

BRAVO

Electric Lubrication pump
for fixed and mobile
applications.

User operation and Maintenance manual

Warranty

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Manufacturer	DropsA S.p.A.
Product	BRAVO
Year	2007
Certification	CE

1. INTRODUCTION

This operation and maintenance manual refers to the Bravo lubrication pump.

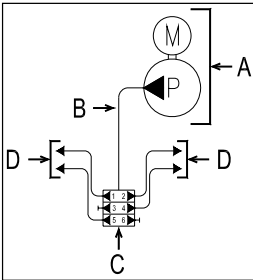
You can obtain the latest release of this document by contacting a Dropsa sales office or distributor or by visiting us on the world wide web at <http://www.dropsa.com>.

This document contains important information concerning the operation of the Bravo lubrication pump and essential information regarding correct operating and safety procedures design to ensure safe and reliable operation of the unit. It is important that this document is read and maintained in a place that anyone operating the Bravo 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 due to better operating conditions as a result of proper lubrication and eliminate 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 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.

When the pump is activated, it pumps grease into the primary line. Then, the distributor element (eg SMX, SMP) divides the lubricant in a volumetric form into a number of secondary lines. These secondary lines are then piped to the lubrication point. The configuration of the divider allows for different ratio of grease to the secondary line to be achieved.

Bravo 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.

The pump should be therefore limited to this purpose. The user should be aware that certain lubricants can be very problematic to pump and therefore care must be taken to select a suitable lubricant that falls within the above range.

2.2 BRAVO ELECTRIC GREASE PUMP

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

The Bravo also has a modular build reservoir that can be supplied in 2,5 8 liter 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 is available as 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 controller 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 grease version of the Bravo includes a stirrer device with a reservoir wiper that help to eliminate air present in the grease and facilitate pumping even at lower temperatures.

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 5 operating modes for the controller version:

1. **TIME:** Lube Cycle and Pause Cycle are controlled using the built in timer.
2. **CYCLE:** Lube cycle is controlled by setting the number of cycles the cycle sensor must register. The pause cycle is set using the built in timer.
3. **PAUSE:** Lube Cycle is time based. Pause cycle is set based on the a user settable number of external inputs that must be received before initiating a lube cycle. (eg a press with cycle switch).
4. **COUNTER:** Lube Cycle and Pause cycle are determined by a user settable number of cycles for each parameter.
5. **OFF:** Pump is activated and deactivated according to a remote signal supplied by the user (mimics the operation of a manual pump).

Bravo has been designed with a configurable wiring and connector system. The connector plate and mating connector or wiring harness must be ordered separately.

On the base of the pump there is are mounting holes for Dropsa SMP or SMPM progressive distributors.

3. PRODUCT IDENTIFICATION

On the side of the pump 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	2 Liter	5,5Kg (12.12lb)			6,5 Kg (14.33lb)				
	5 Liter	6Kg (13.22lb)			7Kg (15.43lb)				
	8 Liter	6,5Kg (14.33lb)			7,5Kg (16.53lb)				
Number of outlets / pumping elements	1 (3 max.)								
Outlet thread	1/4" BSP								
Nominal output per pump element	2,8cm ³ /min (0.17in ³ /min) @ 20 RPM								
Pressione di funzionamento	280bar (4061psi)								
Integrated By-pass pressure (for pump elements with integrated PSV)	320bar ±30bar (4641psi ±435psi)								
Reservoir Capacity	2 – 5 – 8 litri (0.53 – 1.32 – 2.11 gallons)								
Max Grease capability	NLGI 2								
Min. oil viscosity	46cSt								
Operating temperature	-25°C ÷ +80°C								
Storage temperature	-30°C ÷ +90°C								
Humidity	90%								
IP Protection grade	IP65								
Noise	< 70 db (A)								
CONTROL PANEL CHARACTERISTICS									
Operating Voltage	12VDC ±20%								
	24VDC ±20%								
	110VAC	Includes internal transformer							
	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		
	MANUAL Version				0,3A	@	230V		
					0,25A	@	120V		
ELECTRICAL CONNECTIONS									
P/N Connettore	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	



