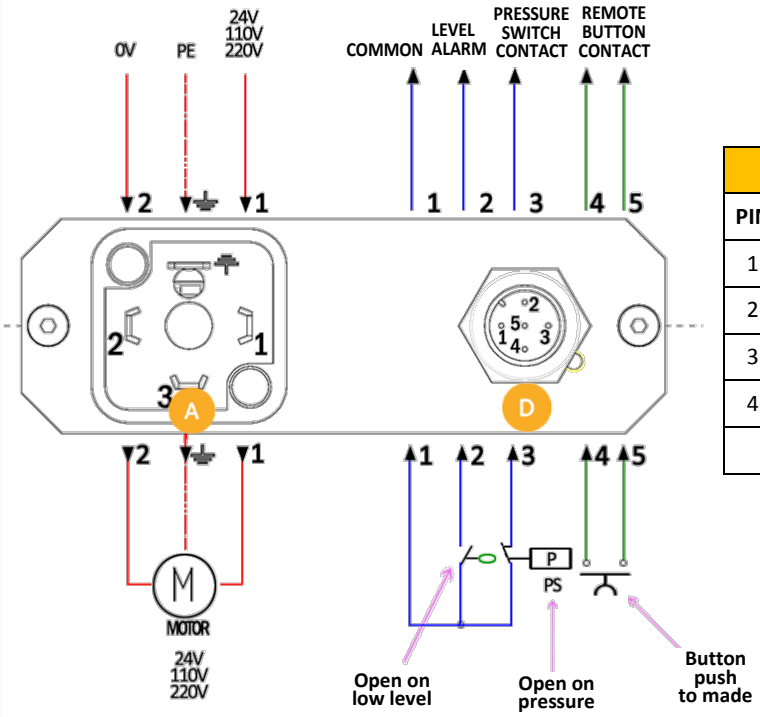

| A (DIN43650) | | C (M12X1) | | D (M12X1) | |
|---|---|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Push Button Contact (Voltage Free) | 1 | Level Sensor Power supply + |
| 2 | | 2 | | 2 | Level Sensor Power supply - |
| 3 | NOT USED | 3 | NOT USED | 3 | NOT USED |
| 4 | Earth | 4 | | 4 | PNP Alarm Output of level |
| | | | | 5 | PNP signal of pressure switch |

*** APPLICABLE TO PUMP CODES:**
4010015/4010115/4010215/4010315/4010415/
4010515/4010615/4010715

For 4010225-4010525 pumps the PS is close on

## ➢ TYPE 3

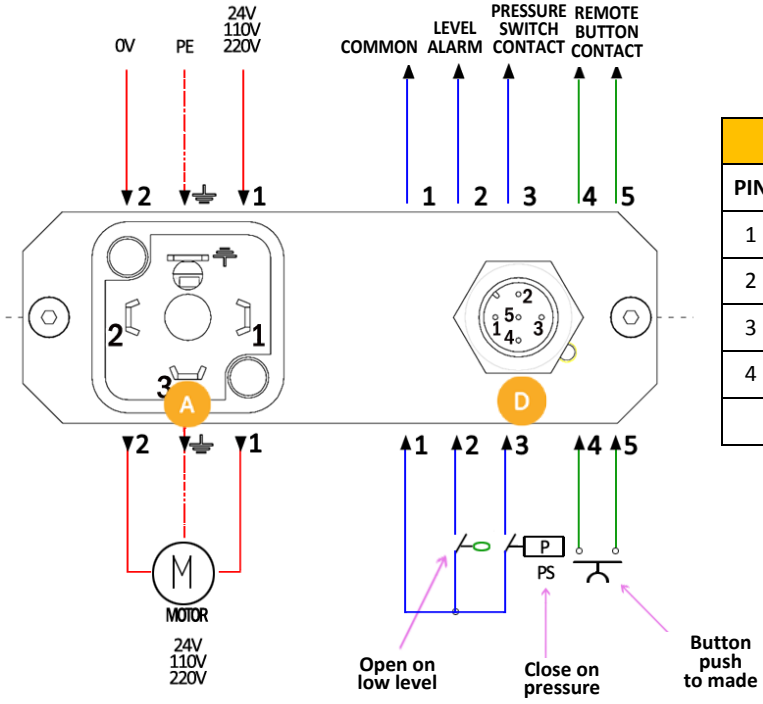
### - FOR MANUAL VERSIONS WITH NC SERIES ALARM*- 3133801




| A (DIN43650) | | D (M12X1) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Common |
| 2 | | 2 | Level alarm |
| 3 | NOT USED | 3 | Pressure Switch Contact |
| 4 | Earth | 4 | Push Button Contact (Voltage Free) |
| | | 5 | |

***APPLICABLE TO PUMP CODES:**
4010001/4010101/4010201/4010301/4010401/
4010501/4010601/4010701

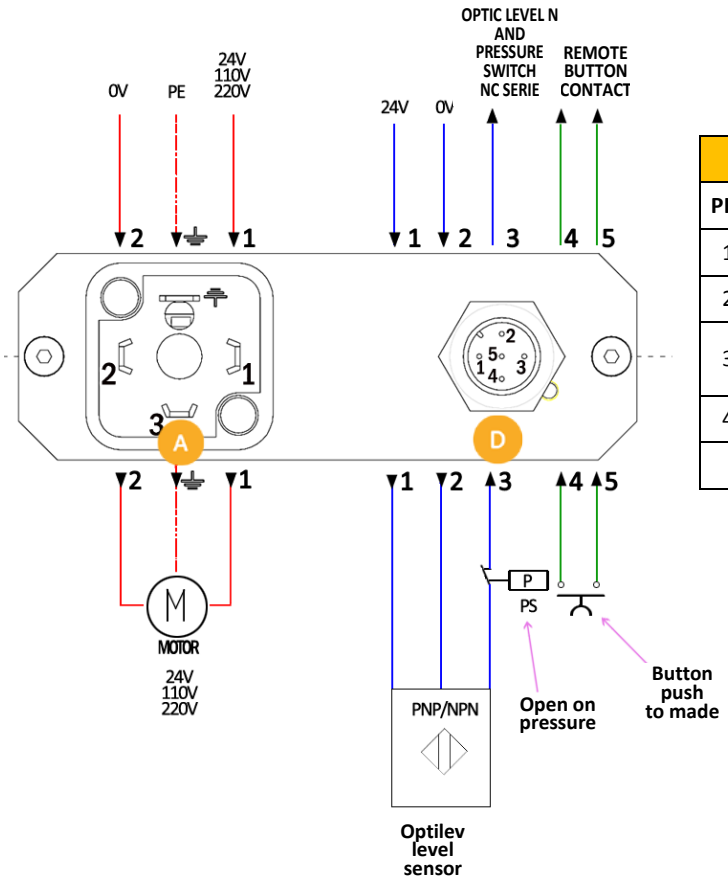
### - FOR MANUAL VERSIONS WITH NO SERIES ALARM*- 3133801




| A (DIN43650) | | D (M12X1) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Common |
| 2 | | 2 | Level alarm |
| 3 | NOT USED | 3 | Pressure Switch Contact |
| 4 | Earth | 4 | Push Button Contact (Voltage Free) |
| | | 5 | |

