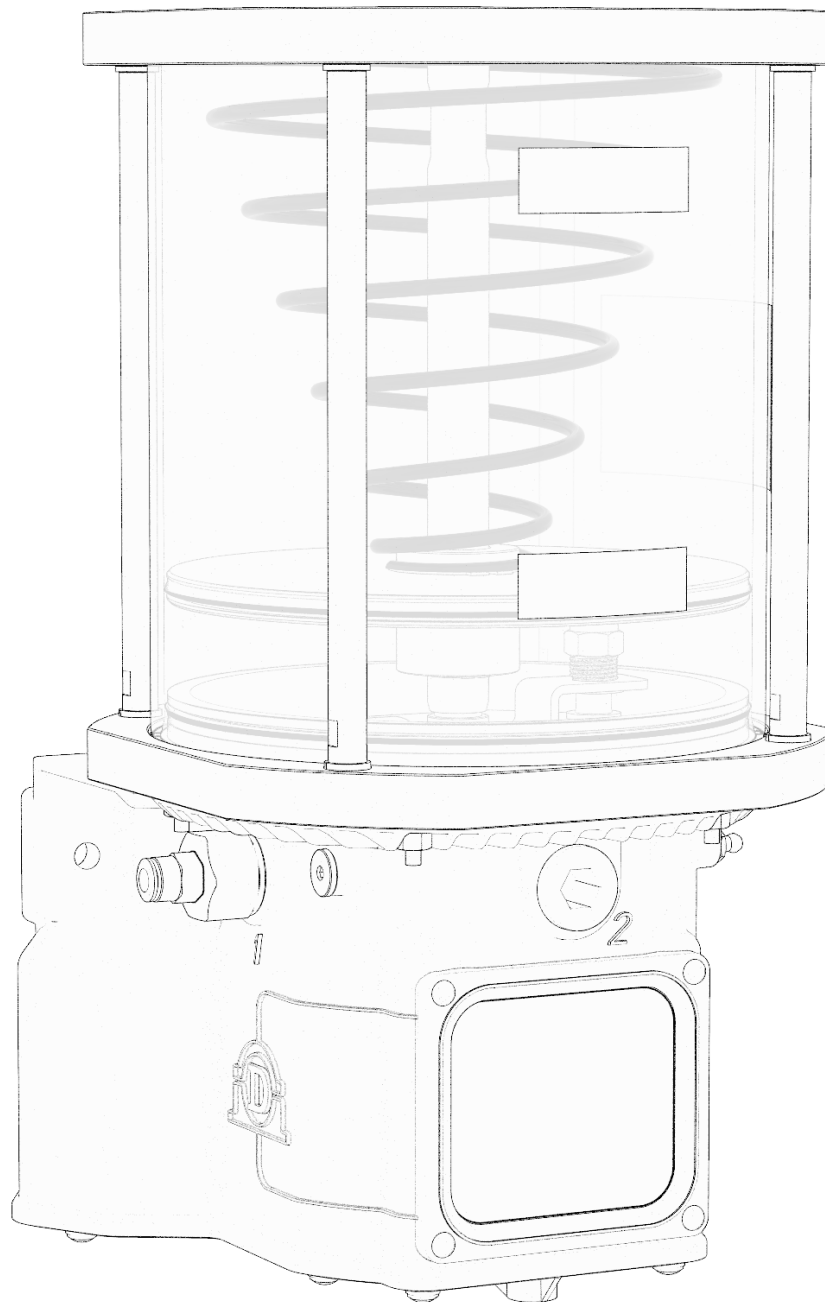


Electric pump with follower plate for grease

User Operating and Maintenance Manual

Original Instructions



Manual drawn up in accordance with EC
Directive 06/42

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1. INTRODUCTION

This operation and maintenance manual refers to the **Bravo FP** lubrication **pump** (Version with grease follower plate), and includes essential information regarding correct operating and safety procedures design to ensure safe and reliable operation of the unit.

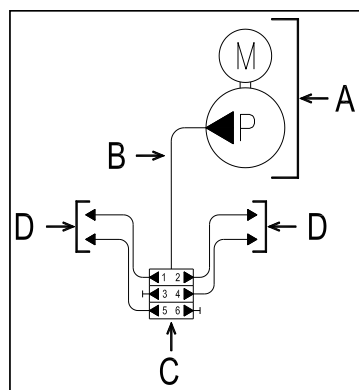
You can obtain the latest release of this document by contacting a Dropsa sales office or distributor or by visiting us on the World Wide Web at <http://www.dropsa.com>.

It is important that this document is read and maintained in a place that anyone operating the Bravo FP. is able to consult it if necessary.

2. GENERAL DESCRIPTION

2.1 CENTRALIZED LUBRICATION – GENERAL OPERATING INFORMATION

Centralized lubrication systems are designed to provide oil or grease for lubricating friction points on industrial and mobile machinery. Such systems considerably reduce the cost of maintaining machinery on which they are installed, eliminating machinery downtime caused by poor lubrication as well as prolonging the life of the machinery in general. Additionally, a centralized lubrication system allows difficult to reach lubrication points to be lubricated at frequent intervals that would otherwise be hard to access under normal conditions.



The diagram on the left shows a typical schematic of a simple centralized lubrication system. The main components are:

- A – Electric Pump with Reservoir (eg. Bravo FP. Pump).**
- B – Primary lubrication line for distributing grease.**
- C – Distributor elements that meters grease into a number of points.**
- D – Secondary tubing that delivers grease to the lube point.**

The pump feeds a distributor element that shares and doses the ratio of grease between the several friction points.

Bravo FP. Pump has been designed to provide the pumping solution for such systems used in industrial and mobile applications for greases up to NLGI 2 consistency and Oils with minimum 46cSt.

2.2 BRAVO FP. ELECTRIC GREASE PUMP

Bravo FP is an electric piston pump with the pumping element operated from a camshaft connected to a reducing gearbox. It can be fitted with up to 3 pumping elements (1 standard) which are available with or without an integrated pre-set bypass (pressure safety valve).

The Bravo FP. also has a modular build reservoir that can be supplied in 2, 5, 8 litre capacity. Additionally a minimum level sensing device is fitted as standard at the base of the unit. As an optional accessory, a remote button with light is available.

Bravo FP. is available both with an integrated automatic control board that controls and monitors the pump and lubrication cycle or a manual version where the pump motor is controlled externally by applying and removing power.

The main body of the pump is made from high performance robust plastic and is compact in size designed to withstand tough environments.

The system with follower plate and stirring paddle ensures a correct working even if the pump is upside-down.

The direct-current geared motor drive arrangement, is controlled remotely in the manual version or via the built in control system in the automatic version. There are three operating modes for the controller version. (Refer to 5.1 paragraph)

3. PRODUCT IDENTIFICATION

On reservoir there is a label that indicates part number of the product, operating voltage and basic characteristics.

4. TECHNICAL CHARACTERISTICS

GENERAL TECHNICAL CHARACTERISTICS								
Operating Voltage	AC		DC		AC - 50Hz		AC - 60Hz	
	12V	24V	12V	24V	110V	230V	110V	230V
Current (nominal)	1A	0,5A	1A	0,5A	0,2A	0,1A	0,2A	0,1A
Current (peak)	6,5A	3A	6,5A	3A	0,3A	0,2A	0,3A	0,2A
Nett weight	4 Liter	12Kg (26.45lb)			13 Kg (28.66lb)			
	8 Liter	14Kg (30.86lb)			15Kg (33.07lb)			
	12 Liter	16Kg (35.27lb)			17Kg (37.48lb)			
Number of outlets / pumping elements	1 (3 max.)							
Outlet thread (pumping outlet)	G1/4 BSP							
Nominal output per pump element (20 RPM) *	2,8 cm ³ /min (0.17 in ³ /min) 5,2 cm ³ /min (0.31 in ³ /min) 0,4 ÷ 2,8 cm ³ /min (0.02 ÷ 0.17 in ³ /min) - Adjustable							
Working pressure	280bar (4061psi)							
Integrated By-pass pressure (if present)	320bar ±30bar (4641psi ±435psi)							
Reservoir Capacity	4 – 8 – 12 liter (1.06 – 2.11 – 3.17 gallons)							
Max Grease capability	NLGI 2							
Operating temperature	-25°C ÷ +80°C							
Storage temperature	-30°C ÷ +90°C							
Humidity	90%							
IP Protection grade	IP65 (IP 69K with special equipment)							
Noise	< 70 db (A)							
CONTROL PANEL CHARACTERISTICS								
Operating Voltage	12VDC ±20%		Includes internal transformer					
	24VDC ±20%							
	110VAC							
	230VAC							
Maximum Output load capability	5A							
Short circuit & Overload protection.	7.5A typical				10A max.			
Operating temperature	-20°C ÷ +80°C							
Storage temperature	-30°C ÷ +90°C							
Hardware protection	<ul style="list-style-type: none"> Overload protection on motor and lamp Integrated Motor protection Spike voltage protection Inverted Polarity protection 							
Memory for parameter storage	EEPROM							
Memory Life	Unlimited (no battery requirement)							
Minimum Level								
Max load	AUTOMATIC Version				1A	@	30V	
					0,3A	@	230V	
	MANUAL Version				0,25A	@	120V	
ELECTRICAL CONNECTIONS								
P/N Connector	Nominal Voltage	Poles	Max Cable.	IP	Max. A			
0039975 (MPM 203)	250V-300V	3+ $\frac{1}{2}$	1mm ²	65	10A			
0039820 (M12)	150V	4	0,5mm ²	68	4A			
0039823 (Amphenol)	1680V	17+PE	1mm ²	65	6A			
0038962 (IP69K)	600V	3	0,5mm ²	69K	7,5A			
0039834 (IP69K)	600V	4	0,5mm ²	69K	7,5A			