*** NOTE:**

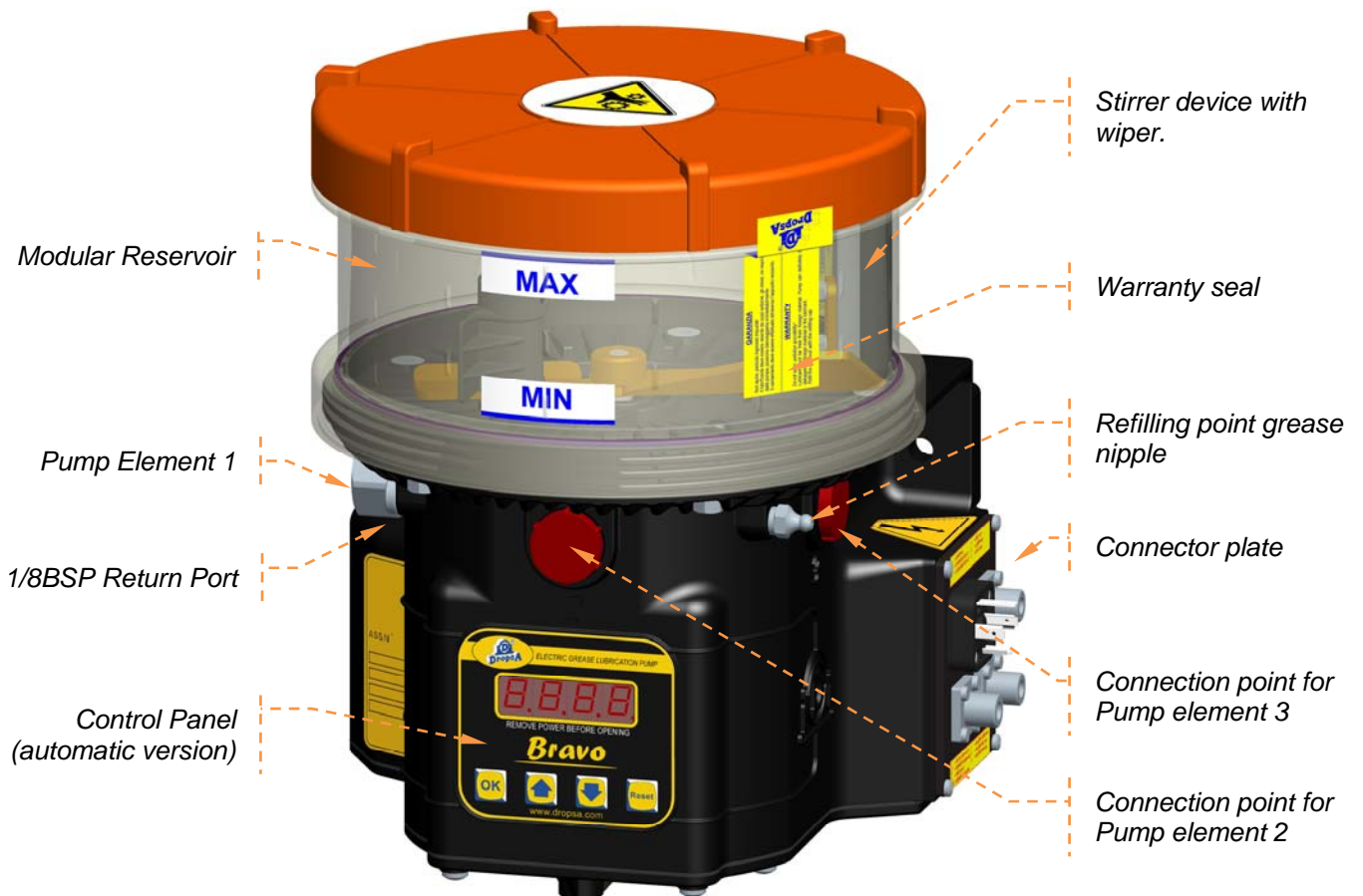
Pump output has been determined at the following conditions: Grease, NLGI 2, Standard environmental conditions (Temperature 20°C / 68°F, Pressure 1 ATM), Back pressure on outlet 50bar (735 psi) 12V e 24V voltage.