***APPLICABLE TO PUMP CODES:**
4010621/4010721/4010021/4010121/4010221/
4010321/4010421/4010521

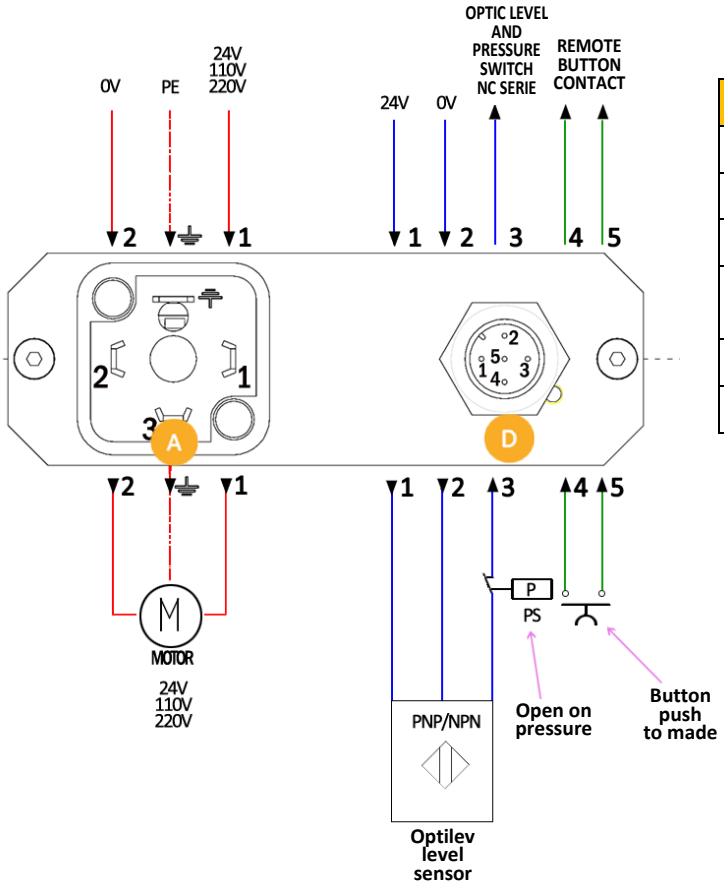
## - FOR MANUAL VERSIONS WITH OPTICAL LEVEL (N) AND PRESSURE SWITCH IN SERIES*- 3133802




| A (DIN43650) | | D (M12X1) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Level Sensor Power supply + |
| 2 | | 2 | Level Sensor Power supply - |
| 3 | NOT USED | 3 | NPN Alarm Output. Level and Pressure switch in series |
| 4 | Earth | 4 | Push Button Contact (Voltage Free) |
| | | 5 | |

***APPLICABLE TO PUMP CODES:**
4010013/4010113/4010213/4010613/4010313/
4010413/4010513/4010713/4010512

## - FOR MANUAL VERSIONS WITH OPTICAL LEVEL (P) AND PRESSURE SWITCH IN SERIES*- 3133804

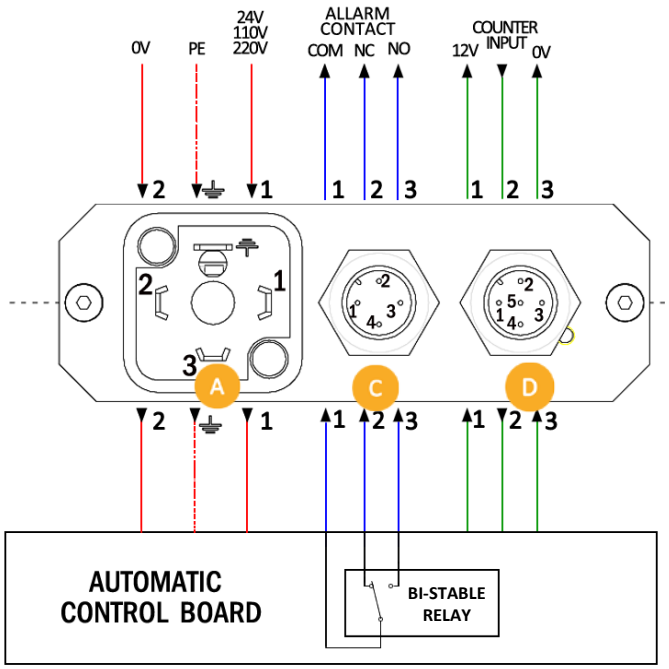



| A (DIN43650) | | D (M12X1) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Level Sensor Power supply + |
| 2 | | 2 | Level Sensor Power supply - |
| 3 | NOT USED | 3 | PNP Alarm Output Level and pressure switch in series |
| 4 | Earth | 4 | Push Button Contact (Voltage Free) |
| | | 5 | |

***APPLICABLE TO PUMP CODES:**
4010014/4010114/4010214/4010314/4010414/
4010514/4010614/4010714

### 6.4.2 Full automatic version- 3133806*

➢ **TYPE 2**



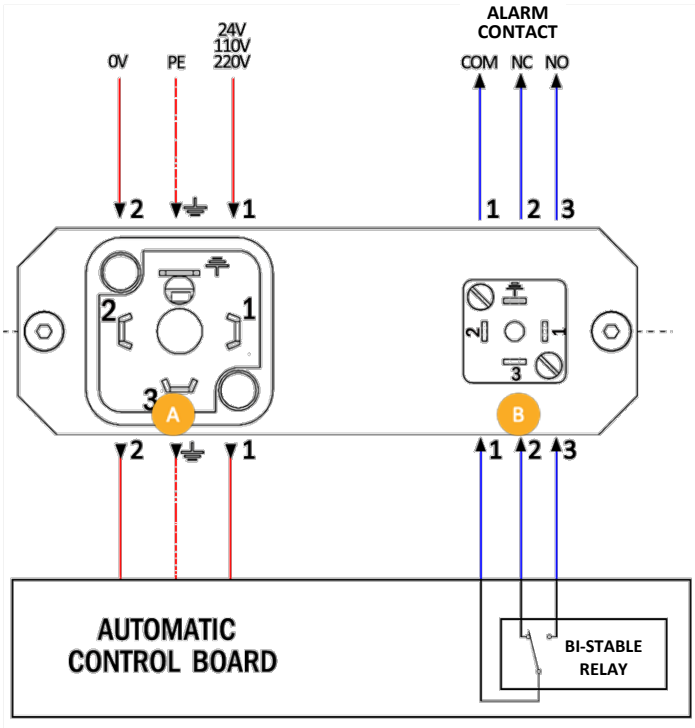

| A (DIN43650) | | C (M12X1) | | D (M12X1) | |
|---|---|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Alarm Relay – Common | 1 | Power counter + ** |
| 2 | | 2 | Alarm Relay - NC contact | 2 | Counter (N / P) / INPUT suspend |
| 3 | NOT USED | 3 | Alarm Relay - NO contact | 3 | Power counter - |
| 4 | Earth | 4 | | 4 | NOT USED |
| | | | | 5 | NOT USED |

**** For 24V versions the output supply is 24Vdc**

***APPLICABLE TO PUMP CODES:**
4011019/4011119/4011219/4011319/4011419/
4011519/4011619/4011719

### 6.4.3 "Smart & Simple" AND AUTOMATIC VERSION - 3133807

➢ **TYPE 1**




| A (DIN43650) | | B (DIN40050) | |
|---|---|---|---|
| PIN | DESCRIPTION | PIN | DESCRIPTION |
| 1 | AC / DC POWER INPUT | 1 | Alarm Relay – Common |
| 2 | | 2 | Alarm Relay - NC |
| 3 | NOT USED | 3 | Alarm Relay - NO |
| 4 | Earth | 4 | NOT USED |

***APPLICABLE TO PUMP CODES:**
4011018/4011118/4011218/4011318/4011418/
4011518/4012018/4012118/4012218/4012318/
4012418/4012518/4011618/4011718/4012618/
4012718

## 7. UNPACKING AND INSTALLATION

### 7.1 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.

### 7.2 INSTALLATION

Allow a sufficient amount of space for installation, leaving a minimum parametric space of 100 mm (3,93 in.).
For wall-mounting, suitable space must be provided (see the installation diagram) to prevent abnormal positions or the possibility of impacts; fixing holes are provided on the plate (see Section 12).
Connect the pipe onto the outlet pressure manifold using a suitable fitting arrangement. Do not exceed 15 Nm. torques.
Proceed with electrical connections and fill the reservoir(making sure not to exceed the maximum visual level).

## 8. INSTRUCTIONS FOR USE

### 8.1START-UP OF THE PUMP

Before using the 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 specialized 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 magnetothermic switch with a triggering threshold of 0.03 Ampere andmax triggering time of 1 second.

**The cut-off power of the switch must be = 10 kV and the rated current= 4 A**

- 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 DropsaSpA technical office to receive a detailed card about the recommended oils.
- Do not ignore the hazards to health and comply with the health regulations.

- 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.
- Check the connection of the level and the pressure switch, if necessary, to the control panel.
- Once the pump has started, check the direction of rotation of the electric motor: if it rotates backward, reconnect it as shown in the wiring diagram provided with the motor.

***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.**

### 8.2 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 DropsaSpA technical office can be contacted to request the inspection procedure).