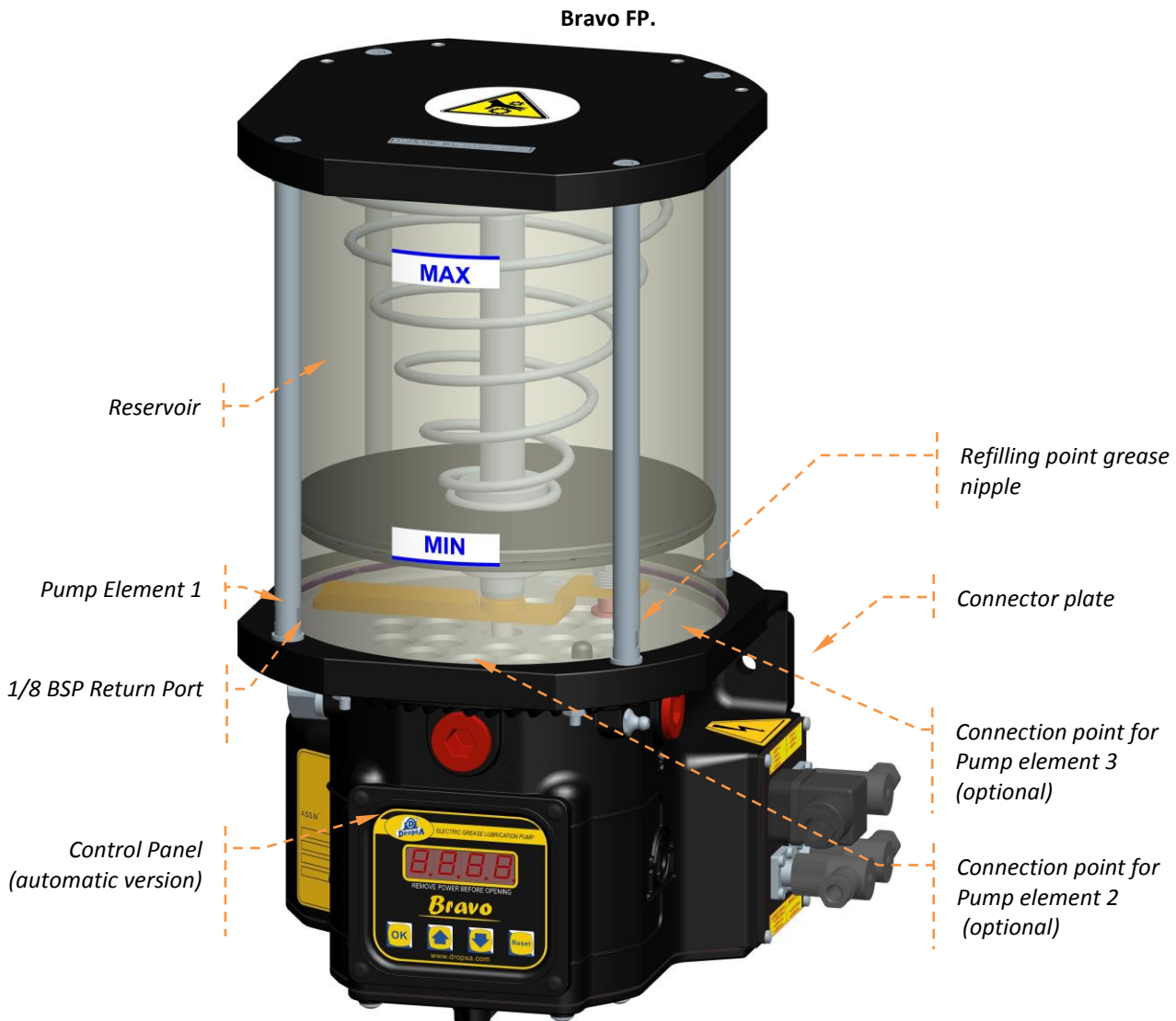
*** NOTE:**

Pump output has been determined at the following conditions: Grease, NLGI 2, Standard environmental conditions (Temperature 20°C / 68°F, Pressure 1 ATM), Back pressure on outlet 50bar (735 psi) 12V e 24V voltage.



WARNING: Do not operate the unit outside the specified voltage ranges.

5. PUMP COMPONENTS



5.1 ELECTRONIC CONTROL BOARD

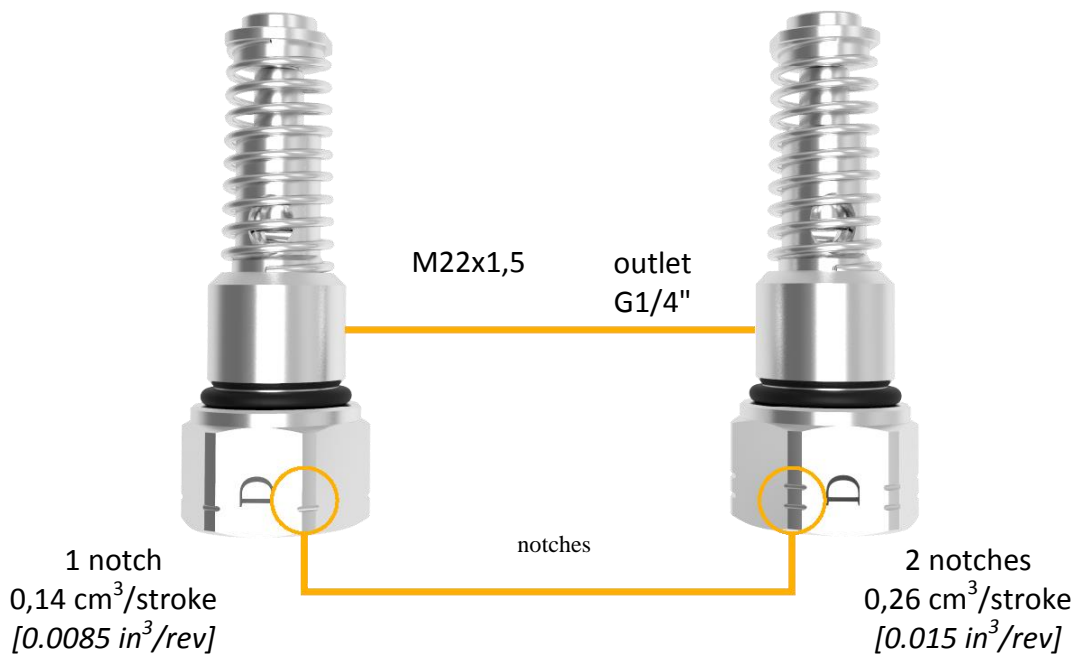
In the automatic version, pump and cycle control is managed by the onboard controller. Three operating modes are possible:

1. **CYCLE:** Lube and pause cycles are set using the built in timer or counting external inputs; the two condition work with every combinations
2. **PULSE** Lube Cycle and Pause cycle are determined by external inputs. During of Lube Cycle, the cycle sensor can be monitored to ensure a correct system working. Pump can suspend the lube cycle if external pulses are not found.
3. **OFF:** Pump works as slave regarding the control of the machine

BRAVO FP. pump has a multi connection system that allows to apply various standards types of connectors to the product to satisfy OEM and end users requests.

Pump has been designed in order to integrate quickly SMP and SMPM metering elements. Programming instructions can be found in chapter 7 of this manual.

5.1.1 PUMPING UNITS IDENTIFICATION



5.2 MINIMUM LEVEL

In manual version (no control board) the minimum level switch (Normally closed) opens when the minimum level is reached. With the automatic (controlled) version, a voltage free changeover contact NC/NA can be obtained to give a remote signal of minimum level.