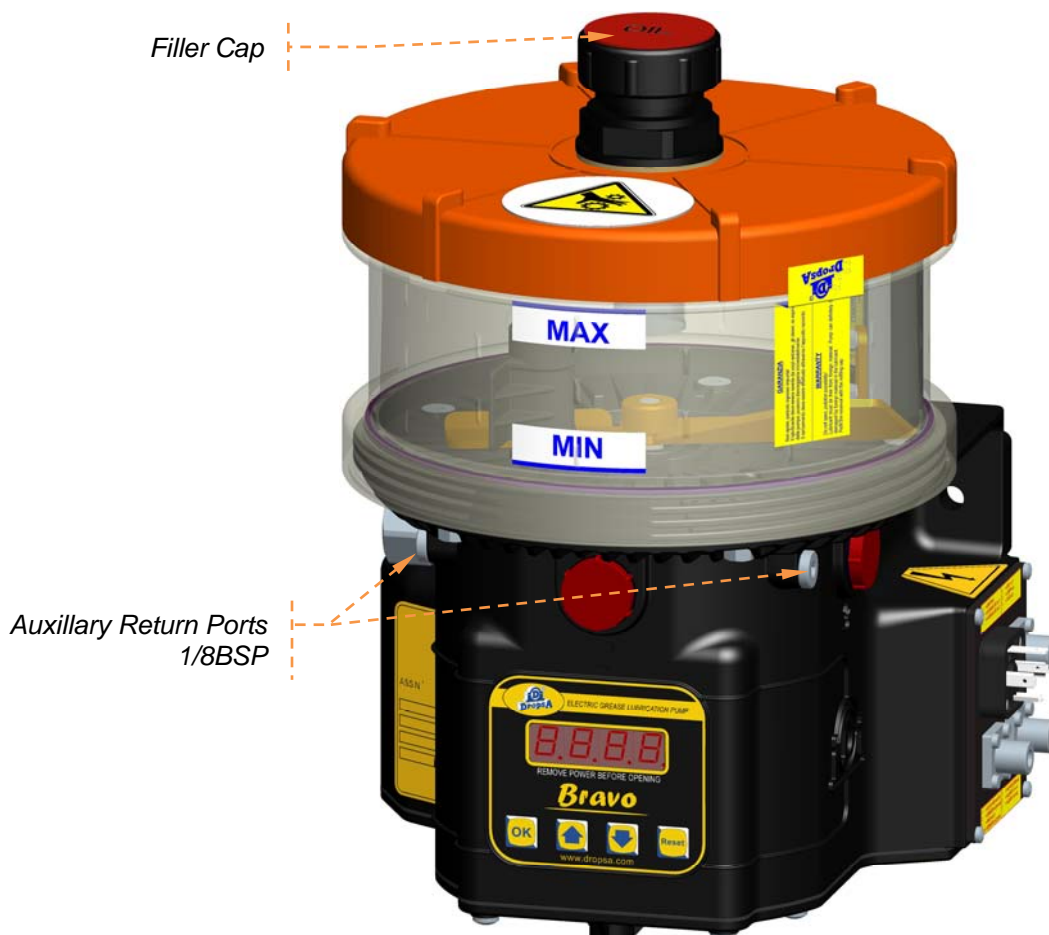
WARNING: Do not operate the unit outside the specified voltage ranges.

5. PUMP COMPONENTS

BRAVO GREASE



BRAVO OIL



5.1 ELECTRONIC CONTROL BOARD.

In the automatic version, pump and cycle control is managed by the onboard controller. 5 operating modes are possible:

1. **TIME:** Lube Cycle and Pause Cycle are controlled using the built in timer.
2. **CYCLE:** Lube cycle is controlled by setting the number of cycles the cycle sensor must register. The pause cycle is set using the built in timer.
3. **PAUSE:** Lube Cycle is time based. Pause cycle is set based on the a user settable number of external inputs that must be received before initiating a lube cycle. (eg a press with cycle switch).
4. **COUNTER:** Lube Cycle and Pause cycle are determined by a user settable number of cycles for each parameter.
5. **OFF:** Pump is activated and deactivated according to a remote signal supplied by the user (mimics the operation of a manual pump).

Programming instructions can be found in chapter 7 of this manual.