### 8.3 RESERVOIR FILLING

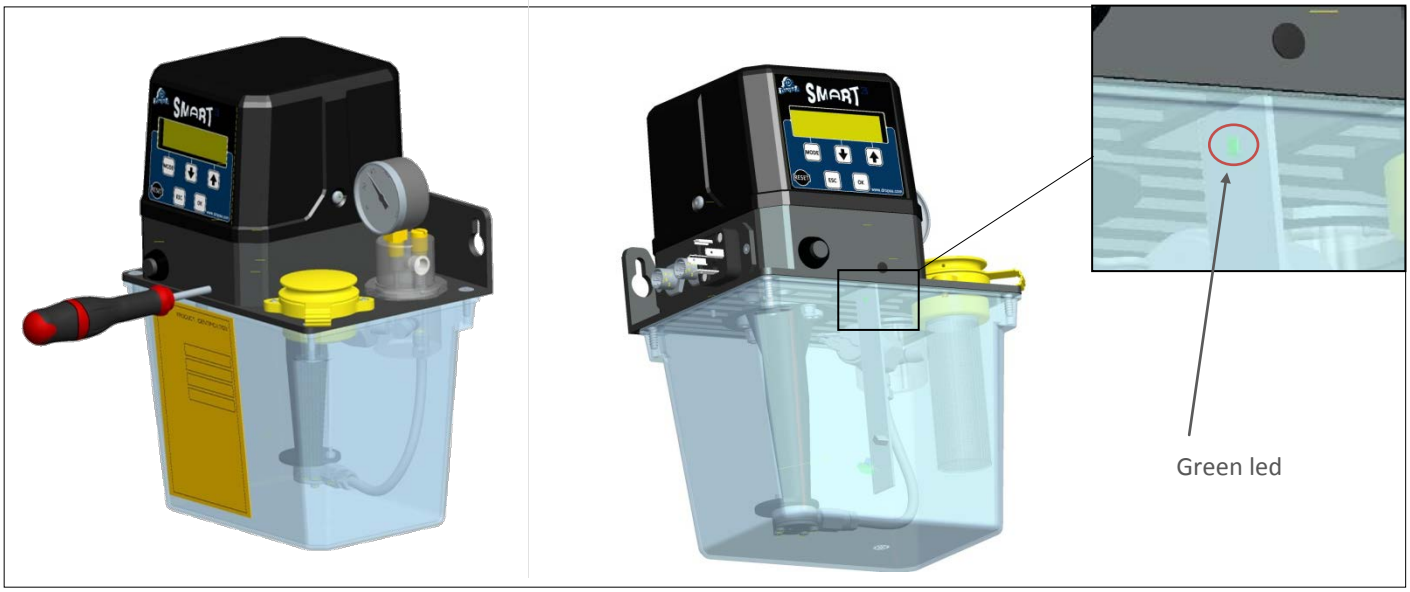
Reservoir filling is done via the filling cap with filter. Fill the reservoir and do not exceed the maximum level line.

### 8.4 ADJUSTEMENT/CALIBRATION OF THE DROPSA OPTILEV OPTICAL LEVEL (on selected models)

The level is tested and calibrated with oil by Dropsa, however is recommended before starting the pump to follow the procedure below:

1) Fill the reservoir;
2) Open the front regulating hole;
3) Turn the level adjustment screw using a screwdriver, until the green led on the level is off (see the image below);
4) Turn the screw in the opposite direction until the minimum signal level disappearance on the display (or the green LED for manual versions).

At the end of this procedure the level is correctly set. It is possible to re-do the calibration following the same procedure above.

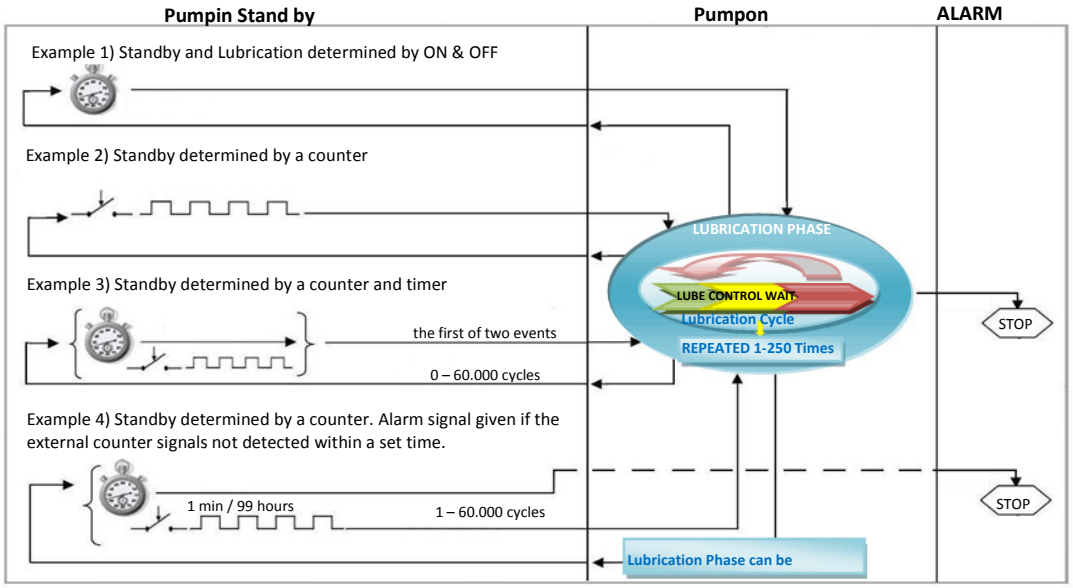



### 8.5 OPERATING MODE FOR AUTOMATIC VERSIONS

For automatic version, you can set two different operating modes: CYCLE or PULSE as described below:

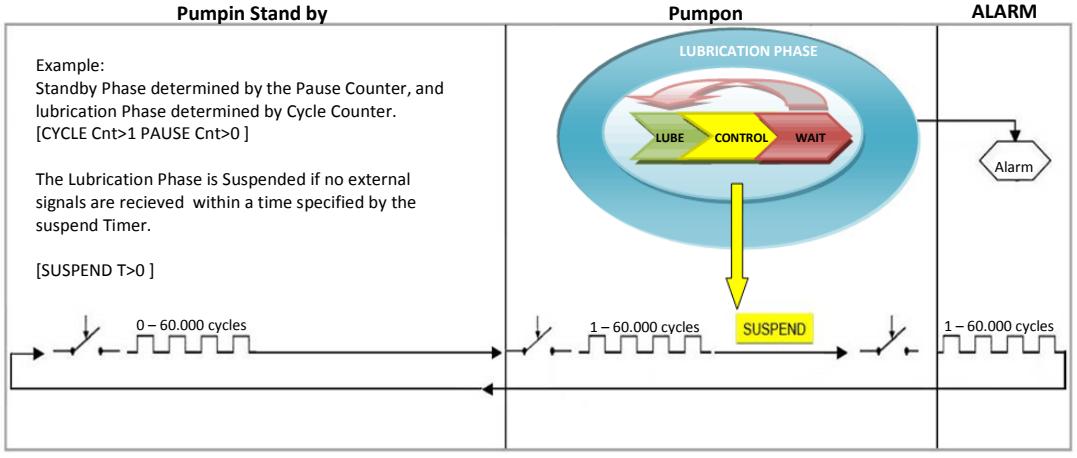
#### 8.5.1 "CYCLE" Mode

In Cycle mode if you use a timer,the lubrication cycle will be completed when the timer ends. The Cycle will complete when the timer expires or the pressure is reached. The Standby phase is determined by a timer or by an external input counter.