5.3 CONNECTIONS & WIRING

Different connectors and wiring are available as standard by fitting a selection of connector plates. It is also possible for custom settings for OEM clients.

6. UNPACKING AND INSTALLING

6.1 UNPACKING

Once a suitable installation position has been identified, unpack the pump and prepare for installation. It is important to inspect the pump to ensure that there has been no damage during transportation. The packaging material used does not require any special disposal procedures. You should refer to you regional requirements.

6.2 INSTALLING THE CONNECTOR BASEPLATE *

The pump and the base plate are purchased separately. To install the base plate following the following steps:

- Connect the multi pin connector from the base plate until security locking (fig.1).
- Fit the base plate into position as shown in figure 2 and use the 4 screws to lock into position, with 0,5Nm torque (fig.2).



fig. 1



fig. 2

* Note: 110/230V versions have two multi pin connectors inside

6.3 INSTALLING THE PUMP

- On the bottom of the box there is a mounting hole template as shown in the diagram on the right. This can be used to drill the fixing holes. The fixing holes should be $\varnothing 9\text{mm}$ ($\varnothing 0.35$ inch). Use 3 screws to fix the pump into place.
- Assemble the pump so that the filling point and the control panel are accessible by the user.
- Allow 100mm (4 inches) perimeter distance around the pump for easy access.
- Ideally, install the pump at a height that is easily and comfortably accessible by the user to facilitate maintenance and refilling.
- For installation on systems subjected to vibrations can be used the clamping kit to be assembled on the top cover with provided screws.
- Do not install the pump where it may be submerged by liquids or in an excessively aggressive environment.
- Do not install the pump in hazardous areas where there may be flammable or explosive materials.
- Do not install near strong heat sources or electrical areas that may cause electrical interference with the control system.
- Ensure that tubing and wiring is appropriately secured and protected.

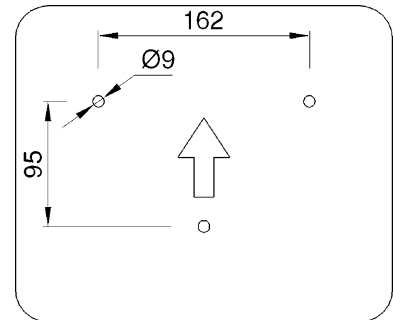


fig. 3

6.4 INSTALLING PUMP ELEMENTS

Bravo FP. pump is supplied with a 2,8 cm³/min single pumping element with by-pass installed in Port 1.

The additional pump elements can be installed in any of the additional pump port (2 or 3) or moving the pump element installed.

To install a new pump element:

- Unscrew and remove the plastic plug with the O Ring that is installed on the standard product.
- Insert and screw the pump element until it is fixed in position.
- Use 20Nm torque to secure the element.



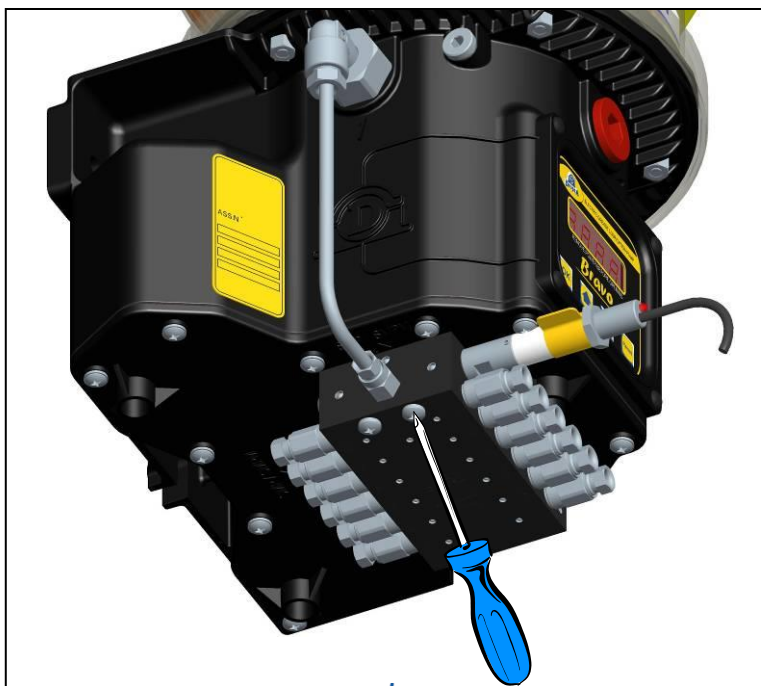
WARNING: Based on the position of the internal cam drive it may be difficult to screw in the pump element as it compresses the return spring. In this case, use another outlet or pay particular attention when inserting the pump element and ensure that it does not cross-thread.

6.5 HYDRAULIC CONNECTIONS

The hydraulic connection to the pump is via the pump outlets using adequate 1/4BSP fitting and tubing. Additionally there is a 1/8" BSP port that can be used as a return line or a remote refilling line.

6.6 INSTALLING THE OPTIONAL SMP OR SMPM DIVIDER VALVE

On the base of the pump it is possible to install an SMP or SMPM distributor valve to further divide the lubricant. This should be secured using fixing screws. Refer to the diagram below.



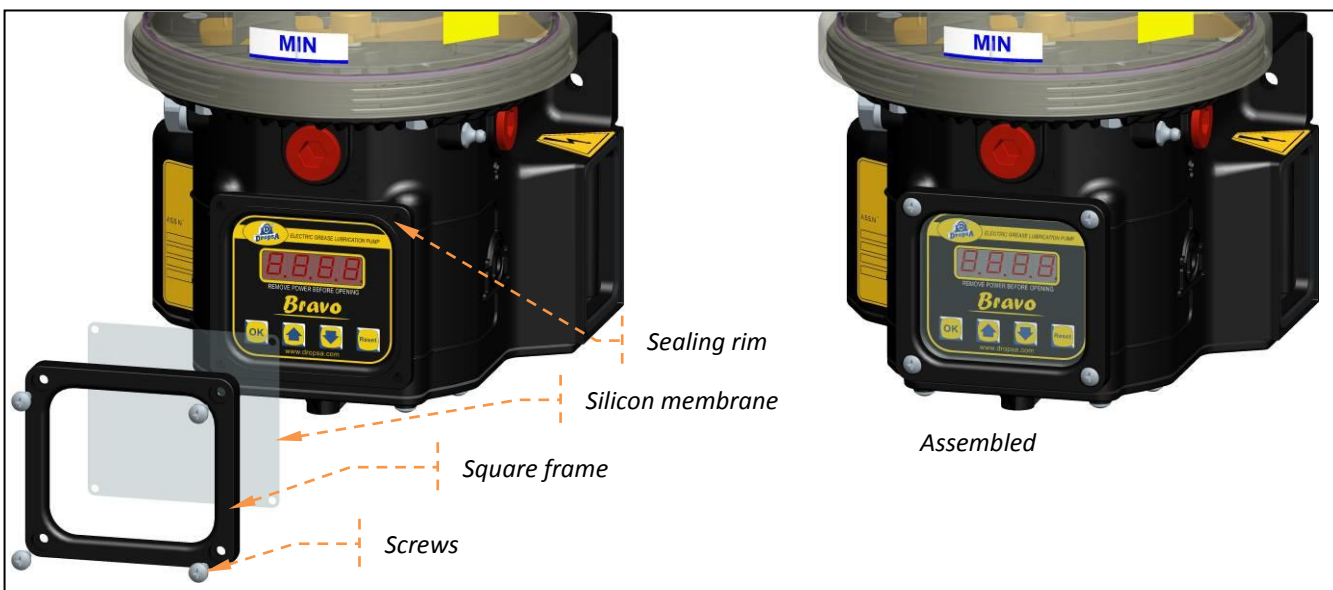
6.7 INSTALLING IP69K PROTECTION EQUIPMENT (OPTIONAL)*.

Bravo pump can be configured with an IP 69K protection degree according to DIN 40050.

To do this is necessary install the right connector plate as mentioned at paragraph 6.2. In addition the key board protection cover has to be mounted.

For cover assembling proceed according to the following steps:

- Remove the four plugs on the pump body using a screwdriver avoiding the sealing rim damage;
- Fit the silicon membrane into the square frame seat;
- Fit the four screws into the holes assembling the membrane;
- Fit the complete frame avoiding a membrane movement;
- Screw the four screws.



***Note:** IP69K kit can be installed on pumps manufactured with a WO following 1207322.

6.8 ELECTRICAL CONNECTIONS & WIRING



CAUTION: Before carrying out any electrical wiring you should verify the label on the pump to ensure that the correct operating voltage is being used and ensure that all power is removed.