5.2 MINIMUM LEVEL

In the manual versions (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. (fig.1). Note:110/230V versions have two multi pin connectors.
- Fit the baseplate into position as shown in figure 2 and use the 4 screws to lock into position.



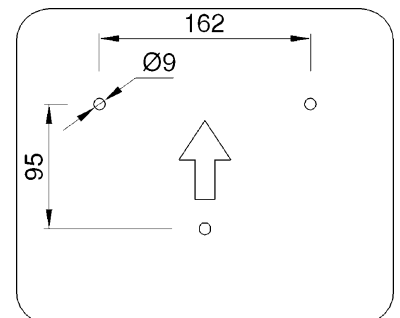
fig. 1



fig. 2

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 $\varnothing 9$ mm ($\varnothing 0,35$ inch). Use 3 screws to fix the pump into place.



- Assembly 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.
- 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.

6.4 INSTALLING PUMP ELEMENTS

Bravo pump is supplied with a single Pump element installed in Port 1.

The additional pump elements can be installed in any of the additional pump port (2 or 3). It is also possible to move Pump Element 1 to another port if necessary, for example to simplify piping arrangements on the lubrication system. 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 a sit compresses the return spring. In this case, use another outlet or of 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. Ensure that any refilling system provides clean grease to the pump.

6.6 INSTALLAING 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 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.*

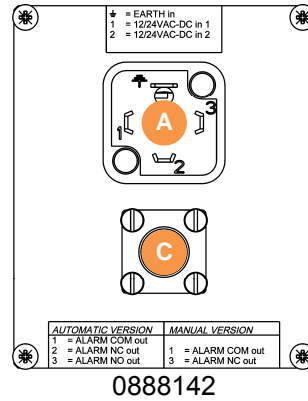
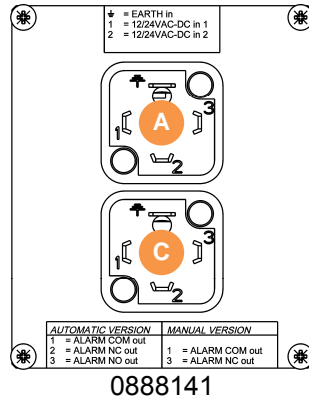
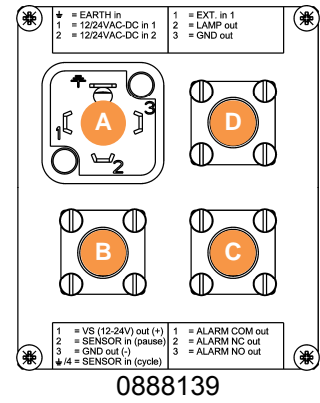
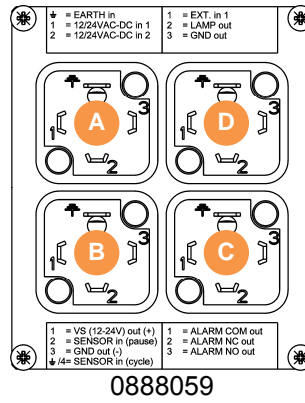
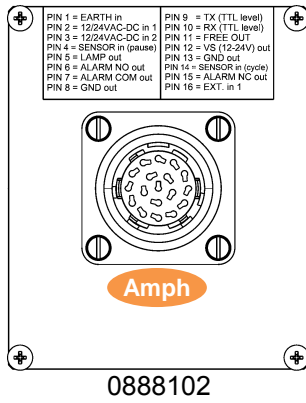
The electrical connection should be carried out an electrician who has understood and identified the various connectors and wiring that has been selected for the system (operating voltage, connector types, remote control, cycle sensors).

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.