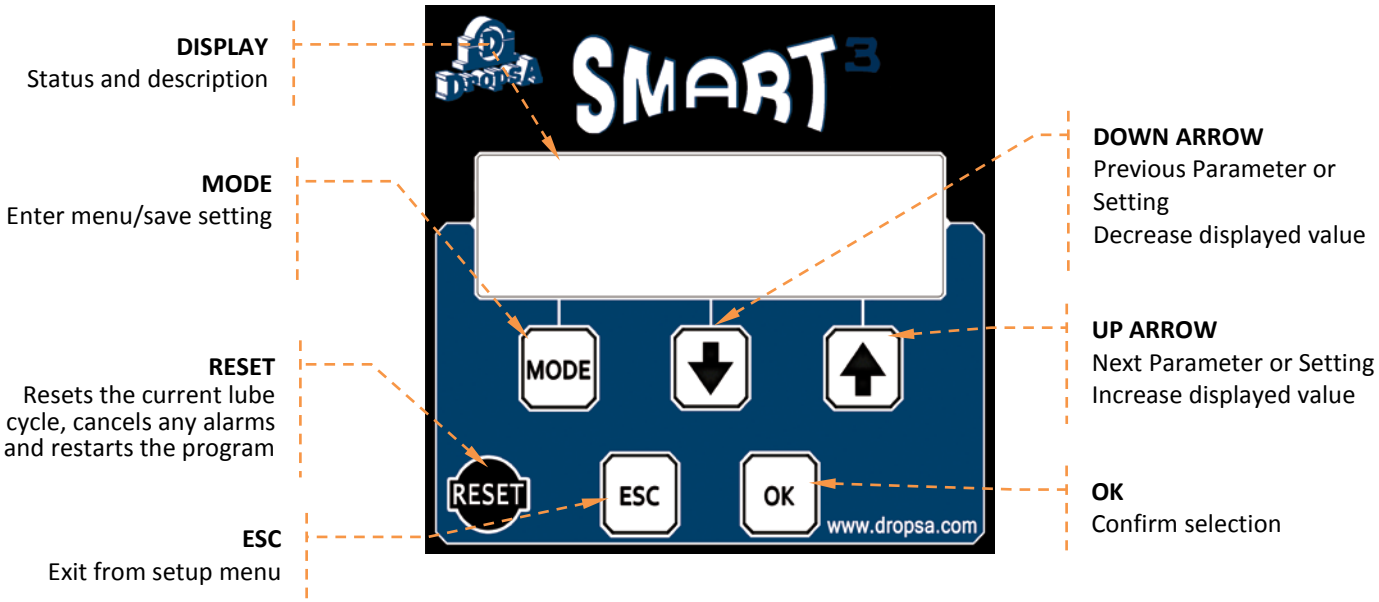

#### 8.5.2 "PULSE" MODE

In ***Pulse***mode, the duration of the ***Standby Phase*** and the ***Lubrication Phase*** are both determined by an external signal counter. The correct operation of the ***Lubrication Cycle*** can be monitored using a cycle sensor. This mode is typically used for conveyor or chain lubrication where the duration of the lubrication cycle is determined by an external pulse.

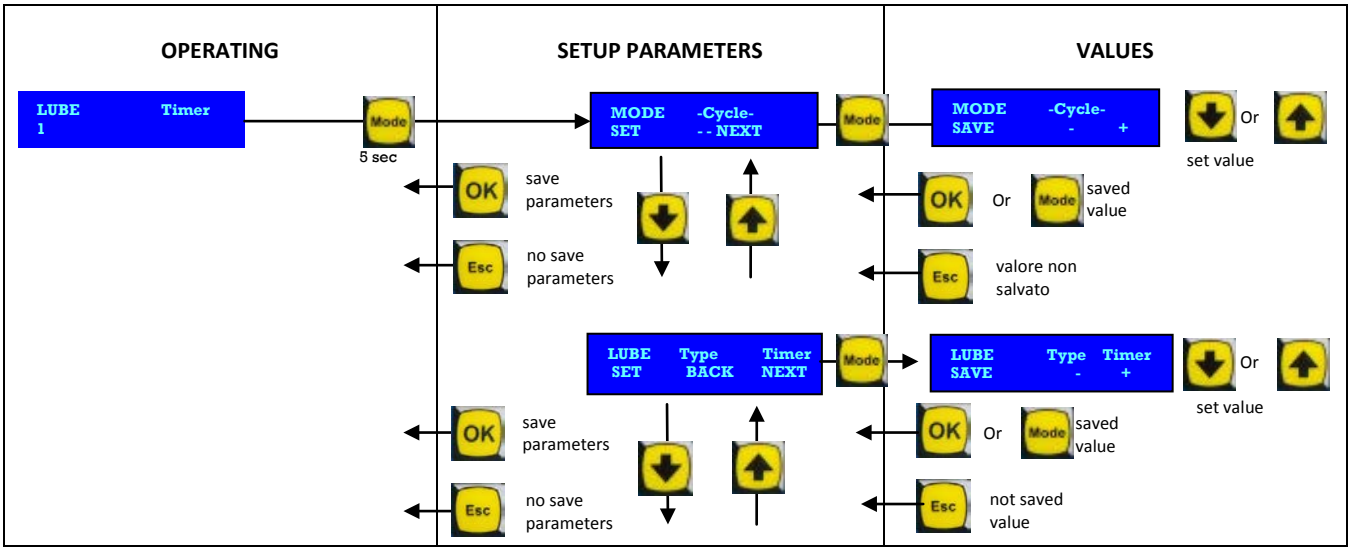


### 8.6FULL AUTOMATIC VERSION PROGRAMMING

Buttons key functions of complete automatic version.




Following diagram shows how to navigate around the parameters and change values.




To enter the SETUP menu from the OPERATING Mode, hold the Mode (Mode) button for 5 seconds.

The (Up and Down) keys allow scrolling through the parameters.

By pressing the Mode button again, the indicated parameter value can be modified by using the Up and Down keys.

To exit, use the OK (OK) key, or Esc (Esc) if you want to exit without saving

**NOTE**: When power is removed from the electronic controller it will save the cycle condition in memory. When power is reapplied the controller will resume the logic from exactly the same point (unless the PRELUBE option is set).
When powering on the system or when pressing the RESET button the controller will display the firmware version of the unit for 2 seconds.
For all modes the Prelube parameter determines if the pump starts in a lubrication cycle when it is set to ON.

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

## 8.7PROGRAMMING THE SMART3 AUTOMATIC VERSION

When switching on the SMART 3 you are automatically in the BASIC MENU. This allows you to run simple lubrication systems with only the main parameters settable such as pause and on time.
If you have more complex requirements - such as multiple monitored cycles or prelube cycles, the user should enter the extended menu. For details on extended menu please refer to section 8.7.1.

The main parameters to set are **CYCLE END** and **LUBE TYPE**.

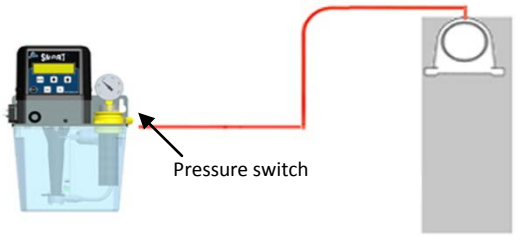
**CYCLE END**is settable as 'cycle' or 'pulse'. If CYCLE is selected it means that the lube cycle is completed with a signal from a sensor. Pulse means that both the standby time and run time is completed by sensor.

**LUBE TYPE**is settable as 'TIMER' or 'no control' or '33vps'.
If CYCLE END is set to 'CYCLE' then you can only choose between 'TIMER'(cycle ends on timed basis) or'33vps'(cycle ends on ps signal).
If CYCLE END is set to 'PULSE' you can choose between 'NO control'(no ps switch needed to finish cycle) or '33vps'(pressure switch signal must be received to finish cycle).

- SMART3 PUMP **DEFAULT** IS SET with "**CYCLE END**" in "CYCLE" and "**LUBE TYPE**" IN "33V/PS":

**BASIC MENU**allowssetting pause time betweenlubrication and the next one.

| BASIC PARAMETERS | | | |
|---|---|---|---|
| PARAMETER | DEFAULT | DESCRIPTION | RANGE |
| Standby | 6m 00s | Standby time | 5s – 99h00m |

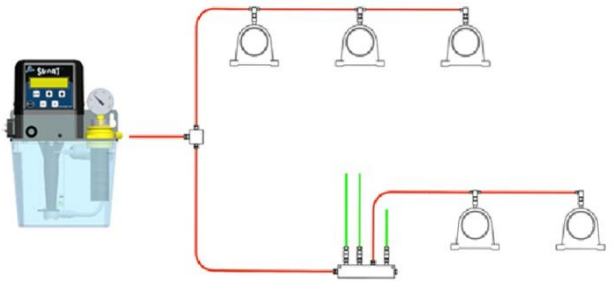



To allow the user to select the other main parameters in **EXTENDED MENU**, hold "MODE" button for 5 seconds as described in previous section and select following parameters you need.