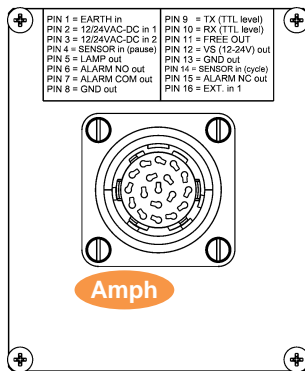
The electrical connection should be carried out an electrician who has understood and identified the various connectors and wiring that has been selected for the system (operating voltage, connector types, remote control, cycle sensors).

Connect the pump to the power supply using the appropriate power connector (refer to 6.7.1 Connector types) again ensuring they are suitable for the selected voltage and frequency. The power cable should be adequately chosen to ensure it can handle the current at the specified voltage.

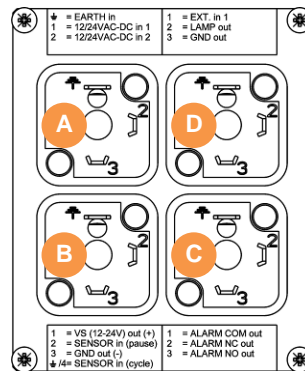
On 110V/230VAC versions it is strongly recommended that a 1A fuse T and a differential trip is installed with an activation level of 30 mA at 1 millisecond max. Isolation capability should be = 10kV minimum and nominal current \geq 4Amps.

6.8.1 Connector Types

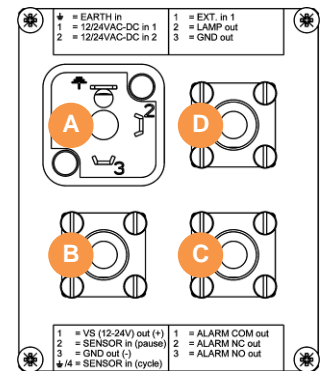
VERSIONS 12V/24V



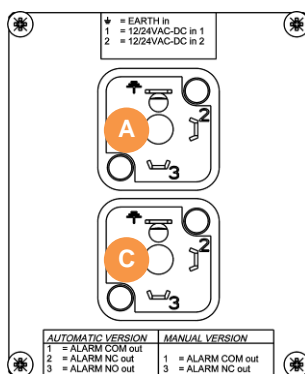
0888102



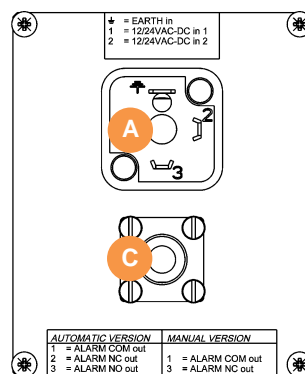
0888059



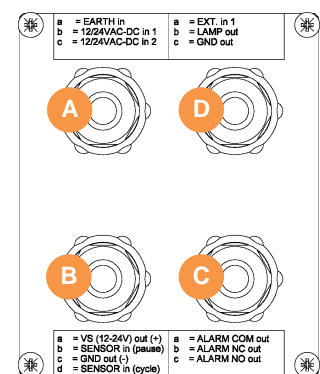
0888139



0888141

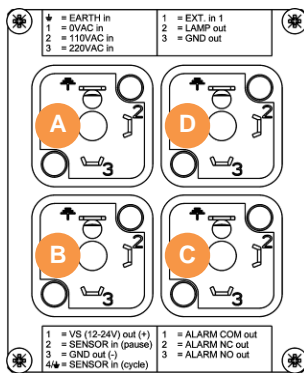


0888142

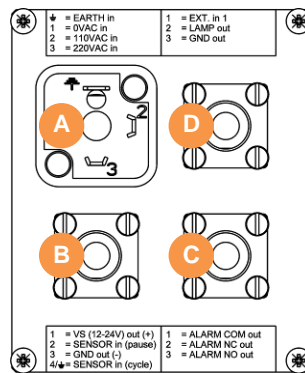


0888437 (IP69K)

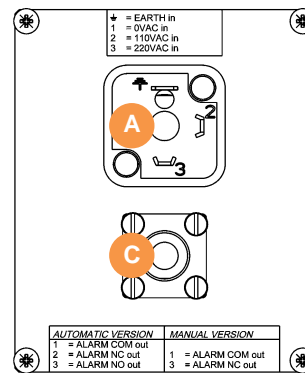
VERSIONS 110V/230V -50Hz/60Hz



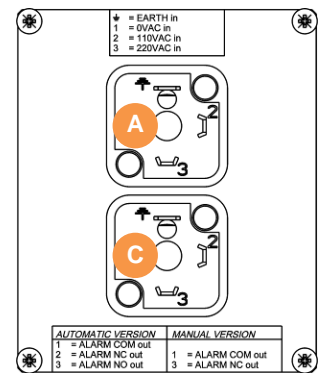
0888134



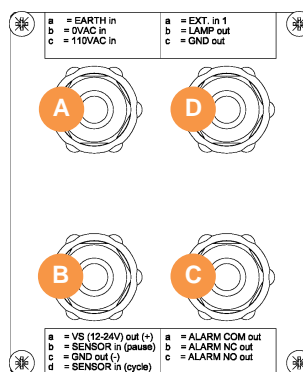
0888136



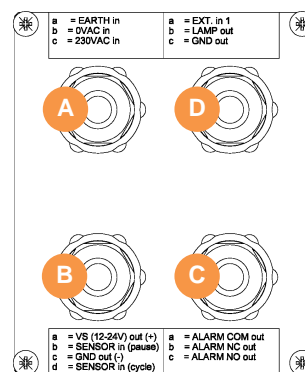
0888137



0888138



110V - 0888472 (IP69K)

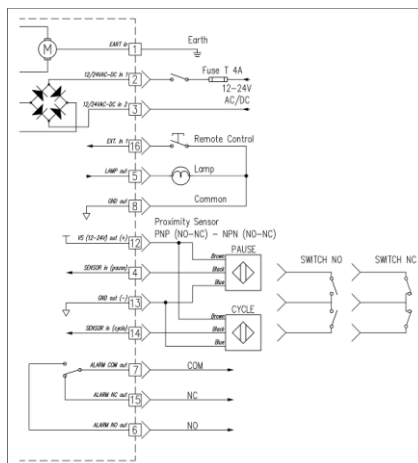


230V - 0888474 (IP69K)

Wiring

Amp

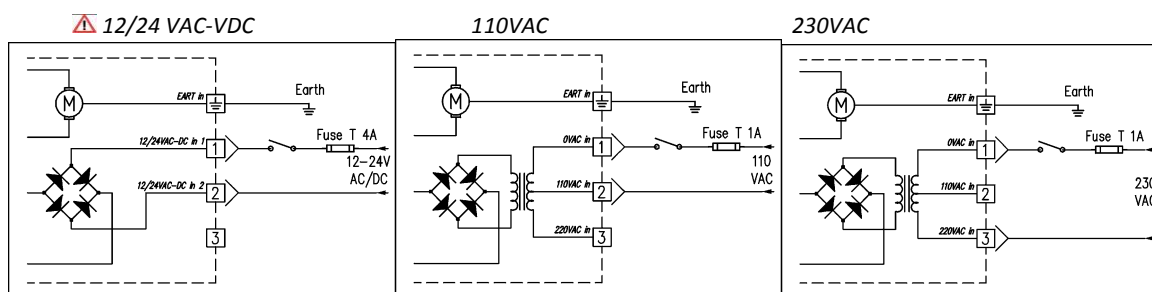
MULTIPOLE Connector



Wiring

A

POWER SUPPLY

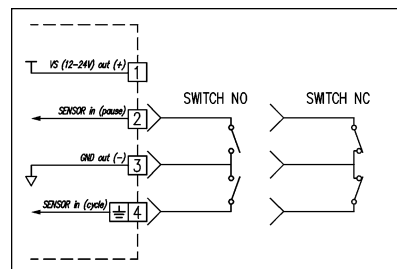
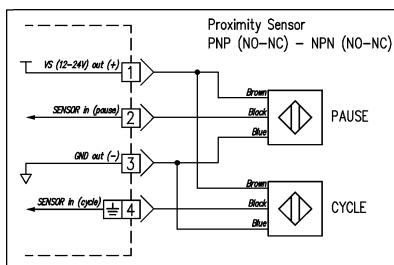