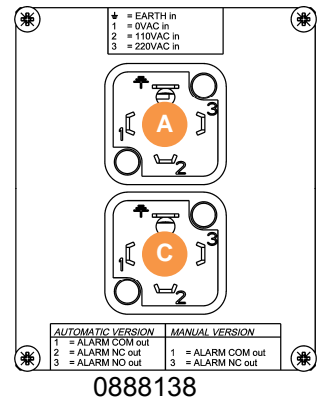
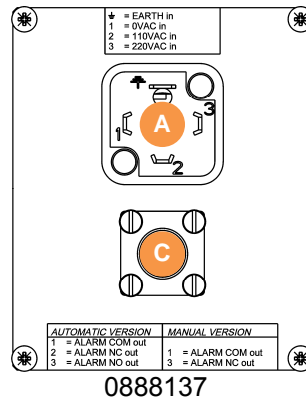
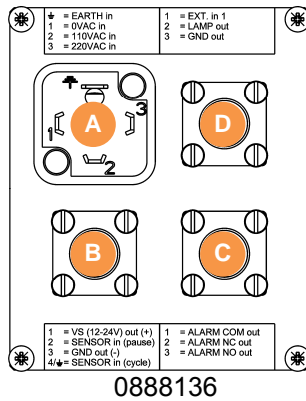
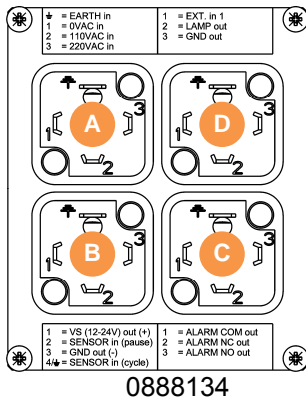
On 110V/230VAC versions it is strongly recommended that a 1A fuse T and a differential trip is installed with an activation level of 0,03A at 1 second max. Isolation capability should be 10kA minimum and nominal current ≥ 4 Amps.