- "**CYCLE END**" in "CYCLE" and "**LUBE TYPE**" in "TIMER"

With these parameters you can set **BASIC MENU**the duration of a lubrication cycle. So, in this case, the pump will lubricate the system every 6 minutes for 30 seconds.

| BASIC PARAMETERS | | | |
|---|---|---|---|
| PARAMETER | DEFAULT | DESCRIPTION | RANGE |
| Lube Timer | 30 sec | How long the pump will run | 1s – 2 min |
| Standby | 6m 00s | Standby time | 5s – 99h00m |

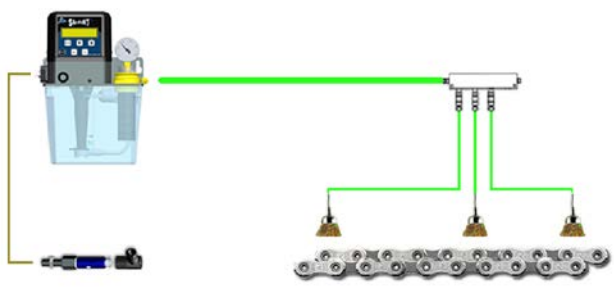


If you need that the pump manages cycle lubrication with an external signal you can set two parameters:

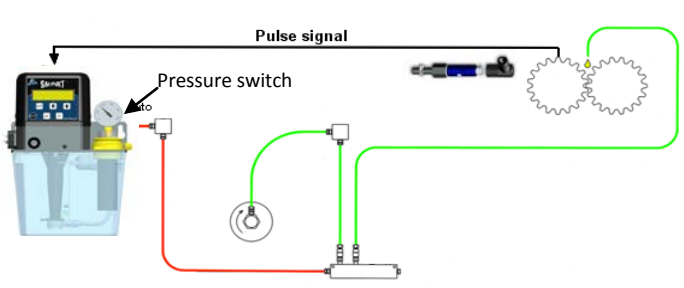
- "**CYCLE END**" in "PULSE" and "**LUBE TYPE**" in "NO CONTROL"
- "**CYCLE END**" in "PULSE" and "**LUBE TYPE**" in "33V/PS"

Bothcases**BASIC MENU**allow setting timeout time for pulses received. Default pause is set to1,therefore,eachlubricationpumpwill pausefor a tot.SECset toleave again. Second case("CYCLE END" in "PULSE" and "LUBE TYPE" in "33V/PS")pumpis controlled by thesetting pressure.

"**CYCLE END**" in "PULSE" and "**LUBE TYPE**" in "NO CONTROL"



"**CYCLE END**" in "PULSE" and "**LUBE TYPE**" in "33V/PS"



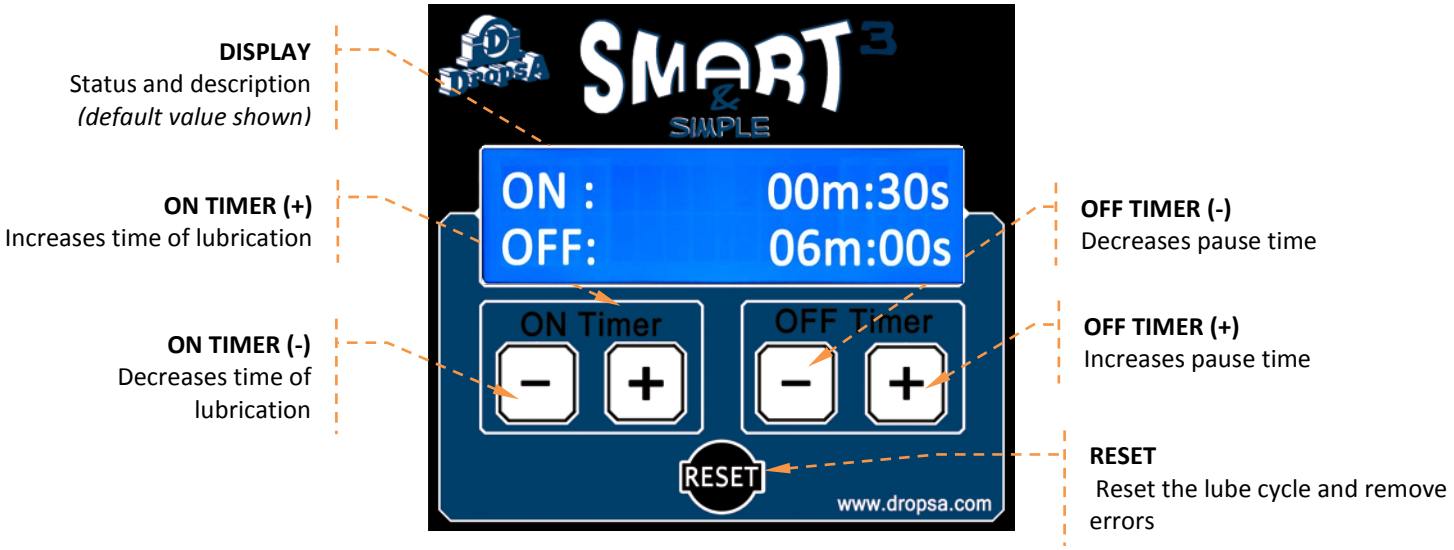
### 8.7.1 COMPLETE LIST OF PARAMETERS FOR AUTOMATIC VERSIONS

APPLICABILITY column of the table shows the possible combinations of the parameters, in relation to the work mode selection (using CYCLE END parameter) and the control type of lubrication cycle (using LUBE TYPE parameter).

| PARAMETER NAME | DEFAULT VALUE | DESCRIPTION | BASIC MENU | VALUES/ RANGE | APPLICABILITY | | | |
|---|---|---|---|---|---|---|---|---|
| CYCLE END | **CYCLE** | **SELECTS THE OPERATING MODE:** | | | | | | |
| | | Lubrication Cycle completed when the cycle sensor confirms correct lubrication | | **CYCLE** | | | | |
| | | Both Standby and Lubrication Phase determined by external signal | | **PULSE** | | | PULSE | CYCLE |
| LUBE TYPE | **TIMER** | **SELECTS THE CYCLE MONITORING:** | | | | | X | X |
| | | IF CYCLE SELECTED | | **TIMER-33V** | | | | |
| | | IF PULSE SELECTED | | **NO CONTROL - 33V** | | | | |
| PauseBy | TIMER | Determines Standby Phase Timing<br>Time based Standby<br>Whichever of above 2 events occurs first<br>A set number of external PULSE signals<br>By PULSE signals. However, if PAUSE TIME is reached, an alarm will be given | | Timer<br>Time & CNT<br>Counter<br>Tout& Cnt | X | X | | X |
| PAUSE | 6m 00s | Pause time | X | 5s – 99h00m | X | X | | X |
| CYCLE TOUT | 30 sec | Timeout counter determines max time permissible for cycle completion before a timeout alarm is generated. | | 1s - 2min | X | | X | X |
| LUBE TIME | 30 sec | How long the pump will run | X | 1s – 2min | | X | | X |
| LUBE CYCLES | 1 | Number of Lubrication Cycles to complete a Lubrication Phase | | 1 – 250 | X | X | | X |
| START IN | Resume | Determines state at power on:<br>Start in Standby Phase<br>Start in Lubrication phase<br>Resume from power down state | | Standby<br>Lube<br>Resume | X | X | X | X |
| PRELUBE | 0 | Number of Prelube Cycles | | 0 – 250 | X | X | | X |
| ALARM | Standard | How REMOTE ALARM is managed<br>Relay is powered off during alarm standard NO/NC<br>A Pulse Coded Alarm signal is given (for details see section 9.1) | | Standard<br>Coded | X | X | X | X |
| STOP | On all | Determines what Alarm conditions should stop the Lubrication cycles.<br>Never stop the lubrication cycle<br>All alarm conditions<br>All but min Level stops the pump<br>Only minimum level alarm stops the pump | | On none<br>On All<br>All but min Level<br>Minlev only | X | X | X | X |
| WAIT TIME | 10s | Time between two Lubrication Cycles within the Lubrication Phase | | Null – 2min | X | X | X | X |
| DELAY TIME | 5s | When the pressure switch is made, how long to keep the pump running to ensure that the signal is genuine and not a pressure spike | | 0s – 2min | X | | x | x |
| SUSPEND | Disable | In enabled, the pump will suspend operation if the external suspend signal is present | | Disable -Enable | X | X | | X |
| SUSPEND T | 1.5 s | In Pulse Mode, if pulses are not received within this time the pump will be in alarm | | Null – 2min | X | X | X | |
| PAUSE CNT | 1 | In Cycle Mode sets the number of external pulses for standby. This parameter can be used in conjunction with the pause timer. If set to zero the standby will be based exclusively on the 'standby timer' setting.<br>In Pulse mode, sets the duration (in pulses) for standby phase. | X | 0 –250<br>(cycle mode)<br>1-60000<br>(PULSE mode) | X | X | X | X |
| PAUSE MULT | 1 | The multiplies is used to increase the order of magniture of the standby counter. For example sending a multiplier of 100 and a standby counter of 52 will result in a standby value of 5200 | | 1; 10; 100 | X | X | X | |
| CYCLE CNT | 1 | The Duration of the Lubrication cycle (in PULSE Mode) | | 1-60000 | X | X | X | |
| SET DEFAULT VAL. | | RESET TO FACTORY DEFAULT SETTINGS | | Yes – No | X | X | X | X |