! On 12/24 VAC-VDC manual version do not connect earth terminal

Wiring

B

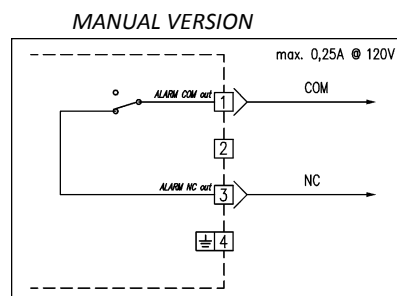
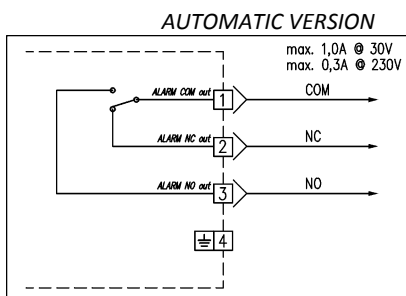
CYCLE SENSOR



Wiring

C

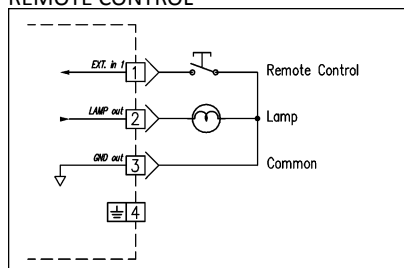
MINIMUM LEVEL



Wiring

D

REMOTE CONTROL



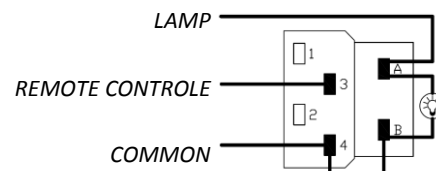
6.8.2 Remote Control switch and Lamp

After connecting the pump, it is possible to continue the installation by connecting the remote switch/lamp when in systems where this has been installed.

Install the remote switch by the control panel of the vehicle or machine.

Refer to the following diagram to connect the switch and lamp.

POWER	LAMP	OPTIONAL
230Vac	12Vdc (3A max)	0039433
110Vac	12Vdc (3A max)	0039433
24Vac/dc	24Vdc (3A max)	0039434
12Vac/dc	12Vdc (3A max)	0039433



7. OPERATING INSTRUCTIONS

7.1 BEFORE PUTTING INTO OPERATION

- The unit should be operated only by qualified personnel.
- The pump should never be used in hazardous environments or immersed in any fluids.
- Always use safety gloves and glasses when handling lubricants.
- Do not use lubricants that may contains substances incompatible with NBR Rubber, if in doubt consult the Dropsa technical department which will provide a detailed documentation about lubricants recommended.
- Follow all health and safety rules required by law.
- Always use pipes suitable for operating pressures.
- Check integrity in the pump. Ensure no damage;
- Check and fill the reservoir. If the reservoir is below the MIN level, follow procedure 7.3 to refill;
- Verify the pump is at the correct operating temperature and tubing is free of air bubbles;
- Check the unit is properly cabled.

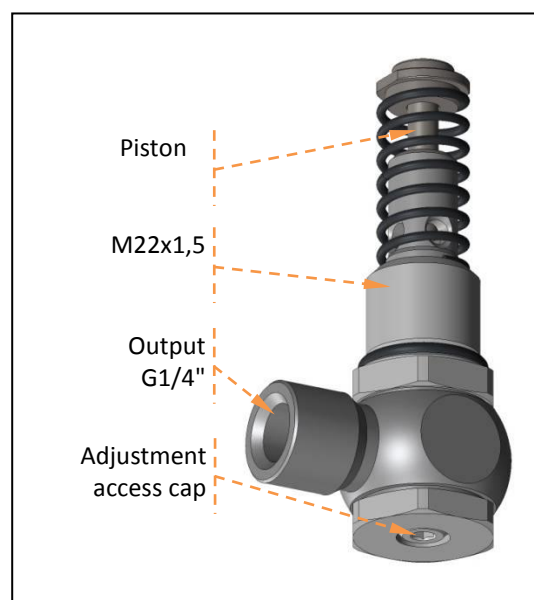
7.2 OPERATION

- Check and set the operating mode and parameter if using the automatic versions.
- Press the remote start button on your machine if using a manual version.
- Check that the pump is running.
- Check lubricant is being delivered to the greasing points as necessary. (If you have any doubts about the correct working of the pump, please contact the Dropsa Technical office to ask the test procedure).

7.3 SETTING OF ADJUSTABLE PUMPING UNIT

To set the progressive pumping unit with adjustable flow, proceed as follows:

- Ensure there is no residual pressure in the pressure line.
- Remove the adjustment access cap using a 4mm Allen wrench
- Rotate the jacket of the pumping unit using a 4 mm Allen wrench inserted in the internal grub screw.
- Each complete rotation of the Allen wrench is approximately 0.6cc/min. Setting range from 0.4 to 2.8 cc/min. for a total of 4 rotations.
- Check the presence and conformity of the copper gasket (replace if necessary).
- Replace the cap using a 4 mm Allen wrench.



7.4 REFILLING THE RESERVOIR

The refilling of the tank is carried out through the dedicated filling ports with adequate filtration to ensure clean lubricant. In case you must perform the first fill (with empty pump, greaseless remaining from previous charging), it is necessary keeping pump in vertical position, to remove the air in reservoir. Reach the bleed point coinciding with the maximum level (the lubricant comes from below).

Afterwards the filling can also be done in different position, by checking to be beyond the line of max level.

Continue to fill unit until the max level is reached/ this level should not be exceed.

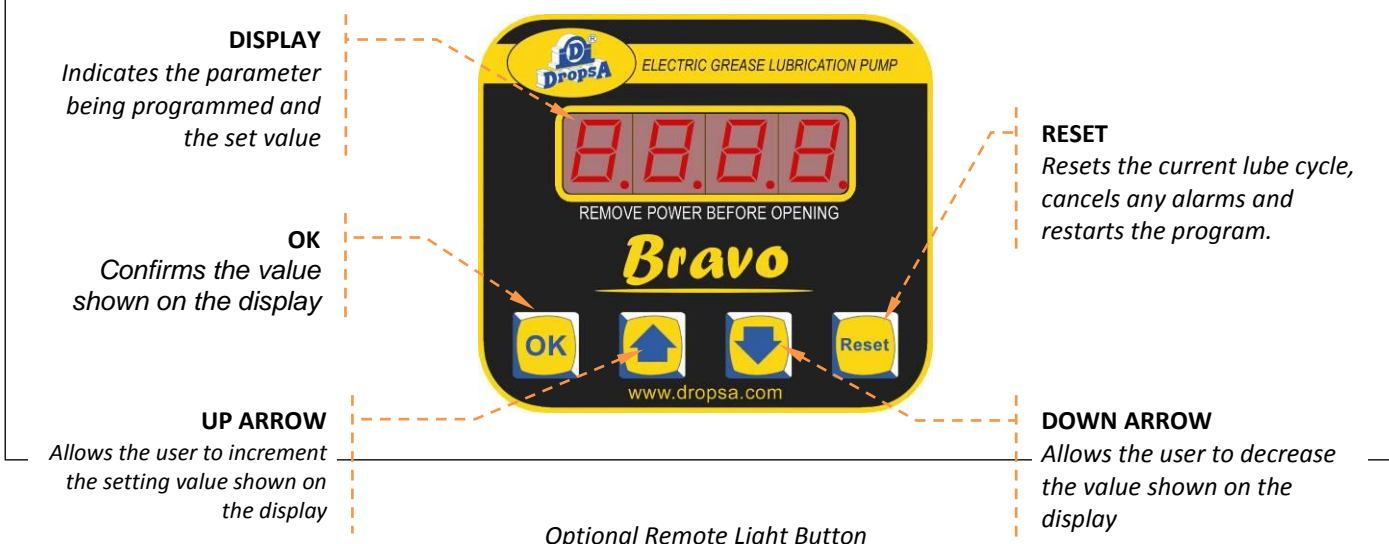
If the of maximum level line was exceeded, the lubricant will be expelled through the center of follower plate. This does not cause any problems or malfunction, in the event the user overfills the tank, the excess lubricant will be expelled above the lid.



WARNING: to avoid introducing contamination into the pump and voiding the warranty ensure that refilling is always carried out through the designated ports using clean grease. Refer to 14.2 for more information about lubricant characteristics.

7.5 CONFIGURATION

Automatic version
Control panel layout



Optional Remote Light Button



The light is constantly lit when the pump is running.