6.7.1 Connector Types

12V/24V VERSIONS



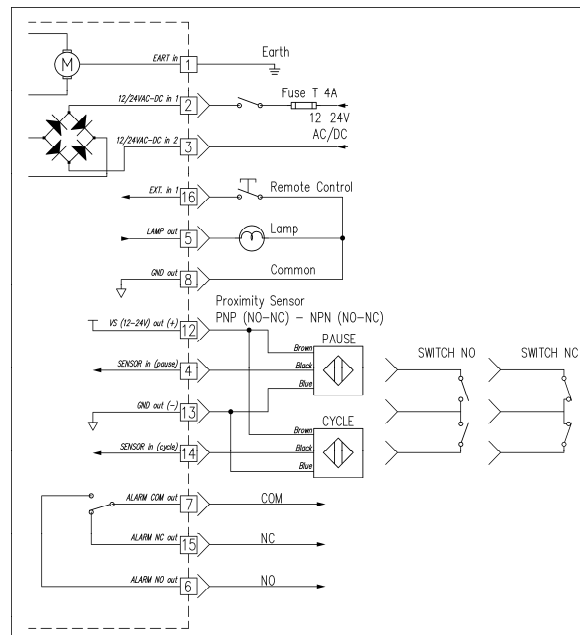
110V/230V -50Hz/60Hz VERSIONS



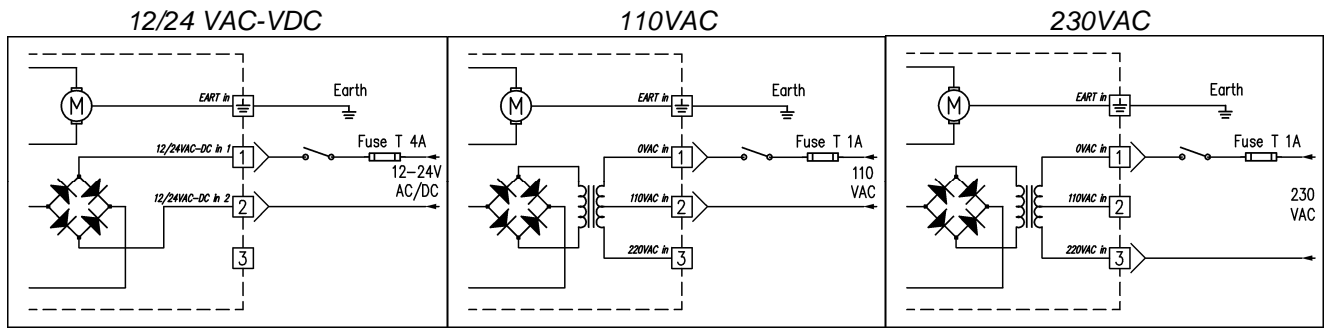
Wiring



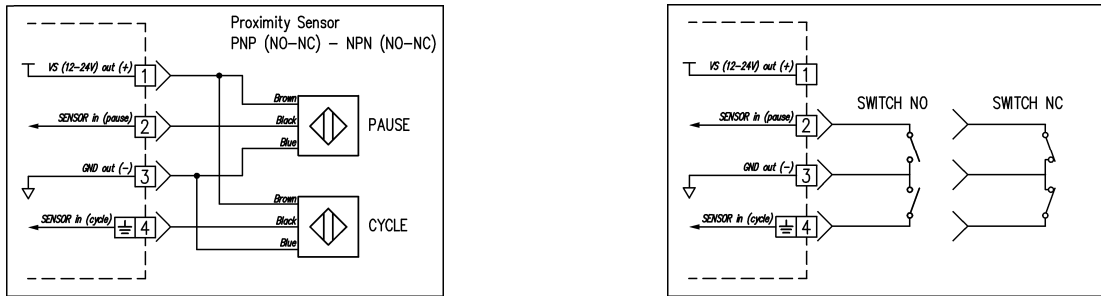
MULTIPOLE Connector



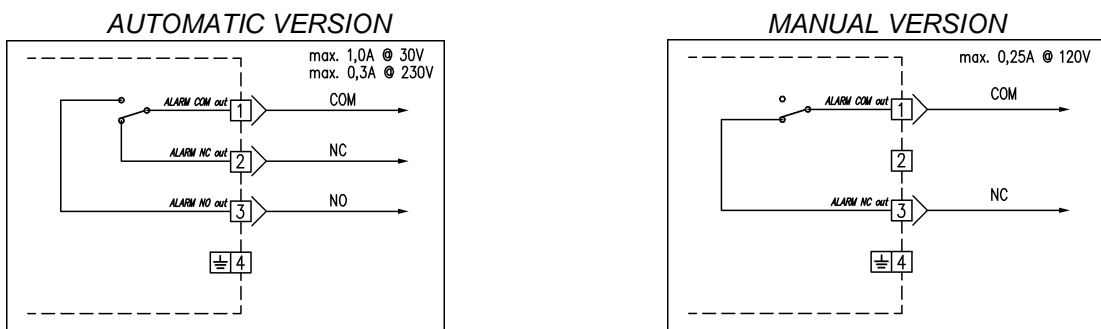
Wiring **A** POWER SUPPLY



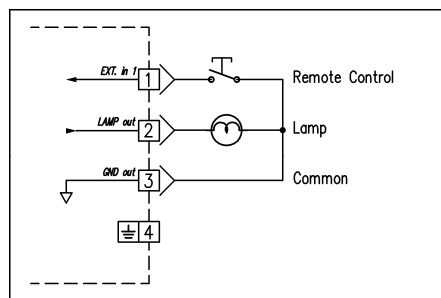
Wiring **B** CYCLE SENSOR



Wiring **C** MINIMUM LEVEL



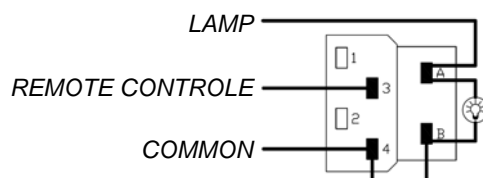
Wiring **D** REMOTE CONTROL



6.7.2 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.



7. OPERATING INSTRUCTIONS

7.1 General notes before startup

- Note that the unit should not be dismantled by the user if a fault is found.
- Use gloves when handling lubricants and ensure you have checked the lubricant safety data sheet.
- Do not use lubricants that are incompatible with NBR (Buna) seals.
- Ensure that you have complied with all health and safety requirements before putting the pump into service.
- Maintain proper hygiene standards. Never ignore any potential danger to health.
- Ensure all tubing and fittings are designed to handle the maximum system pressure.