**8.8SMART&SIMPLE – SIMPLIFIED AUTOMATIC VERSION PROGRAMMING**

In this version the pump operates only in TIMER mode.Using 4 buttons placed on the panel you can set times and pause of lubrication.To change ON and OFF timing press related buttons for 3s.




## 9. PROBLEMS AND SOLUTIONS

### 9.1 ALARM TABLE for AUTOMATIC VERSION

The following is a list of possible alarms generated by the SMART3 AUTOMATIC VERSION with information for troubleshooting purposes.

| ALARM CODE | DESCRIPTION | NOTES/CHECKS/SOLUTIONS |
|---|---|---|
| ALARM 01 | LOW LEVEL | The Low level sensor has triggered.<br>Replenish the oil reservoir. |
| ALARM 05 | PS ALREADY ON | The pressure switch has not been detected in the specified time. Make sure that you have set the timer to a value that allows the cycle to complete and check for leaks. |
| ALARM 06 | PS AFTER WAIT | The P2 input has been activated and the Boost Function has increased the number of Lubrication Cycles in the Lubrication Phase. |
| ALARM 07 | NOT IN PRESS. | The Thermal relay trip signal has been detected.<br>Verify and repair. |
| ALARM 08 | PAUSE TIMEOUT | In PS Cycle mode, the pressure switch was already active before the pump was switched on.<br>Check to ensure the venting system is operating correctly. |
| ALARM 15 | UNCODED FAIL | An unknown Internal error has occurred.<br>Try resetting the unit. If the error re-occurs, the unit must be returned to Dropsa for inspection. |

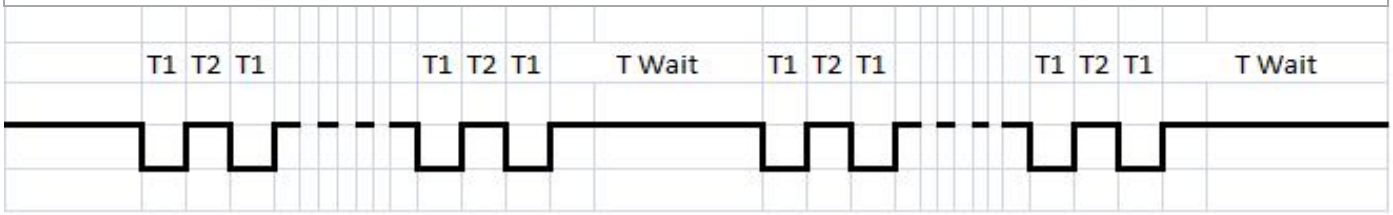
### 9.2 REMOTE CODED ALARM FUNCTION

The SMART3 AUTOMATIC VERSION has the ability to use a remote pulsed coded alarm contact.
Every time the SMART3 AUTOMATIC VERSION enters an alarm condition, the remote alarm relay contact is activated.
Most alarm contacts are simply a NC or NO contact that gives a remote system indication that the local controller is in a fault condition.
Additionally, the SMART3 AUTOMATIC VERSION can trigger the alarm according to the alarm code being generated and allow a remote PLC (or even a remote LAMP signal) to read the number of the alarm being generated.

This is done by pulsing the alarm relay in 500ms bursts with a 2000ms gap between each signal burst.

The timing chart below shows how to interface the logic with your PLC.

| |
|---|
| **Alarm code= number of (T1+T2)** |
| **T1= 500ms = alarm contact activation time** |
| **T2= 500ms = alarm contact deactivation time** |
| **TWait= 2000ms= pause time before repetition of same alarm code** |




**9.3 DIAGNOSTICS**

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.

| **DIAGNOSTICS TABLE** | | |
|---|---|---|
| **PROBLEMS** | **PROBABLE CAUSES** | **ACTIONS** |
| **The pump does not deliver oil** | • It intakes air because the tank is empty<br>• The intake filter is dirty or clogged<br>• The internal fittings are loose or broken<br>• The motor rotates backward | • Restore the level in the tank and bleed the air from the system<br>• Wash the filter with petroleum and blow with compressed air<br>• Carefully close all the fittings, making sure there are no leaks and replace the broken pipes.<br>• Correctly connect the motor, inverting the direction of rotation |
| **The pump does not deliver oil at the required pressure** | • Pump deteriorated<br>• Pressure control valve uncalibrated set too low (therefore the oil returns immediately to the tank).<br>• Release valve damaged<br>• Adjustment valve incorrectly calibrated<br>• Presence of dirt in the by-pass valve | • Replace the pump<br>• Tighten the adjustment screw until oil comes out of the delivery pipe<br>• Replace the by-pass valve<br>• Connect a pipe that is approx. 30 cm long to the pump outlet with a pressure gauge applied to the free end. Adjust the valve by turning the screw and reading the corresponding pressure value on the pressure gauge<br>• Remove the components and wash them with petroleum. Before reassembling the components, check the wear status of the O-ring. Replace the entire assembly if necessary |
| **Line pressure not released** | • Control valve with irregular operation | • Disassemble and clean the by-pass valve, replace the valve if necessary |
| **Emptying of the main system line during the pause time** | • Pump or system outlet fittings loosened<br>• Non-return or release valve dirty | • Tighten the fittings<br>• Disassemble and clean the by-pass valve, replace the valve if necessary |
| **Lubrication cycle not performed** | Cycle control pressure switch calibration pressure not reached due to:<br>• Line pipe broken or loose fittings<br>• Pressure switch calibrated higher than the pump<br>• The pump does not deliver oil at the required pressure<br>• The pump does not deliver oil | <br>• Replace the pipe - fully tighten the fittings<br>• Correctly calibrate the pressure switch<br>• See the diagnostics table<br>• See the diagnostics table |

## 10. MAINTENANCE PROCEDURE

The pump was designed and built in order to minimize 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 filter is clean after every 2000 hours of operation.

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.