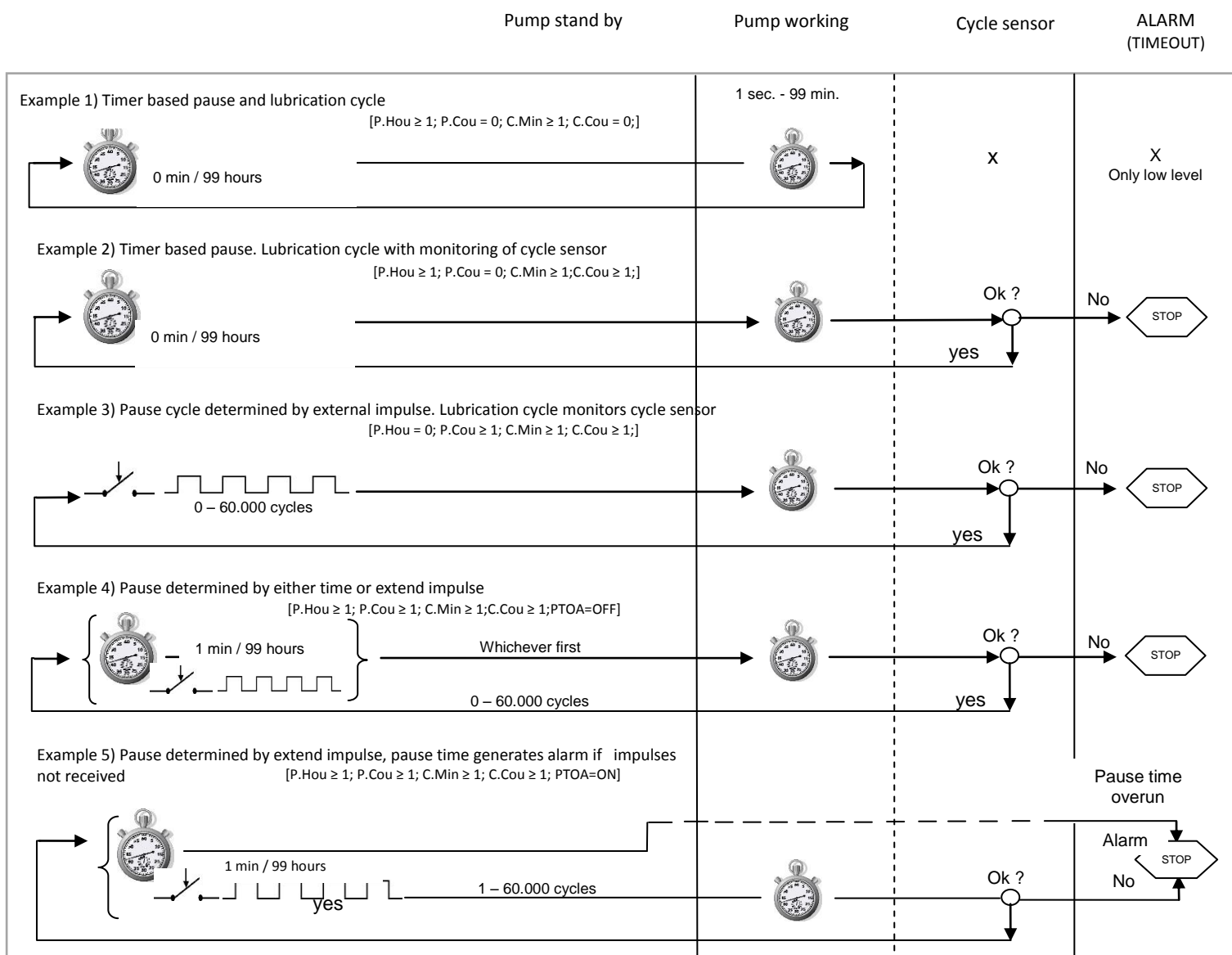
Flashes when a minimum level or other alarm is detected by the control system in the pump. The number of flashes defines the anomaly code.

When pressed during the pause (standby) cycle, it will make the pump starts a lubrication cycle and then return to normal automatic operation. The RESET of the pump is allowed when the button is pressed for 6 seconds.

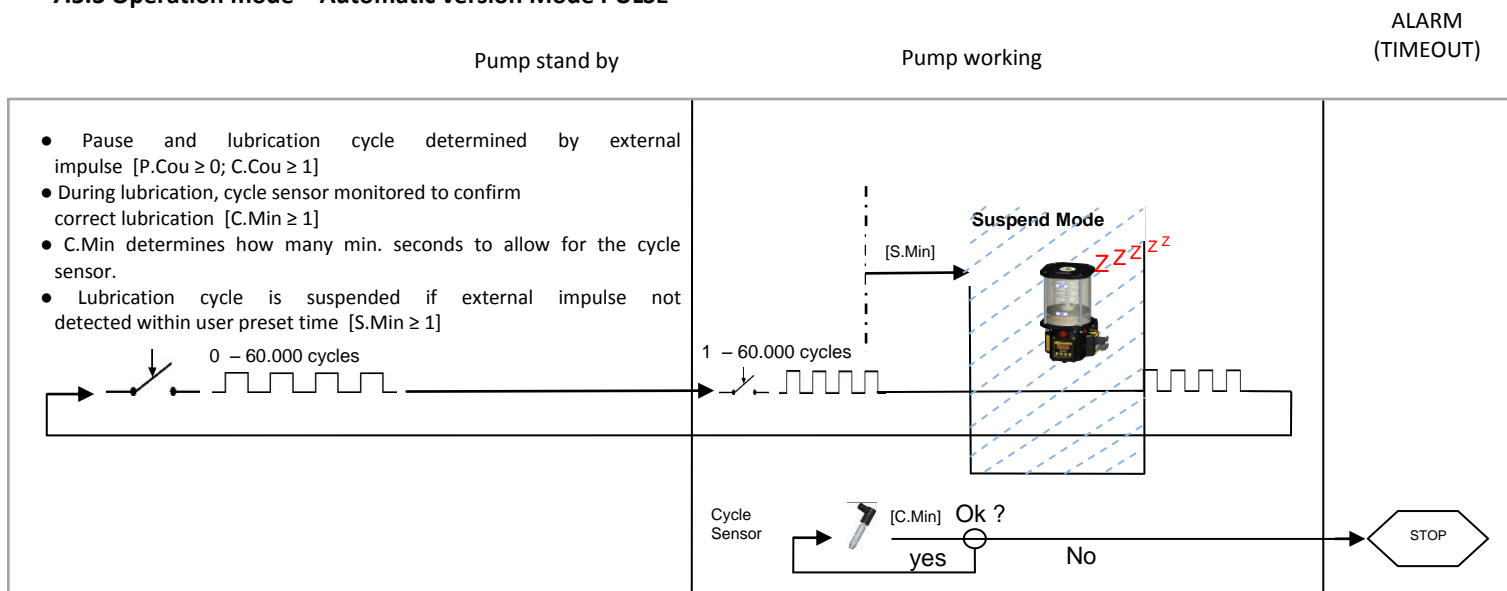
7.5.1 Operating mode: MANUAL VERSION

The Bravo FP. Manual version does not have any settable feature as there is no local controller. You should arrange to control the pump ON/OFF with a host system that activates the pump as required and monitors the lubrication system, including checking level switch and cycle switch when installed.

7.5.2 Operation mode – Automatic version Mode CYCLE



7.5.3 Operation mode – Automatic version Mode PULSE



7.5.4 Operation mode – Automatic version Mode OFF

Pump operates when external signal is given. No monitoring











NOTE:

When power is removed from the Bravo FP., the electronic control 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 display will 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. Cycle and Pause inputs consider one complete cycle when the input returns to its original state at the time of cycle. For example, if the switch is in the ON state at the start of the lubrication cycle then it must change state to OFF, and then back to ON to count as one cycle.

7.6 PROGRAMMING THE ELECTRICAL CONTROLLER

PROGRAMMING SEQUENCE		
STEP	BUTTONS	OPERATION
1	 hold for 5 seconds.	Enter programming mode
2	 or 	Select PARAMETER to change
3		Confirm the selection and view the current value
4	 or 	Increment/Decrement VALUE/SETTING of PARAMETER
5		Confirm value/setting and return to menu
6	 hold for 2.5 seconds.	Save settings and exit programming mode



NOTE: To modify the operating parameters repeats steps 2 to 5 for all necessary values and then follow step 6 to save and exit.

During programming mode, if no button is pressed for 20 seconds, or alternatively UP or DOWN arrows are held for 2.5 seconds, this will exit Programming mode without saving the values.













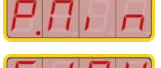
















NOTE:

Continuous Cycle: Continuous cycle can be achieved by setting the pause timer to zero.

Complete cycle: Valid on input full cycle ON>OFF>ON or OFF>ON>OFF.

Both: When the pause timer is set to non zero, the system operates in a combined mode. The cycle will start EITHER on impulse Count OR Pause Time being reached.