Before putting into operation

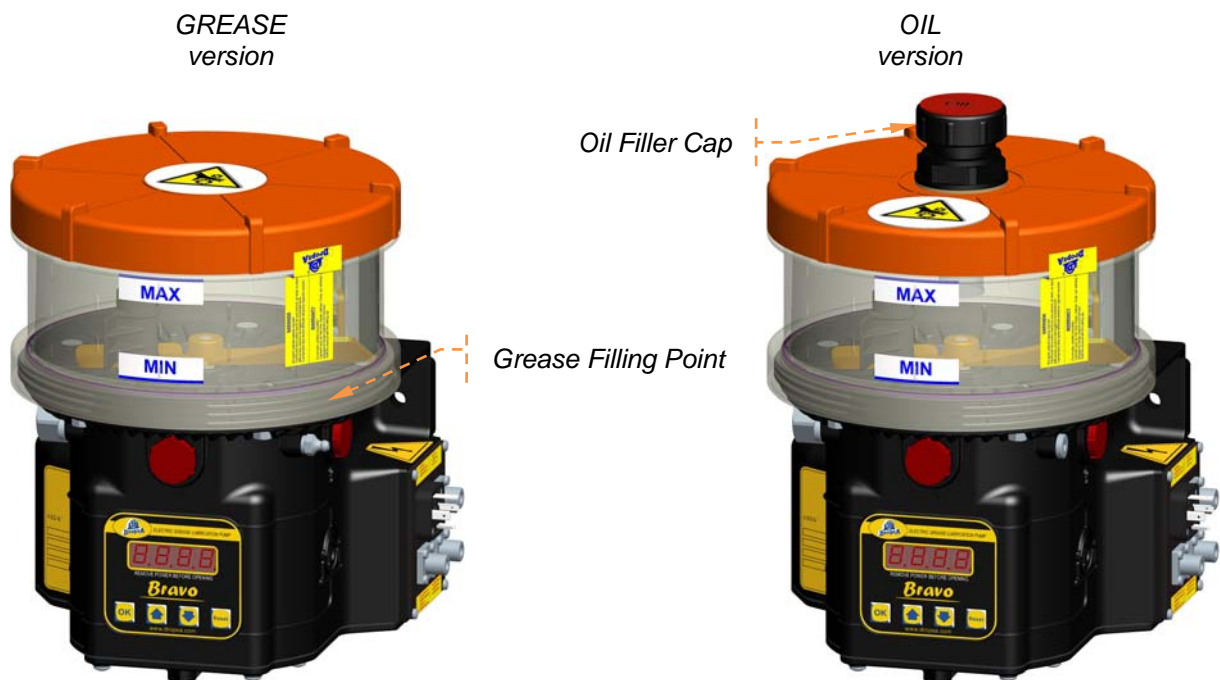
- Check integrity in the pump. Ensure no damage;
- Check and fill the reservoir. If the reservoir is below the MIN level, follow procedure 7.3 to refill;
- Verify the pump is at the correct operating temperature and tubing is free of air bubbles;
- Check the unit is properly cabled.

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.

7.3 Refilling the reservoir

The refilling of the tank is carried out through the dedicated filling ports with adequate filtration to ensure clean lubricant. Continue to fill unit until the max level is reached/ this level should not be exceeded. In the event the user overfills the tank, the excess lubricant will be expelled through vent holes located under 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.

7.4 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.
When pressed during the pause (standby) cycle, it will make the pump commence a lubrication cycle and then return to normal timed operation.

7.4.1 OPERATING MODE: Manual version

The Bravo 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.

7.4.2 OPERATING MODE – Automatic version Mode: TIME (Time)

When TIMER mode is set the Lubrication and pause (standby) time are settable.

The control of the pump is therefore completely time dependant on the integrated control board. Once the pause timer has run to completion. The pump will be activated for the duration of the Lubrication timer and then return to pause cycle.

You should ensure that sufficient time is allowed to cycle all the distribution elements in the system.

7.4.3 OPERATING MODE – Automatic version Mode: CYCL (Cycle)

When Cycle mode is set the control of the entire lubrication is determined by setting the Pause (standby) and the number of cycles to read from a cycle switch installed on the system. When the Pause timer has run to completion the pump is activated and the cycle switch is monitored until the number of cycles set has been detected on the cycle switch input.

The lubrication time in this mode is a timeout value which determines how long the pump must wait to receive the number of cycle inputs set before going into an alarm state. This value can be set up to 10 minutes maximum.

7.4.4 OPERATING MODE – Automatic version Mode: PAUS (Pause)

When PAUSE mode is set, the user sets the lubrication timer and the number of external cycle inputs to receive between each lubrication cycle. The built in controller will therefore wait in a Pause state until the number of cycles set is received. This then triggers the pump to activate for the period set in the lubrication time. Once the lubrication time has run, the pump will return to a pause state once again.