## 11. 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.

## 12. ORDERING INFORMATION

| SMART3 - MANUAL VERSION - NO CONTROLLER | | | | | | |
|---|---|---|---|---|---|---|
| **LEVEL** | **ALARM** | **RESERVOIR** | **CONNECTOR PLATE** | **VOLTAGE** | **DESCRIPTION** | **PART NUMBER** |
| Magnetic for oil | Contact level open without oil in series pressure switch open on pressure | 2L | Type 1 3133800 | 24Vdc | SMART3-MAN-24V-2L-FL-S-NC | **4010000** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-FL-S-NC | **4010100** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-2L-FL-S-NC | **4010200** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-2L-FL-S-NC | **4010600** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-FL-S-NC | **4010300** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-FL-S-NC | **4010400** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-3L-FL-S-NC | **4010500** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-3L-FL-S-NC | **4010700** |
| | Contact level open without oil in parallel pressure switch contact open on pressure | 2L | Type 3 3133801 | 24Vdc | SMART3-MAN-24V-2L-FL-P-NC | **4010001** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-FL-P-NC | **4010101** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-2L-FL-P-NC | **4010201** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-2L-FL-P-NC | **4010601** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-FL-P-NC | **4010301** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-FL-P-NC | **4010401** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-3L-FL-P-NC | **4010501** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-3L-FL-P-NC | **4010701** |
| Optical for oil/fluid grease | Level N signal in series pressure switch contact open under pressure | 2L | Type 3 3133802 | 24Vdc | SMART3-MAN-24V-2L-OP-NPN-S-NC | **4010012** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-OP-NPN-S-NC | **4010112** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-2L-OP-NPN-S-NC | **4010212** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-2L-OP-NPN-S-NC | **4010612** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-OP-NPN-S-NC | **4010312** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-OP-NPN-S-NC | **4010412** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-3L-OP-NPN-S-NC | **4010512** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-3L-OP-NPN-S-NC | **4010712** |
| | Level N signal in parallelpressure switch contact open under pressure | 2L | Type 2 3133803 | 24Vdc | SMART3-MAN-24V-2L-OP-NPN-P-NC | **4010013** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-OP-NPN-P-NC | **4010113** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-2L-OP-NPN-P-NC | **4010213** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-2L-OP-NPN-P-NC | **4010613** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-OP-NPN-P-NC | **4010313** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-OP-NPN-P-NC | **4010413** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-3L-OP-NPN-P-NC | **4010513** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-3L-OP-NPN-P-NC | **4010713** |
| | P Level signal in series pressure switch contact open under pressure | 2L | Type 3 3133804 | 24Vdc | SMART3-MAN-24V-2L-OP-PNP-S-NC | **4010014** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-OP-PNP-S-NC | **4010114** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-2L-OP-PNP-S-NC | **4010214** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-2L-OP-PNP-S-NC | **4010614** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-OP-PNP-S-NC | **4010314** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-OP-PNP-S-NC | **4010414** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-3L-OP-PNP-S-NC | **4010514** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-3L-OP-PNP-S-NC | **4010714** |
| | P Level signal and parallel pressure switch contact open under pressure | 2L | Type 2 3133805 | 24Vdc | SMART3-MAN-24V-2L-OP-PNP-P-NC | **4010015** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-OP-PNP-P-NC | **4010115** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-2L-OP-PNP-P-NC | **4010215** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-2L-OP-PNP-P-NC | **4010615** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-OP-PNP-P-NC | **4010315** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-OP-PNP-P-NC | **4010415** |
| | | | | 230Vac-50Hz | SMART3-M-230V50-3L-OP-PNP-P-NC | **4010515** |
| | | | | 230Vac-60Hz | SMART3-M-230V60-3L-OP-PNP-P-NC | **4010715** |
| | P Level signal and parallel pressure switch contact close under pressure | 3L | TIPO 2 3133805 | 230Vca-50Hz | SMART3-M-230V50-3L-OP-PNP-P-NC | **4010525** |
| Magnetic for oil | Contact level open without oil series pressure switch contact close on pressure | 2L | Type 1 3133800 | 24Vdc | SMART3-MAN-24V-2L-FL-S-NO | **4010020** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-FL-S-NO | **4010120** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-2L-FL-S-NO | **4010220** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-2L-FL-S-NO | **4010620** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-FL-S-NO | **4010320** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-FL-S-NO | **4010420** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-3L-FL-S-NO | **4010520** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-3L-FL-S-NO | **4010720** |
| | Contact level open without oil in parallel pressure switch contact close on pressure | 2L | Type 3 3133801 | 24Vdc | SMART3-MAN-24V-2L-FL-P-NO | **4010021** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-2L-FL-P-NO | **4010121** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-2L-FL-P-NO | **4010221** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-2L-FL-P-NO | **4010621** |
| | | 3L | | 24Vdc | SMART3-MAN-24V-3L-FL-P-NO | **4010321** |
| | | | | 110Vac-50/60Hz | SMART3-MAN-110V-3L-FL-P-NO | **4010421** |
| | | | | 230Vac-50Hz | SMART3-MAN-230V50-3L-FL-P-NO | **4010521** |
| | | | | 230Vac-60Hz | SMART3-MAN-230V60-3L-FL-P-NO | **4010721** |

| SMART3 - AUTOMATIC VERSION-ON BOARD CONTROLLER | | | | | | |
|---|---|---|---|---|---|---|
| **LEVEL** | **ALARM** | **RESERVOIR** | **CONNECTOR PLATE** | **VOLTAGE** | **DESCRIPTION** | **PART NUMBER** |
| Magnetic for oil | Contact NO/NC | 2L | Type 1 3133807 | 24Vdc | SMART3-AUT-24V-2L-FL-NC/NO | **4011018** |
| | | | | 110Vac-50/60Hz | SMART3-AUT-110V-2L-FL-NC/NO | **4011118** |
| | | | | 230Vac-50Hz | SMART3-AUT-230V50-2L-FL-NC/NO | **4011218** |
| | | | | 230Vac-60Hz | SMART3-AUT-230V60-2L-FL-NC/NO | **4011618** |
| | | 3L | | 24Vdc | SMART3-AUT-24V-3L-FL-NC/NO | **4011318** |
| | | | | 110Vac-50/60Hz | SMART3-AUT-110V-3L-FL-NC/NO | **4011418** |
| | | | | 230Vac-50Hz | SMART3-AUT-230V50-3L-FL-NC/NO | **4011518** |
| | | | | 230Vac-60Hz | SMART3-AUT-230V60-3L-FL-NC/NO | **4011718** |
| Optical for oil/fluid grease | Contact NO/NC | 2L | Type 2 3133806 | 24Vdc | SMART3-AUTC-24V-2L-OP-NC/NO | **4011019** |
| | | | | 110Vac-50/60Hz | SMART3-AUTC-110V-2L-OP-NC/NO | **4011119** |
| | | | | 230Vac-50Hz | SMART3-AUTC-230V50-2L-OP-NC/NO | **4011219** |
| | | | | 230Vac-60Hz | SMART3-AUTC-230V60-2L-OP-NC/NO | **4011619** |
| | Contact NO/NC | 3L | | 24Vdc | SMART3-AUTC-24V-3L-OP-NC/NO | **4011319** |
| | | | | 110Vac-50/60Hz | SMART3-AUTC-110V-3L-OP-NC/NO | **4011419** |
| | | | | 230Vac-50Hz | SMART3-AUTC-230V50-3L-OP-NC/NO | **4011519** |
| | | | | 230Vac-60Hz | SMART3-AUTC-230V60-3L-OP-NC/NO | **4011719** |

| AUTOMATIC VERSION - SMART&SIMPLE | | | | | | |
|---|---|---|---|---|---|---|
| **LEVEL** | **ALARM** | **RESERVOIR** | **CONNECTOR PLATE** | **VOLTAGE** | **DESCRIPTION** | **PART NUMBER** |
| Optical for oil/fluid grease | Contact NO/NC | 2L | Type 1 3133807 | 24Vdc | SMART3-SIMP-24V-2L-OP-NC/NO | **4012018** |
| | | | | 110Vac-50/60Hz | SMART3-SIMP-110V-2L-OP-NC/NO | **4012118** |
| | | | | 230Vac-50Hz | SMART3-SIMP-230V50-2L-OP-NC/NO | **4012218** |
| | | | | 230Vac-60Hz | SMART3-SIMP-230V60-2L-OP-NC/NO | **4012618** |
| | | 3L | | 24Vdc | SMART3-SIMP-24V-3L-OP-NC/NO | **4012318** |
| | | | | 110Vac-50/60Hz | SMART3-SIMP-110V-3L-OP-NC/NO | **4012418** |
| | | | | 230Vac-50Hz | SMART3-SIMP-230V50-3L-OP-NC/NO | **4012518** |
| | | | | 230Vac-60Hz | SMART3-SIMP-230V60-3L-OP-NC/NO | **4012718** |

**N.B. The following specifications apply for all models:**
***Bypass calibration pressure 25 bar; Pressure switch 18 bar; Pressure gauge 0 – 100 bar.***