SPECIAL FUNCTIONS AND PARAMETERS		
BUTTONS	DISPLAY	DESCRIPTION
		Locked the keyboard. The reset is still activated
		Unlocked the keyboard.
 Release 		Reset to default parameters for the current OPERATING MODE
 Release 	     	Display total days in working state Display total minutes in working state Display total days in pause state Display total minutes in pause state Display total days in alarm state Display total minutes in alarm state


PARAMETRI OPERATIVI					
DISPLAY	DESCRIPTION	MODE	DEFAULT	RANGE	NOTES
 		CYCLE PULSE OFF			Ciclo 100%
	PAUSE TIMER: SET Hours and Minutes	CYCLE	10 min	0 min / 99 ore	Both
	TIMER to suspend the cycle	PULSE	0 sec	0 sec / 99 min	
	PAUSE COUNTER: number of divider switch cycles to wait in pause	CYCLE PULSE	1 cycle	0 / 60000	Complete Cycle
	CYCLE TIMER: if timed cycle it indicates the duration; if cycle with control impulses, indicates the waited maximum time of the single impulse before alarm	CYCLE PULSE	1 min	99 min / 1 sec	
	CYCLE COUNTER: number of divider switch cycles per lubrication cycle. input used: <ul style="list-style-type: none"> ▪ Sensor Cycle if Cycle Mode ▪ Sensor Pause if Pulse Mode 	CYCLE PULSE	1 ciclo	0 / 60000	Complete Cycle
	PRELUBE: Start –controller in Lubrication mode when powered on.	CYCLE PULSE	OFF	ON-OFF	
	Motor DUTY: allows reduction in pump output by adjusting motor speed	CYCLE PULSE OFF	100	100 / 50	
	Number of cycles given from the manual input (it allows eventual filling system)	CYCLE PULSE	1	0 / 9999	
	If OFF, to expiring of the pause time, stars the lubrication cycle If ON, to expiring of the pause time, gives Pause Time Overrun alarm.	CYCLE	OFF	ON-OFF	
	If OFF, minimum level is excluded	CYCLE PULSE OFF	ON	ON-OFF	

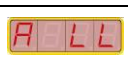


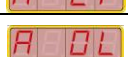



8. TROUBLESHOOTING

Below is a trouble shooting table to show possible problems and solutions.

If you are in any doubt about the correct solution to fixing a problem, do not dismantle parts of the Bravo FP. but contact an Authorized Dropsa Sales and Service Point for technical assistance.

TROUBLESHOOTING TABLE		
PROBLEM	POSSIBLE CAUSE	REMEDIAL ACTION
Pump Motor does not operate	Power missing.	Check the power lines, ensure that any fuse installed is still intact.
	Electronic Controller does not function.	Replace electronics board. 
	Gear motor no longer works.	Replace gear motor assembly. 
Pump is operating but no lubricant reaches points	Tubing is disconnected.	Check the condition of tubing in the system and ensure that it is correctly secured and not blocked for example, by hardened grease.
	Presence of air in the lower casing of the pump	Detach the fitting of the pump, start the pump until the grease starts coming out; reattach the fitting and verify that the pump distributes properly.
	Pump blocked	Disassembly and cleaning the pump;  or replace the pump.
	Progressive distributor blocked	Unblock the progressive distributor by means of removing the cap corresponding to the piston and shift the position of the piston; re-tighten the cap and verify that the pump distributes properly. In case the defect persists, replace the progressive distributor.
Lubricant does not reach lubrication points on each pump cycle or irregularly	Distributor valves are incorrectly connected or sized.	Check valves and system schematic.
	Incorrect Pause/Cycle Settings.	Ensure that the system designs and settings allow for at least a full cycle for all distributor valves in the system.
PROBLEM	POSSIBLE CAUSE	REMEDIAL ACTION
No lubricant from pump	Reservoir is empty.	Refill, and verify any low level alarms.
	Air bubble in grease	Disconnect the primary tubing from the pump and operate a lubrication cycle. Check that clean, air free grease is coming from the pump and then reconnect the tubing.
	Incompatible lubricant.	Some lubricants are not suitable for automatic pumping systems. Replace the grease.
	Blocked pumping element.	Dismantle the pumping element and check for contamination. Clean and reinstall or repalce.
	Worn pump element.	Replace pump element.
	Pump element Check worn.	Replace pump elment.
The display is not lit	Incorrect power/voltage.	Check power and voltage. Ensure proper power supply to pump.
The pump starts the lubrication cycle but then immediately stops	Defective or blocked Pump motor.	Allow the pump to cool. Retry the lubrication cycle. If the problem persists It will be necessary to replace the pump motor assembly. 

 : Allowed only specialized Dropsa's staff

ALARM CODES			
MESSAGE	LIGHT BUTTON	ALARM	REMEDY
	1 Flash	Low lubricant level in reservoir	Refill with clean lubricant.
	2 Flashes	Cycle Sensor overrun	The cycle sensor was not received within the specified time. Ensure Timer overlong is set to appropriate value and that there is no problem on the lubrication circuit.
	3 Flashes	Pause timer overrun	Verify input pause sensor
	4 Flashes	Pump Motor Blocked	Replace the motor unit
	5 Flashes	Pump Motor Over-load	Allow system to cool, if the problem still goes on go on, replace the motor unit.
	6 Flashes	C.COU pulses counter in Pulse Mode	Modify C.COU parameter
	7 Flashes	Eprom Error	Electronic Board memory error. Board requires replacement.



NOTE: To cancel alarm message push buttons  and  together

9. MAINTENANCE PROCEDURE



WARNING: Before carrying out any maintenance operation, ensure that power and hydraulic system are disconnected.

The pump does not necessitate any special tool for operation and maintenance. When working with the Bravo FP. pump it is nonetheless recommended that personal health and safety equipment is used as is normal for any operation in an industrial or similar workplace to best safeguard the user from harm.

The Bravo FP. pump has been designed and built as to require minimal maintenance and operate in diverse and challenging operating environment. It is recommend that the unit is inspected and kept clean to ensure long life and trouble free operation. It is important to check all tubing on the system to ensure that it is always tight and leak free.

9.1 Programmed and operational Maintenance

The following operations should be performed on the pump.

ITEM	FREQUENCY	OPERATION
Integrity of tubing and system	After initial 500 hours. Every 1500 hours.	Check fittings and tubing secured. Verify components are correctly fixed to machine.
Reservoir level	As needed.	Top up level with clean lubricant.
Filling Filter	As needed, or once per year.	Check and replace as necessary.

10. DISPOSAL

During maintenance or disposal of the machine care should be taken to properly dispose of environmentally sensitive items such as oils or other lubricants. Refer to local regulations in force in your area. When disposing of this unit, it is important to ensure that the identification label and all the other relative documents are also destroyed.

11. ORDERING INFORMATION

PUMPS						
Operating Voltage	AUTOMATIC VERSIONS			MANUAL VERSIONS		
	Reservoir 4Lt. (1.06gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (3.17gal)	Reservoir 4Lt. (1.06gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (3.17gal)
110V/230V	0888480	0888481	0888482	0888486	0888487	0888488
12V/24V	0888483	0888484	0888485	-	-	-
12V	-	-	-	0888489	0888490	0888491
24V	-	-	-	0888492	0888493	0888494

CONNECTORS BASE AND CONNECTORS

AUTOMATIC VERSION 12V/24V							
CONNECTION		FEMALE CONNECTOR		CONNECTIONS AVAILABLE			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	Power	Alarm Contact	Cycle Sensor	External Switch
0888102	Base Connector "Amphenol"	0039828	Connector "Amphenol"	•	•	•	•
0888059	Base Connector "MPM x 4"	0039976	Connector "MPM"	•	•	•	•
0888141	Base Connector "MPM x 2"	0039976	Connector "MPM"	•	•		
0888139	Base Connector "MPM x 1 + M12 x 3"	0039976 0039999	Connector "MPM" Connector "M12"	•	•	•	•
0888142	Base Connector "MPM x 1 + M12 x 1"	0039976 0039999	Connector "MPM" Connector "M12"	•	•		
0888437	IP69K – 12V/24V	0038963 0039835	Connector 3 pin IP69K Connector 4 pin IP69K	•	•	•	•

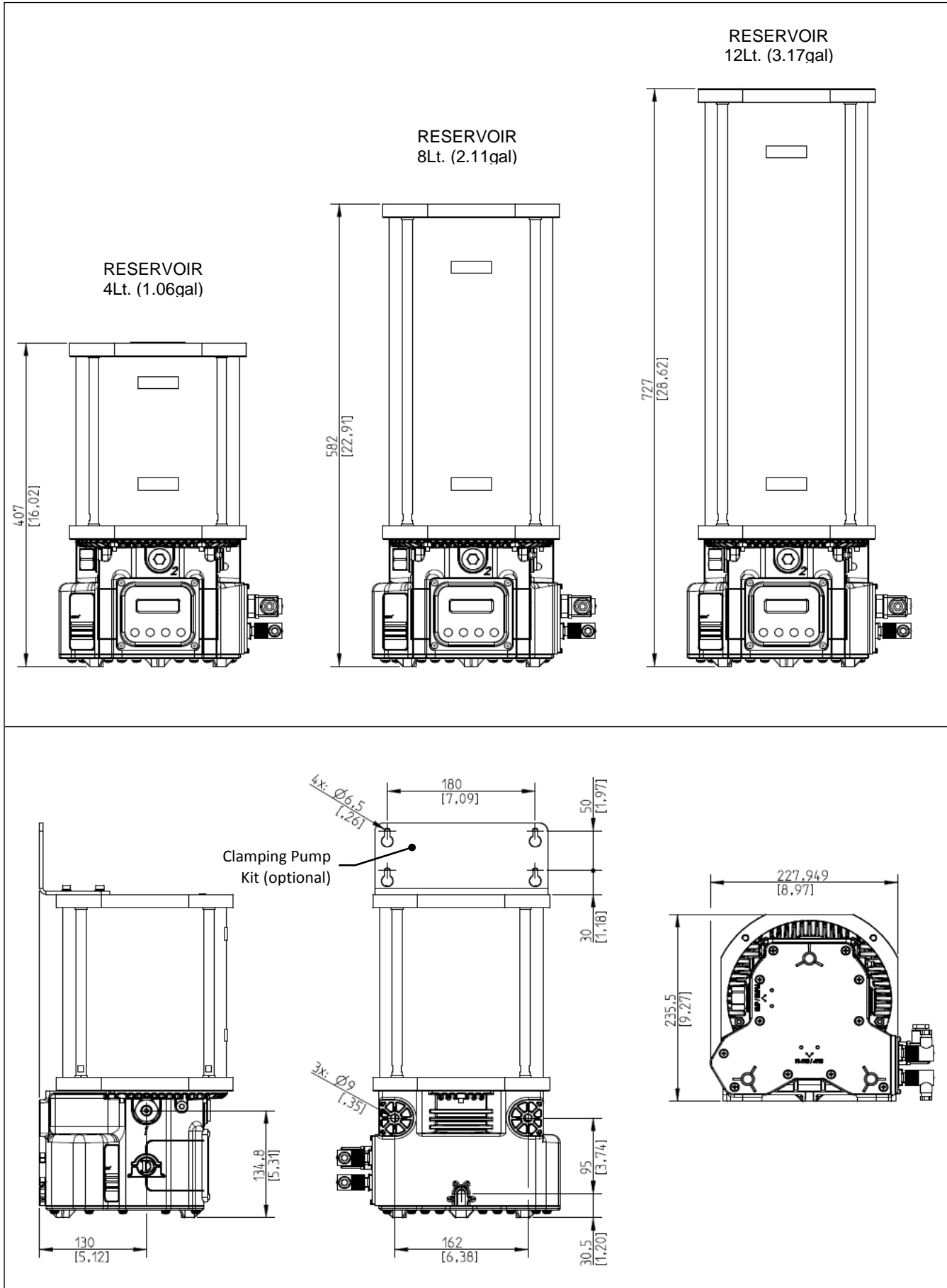
AUTOMATIC VERSION 110V/230V							
CONNECTION		FEMALE CONNECTOR		CONNECTIONS AVAILABLE			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	Power	Alarm Contact	Cycle Sensor	External Switch
0888134	Base Connector "MPM x 4"	0039976	Connector "MPM"	•	•	•	•
0888138	Base Connector "MPM x 2"	0039976	Connector "MPM"	•	•		
0888136	Base Connector "MPM x 1 + M12 x 3"	0039976 0039999	Connector "MPM" Connector "M12"	•	•	•	•
0888137	Base Connector "MPM x 1 + M12 x 1"	0039976 0039999	Connector "MPM" Connector "M12"	•	•		
0888472	IP69K – 110V	0038963 0039835	Connector 3 pin IP69K Connector 4 pin IP69K	•	•	•	•
0888474	IP69K – 230V	0038963 0039835	Connector 3 pin IP69K Connector 4 pin IP69K	•	•	•	•

MANUAL VERSION 12V/24V							
CONNECTION		FEMALE CONNECTOR		CONNECTIONS AVAILABLE			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	Power	Alarm Contact	Cycle Sensor	External Switch
0888141	Base Connector "MPM x 2"	0039976	Connector "MPM"	•	•		
0888142	Base Connector "MPM x 1 + M12 x 1"	0039976 0039999	Connector "MPM" Connector "M12"	•	•		

MANUAL VERSION 110V/230V							
CONNECTION		FEMALE CONNECTOR		CONNECTIONS AVAILABLE			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	Power	Alarm Contact	Cycle Sensor	External Switch
0888138	Base Connector "MPM x 2"	0039976	Connector "MPM"	•	•		
0888137	Base Connector "MPM x 2"	0039976 0039999	Connector "MPM" Connector "M12"	•	•		

OPTIONAL			
Part No.	Description	Part No.	Description
0039433	Remote control switch and lamp 12V	0888058C	2,8cm ³ /min pumping element with by-pass 1 notch
0039434	Remote control switch and lamp 24V	0888156	2,8 cm ³ /min pumping element without integrated by-pass 1 notch
0038966	IP69K protection plug connection	0888391	5,2 cm ³ /min pumping element 2 notches
0888470	IP69K protection kit	0888555	0,4÷2,8 cm ³ /min adjustable pumping element
0888386	Clamping Pump Kit	0010509	Screws for SMP-SMPM base installation

12. DIMENSIONS



Dimensions in mm [in].

13. HANDLING AND TRANSPORTATION

Prior to shipping, the equipment is carefully packed in cardboard package. During transportation and storage, always maintain the pump the right way up as indicated on the box. On receipt check that package has not been damaged. Then, storage the machine in a dry location.

14. OPERATING HAZARDS



WARNING: It is necessary to carefully read about the instructions and the risks involved in the use of lubrication machines. The operator must know the machine functioning through 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 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.

Noise

Pump produces noise, not more than 70 dB(A).

14.1 Lubricants



NOTE: The pump has been designed to operate with grease max NLGI 2. Always use lubricants compatible with NBR (Buna) Rubber seals. Any residual lubricant found on new units is residual NLGI 2 test grease used during the assembly of the pump.

The following table shows the comparison between NLGI (National Lubricating Grease Institute) classification and ASTM (American Society for Testing and Materials) for greases, classification is only for Bravo FP. values.

For further technical information and on safety information consult the lubricant MSDS Safety data sheet or equivalent document supplied by the lubricant manufacturer.

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

15. PRECAUTIONS

The verification of conformity with the essential safety requirements and regulations of the Machine Directive is effected by means of the compilation of a check list which has been pre-prepared and is contained in the *technical file*.

The lists which are utilised are of three types:

- list of dangers (appendix A, EN 1050).
- application of essential safety requirements.
- electrical safety requirements (EN 60204).

The following is a list of dangers which have not been fully eliminated but which are considered acceptable:

- ◆ During installation there may be small low pressure oil seepage from the pump. Always use appropriate protective clothing, gloves and take all necessary safety precautions.
- ◆ Contact with lubricant during maintenance or filling of the reservoir. → As per previous point, correct precautions must be taken to protect from contact with lubricant.
- ◆ Moving Parts and crush danger. → All moving parts are enclosed within the pump unit. Do not open the pump unit. Appropriate danger labels are located on the pump.
- ◆ Electric shock. → All electrical connections must be carried out by a qualified electrician who has studied the connection to ensure no electrical danger.
- ◆ Abnormal operation posture. → The pump should be installed in a suitable position with ample clearance as indicated in this manual to avoid abnormal posture for the operator.
- ◆ Unsuitable Lubricant. → Lubricant characteristics are indicated on the pump and in this user manual. In any case contact a Dropsa Sales and Support engineer (**if in any doubts, contact the Technical Department Dropsa SpA**).

FLUIDS EXPLICITLY NOT ALLOWED	
Fluid	Danger
Lubricants with abrasive additives	High wear rate of contacted parts
Lubricants with silicone based additives	Seizure of the pump
Petrol – solvents – inflammable liquids	Fire – explosion – damage to seals
Corrosive products	Corrosion of the pump– injury to persons
Water	Oxidation of the pump
Food substances	Contamination of the substances themselves