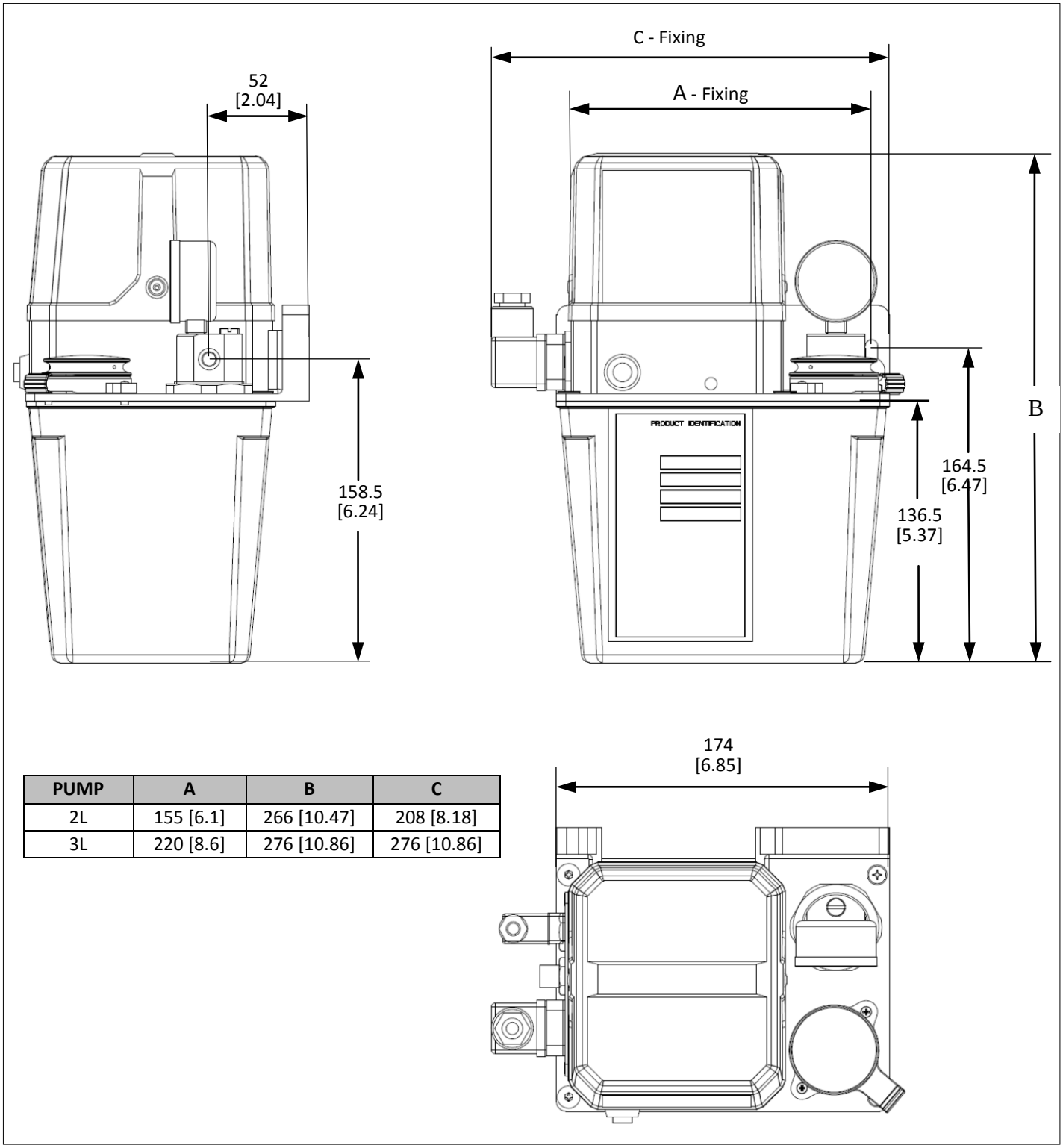
### 12.2 SPARE PARTS

| ITEM | DESCRIPTION | PART NUMBER |
|---|---|---|
| **PUMP** | 180 DC flow rate | **3099166** |
| **MOTOR** | 110Vac 50/60Hz single-phase - 140/175W 2P(2800/3500 rpm) | **3301565** |
| | 230Vac 50Hz single-phase - 135W 2P(2800 rpm) | **3301567** |
| | 230Vac 60Hz single-phase - 170W 2P- (3500 rpm) | **3301600** |
| | 24Vdc - 55W (2800 rpm) | **3301582** |
| **SENSOR LEVEL** | Magnetic | **1655763** |
| | Optical | **1639201** |
| **RESERVOIR** | 2 L | **6770102** |
| | 3 L | **6770033** |
| **FILTER** | 1000µ grade | **3130466** |
| **PRESSURE GAUGE** | 0 -100 bar | **0020564** |
| **PRESSURE SWITCH** | NA 10÷20 bar set.18bar | **3291048** |
| | NC 10÷20 bar set.18bar | **3291035** |
| **CONTROL PCB** | 110Vac | **1639225** |
| | 230Vac | **1639224** |
| | 24Vdc | **1639226** |

### 12.3 Connector ACCESSORIES

| ITEM | | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| C | **CONNECTOR M12 X 1** | 4 poles plug connector -female | **0039169** |
| D | **CONNECTOR M12 X 1** | 5 poles plug connector -female | **0039170** |
| A | **DIN 43650 CONNECTOR** | 3 poles /heart connector –PG9 output cables | **0039976** |
| B | **DIN 40050 CONNECTOR** | 3 poles / heart -female- miniaturizated connector | **0039841** |

## 13. DIMENSIONS




| PUMP | A | B | C |
|---|---|---|---|
| 2L | 155 [6.1] | 266 [10.47] | 208 [8.18] |
| 3L | 220 [8.6] | 276 [10.86] | 276 [10.86] |

## 14. HANDLING AND TRANSPORT

Before shipping, the SMART3 pumps are carefully packed inside cardboard boxes. When transporting and storing the equipment, pay attention to the direction indicated on the boxes themselves.
Upon receipt, check that the package has not been damaged and store the equipment in a dry location.
Manual handling must be done by at least two people.

**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.**

## 15. OPERATING HAZARDS

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 pressurized 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.**

***Power supply***
Any type of intervention must not be carried out before unplugging the machine from power supply. Make sure that no one can start it up again during the intervention. All the installed electric and electronic equipment, reservoirs and basic components must be grounded.

***Flammability***
The lubricant generally used in lubrication systems is not normally flammable. However, it is advised to avoid contact with extremely hot substances or naked flames.

***Pressure***
Prior to any intervention, check the absence of residual pressure in any branch of the lubricant circuit as it may cause oil sprays when disassembling components or fittings.
After long periods of inactivity, check the seal of all the parts subject to pressure.
Do not subject the fittings, pipes and pressurized 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 exceed70 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 000. [(1)]**
**Use lubricants that are compatible with NBR gaskets.**
**Any internal residual lubricant used for assembly and testing purposes is 32 cSt oil**

**[(1)]The use of the pump with grease with a consistency NLGI000 must be assessed on a case by case basis given the extreme difference in the sliding properties of the compound, which depends both on the viscosity of the base oil as well as the soaps and additives that are used.**
The use of the pump with grease with a consistency NLGI000 must be assessed on a case by case basis given the extreme difference in the sliding properties of the compound, which depends both on the viscosity of the base oil as well as the soaps and additives that are used. *
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 |

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.

**15.1GUIDELINES FOR USE**

Compliance with the essential safety requirements and the provisions specified in the machine directive was checked by filling out prepared check lists that are contained in the technical file.
Two types of lists were used:

- Riskassessment (UNI EN ISO 14121-1).
- Compliance with the essential safety requirements Machine Directive –EC 06/42).

**The risks that were not completely eliminated, but considered acceptable, are specified below:**

- Electrocution: this can only occur in the case of serious user incompetence.
- Use of unsuitable lubricant: the types of fluids that are not compatible with correct pump operation are listed below.*
- Contact with harmful fluids.

| FLUIDS THAT ARE NOT PERMITTED | |
|---|---|
| **FLUIDS** | **RISKS** |
| Lubricants with abrasive additives | Wear of the components inside the pump |
| Lubricants with silicone additives | Pump seizure |
| Petrol – solvents – inflammable liquids | Fire – explosion – damage to the gaskets |
| Corrosive products | Pump corrosion - damage to people |
| Water | Pump oxidation |
| Food substances | They would be contaminated |

*** For more detailed information regarding product compatibility with particular fluids, contact the Dropsa S.p.A. technical office**