If the Pause timer parameter is not set to Zero the controller will operate in combined mode. This is a combined mode in which the pause timer continues to operate during the pause time.

The result is that the lubrication cycle is started by EITHER the number of cycles being reached OR the Pause time reached.

7.4.5 OPERATING MODE – Automatic version Mode: COU (Counter)

When Counter mode is set, the lubrication cycle and pause (standby) cycle is determined by a user settable number of impulse cycles that must be sensed on the cycle switch.

If a value other than zero is set for the Pause timer parameter the controller will operate in combined mode. If the pause timer reaches zero before the number of cycles on the switch set then it will in any case start a lubrication cycle.

7.4.6 OPERATING MODE – Automatic version Mode: MODE OFF (Off)

With this operating mode, no parameters are settable. The pump will be activated only when a remote signal is sent to it from a user installed control system. The user's control system should also monitor level and cycle switches and appropriately switch the pump on and off based on the desired control logic.



NOTE:

When power is removed from the Bravo, 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).

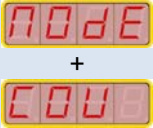







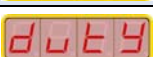
When powering on the system or when pressing the RESET button the display will the firmware version of the unit for 2 seconds.

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.

7.5 Programming the Electrical Controller

OPERATING PARAMETERS				
DISPLAY	DESCRIPTION	DEFAULT	RANGE	NOTES
MODE + TIME	Operating Mode: TIMER (default) Set Lube Cycle and Pause time			Continuous Cycle (*)
PREL	PRELUBE: Start Controller in Lubrication mode when powered on	OFF	ON-OFF	
PHOU	Pause Timer (Hours): set Hours and Minutes	10min	0 min / 99 hr	
CN, n	Cycle Timer (Min): set cycle time in minutes and seconds	1 min	99 min / 1 sec	
DUTY	Motor DUTY. Allows reduction in pump output by adjusting motor speed	100	100 / 50	
MODE + CYCL	Operating Mode: CYCLE Lube cycle terminated by cycle switch. Pause is timer based			Continuous Cycle (*)
PREL	PRELUBE: Start Controller in Lubrication mode when powered on	OFF	ON-OFF	
PHOU	Pause Timer (Hours): set Hours and Minutes	1 minuto	0 min / 99 ore	
CCOU	Cycle Counter: Number of divider switch cycles per lubrication cycle	1 ciclo	1 / 9999	Count on Close
TOU, t	Time out (min. secs): Time allowed for Cycle counter to complete before indicating cycle alarm	1 minuto	1 sec / 30 min	
DUTY	Motor DUTY. Allows reduction in pump output by adjusting motor speed	100	100 / 50	
MODE + PAUS	Operating Mode: PAUSE Triggered Lube Cycle is timer based. Pause cycle is triggered by external switch and pause timer if set			Continuous Cycle (*)
PREL	PRELUBE: Start Controller in Lubrication mode when powered on	OFF	ON-OFF	
PHOU	Pause Timer(Hours): set Hours and Minutes. If set to zero, parameter is ignored	0 min	0 min / 99 ore	
PCOU	Cycle Counter: Number of divider switch cycles per lubrication cycle	1 cycle	0 / 9999	Attivo chiuso
CN, n	Cycle Timer(Min): set cycle time in minutes and seconds	1 minuto	99 min / 1 sec	
DUTY	Motor DUTY. Allows reduction in pump output by adjusting motor speed	100	100 / 50	

SIGLA	DESCRIZIONE	DEFAULT	RANGE	NOTE
	Modo di funzionamento: COUNTER Cycle switch counter is used to determine both Lube and Pause Cycles (Timers used if set)			Continuous Cycle (*)
	PRELUBE: Start Controller in Lubrication mode when powered on	OFF	ON-OFF	
	Pause Timer(Hours): set Hours and Minutes. If set to zero, parameter is ignored	0 min	0 min / 99 ore	Both
	Pause Counter: Number of divider switch cycles to wait in pause (standby)	1 cycle	0 / 9999	Count on Close
	Cycle Counter: Number of divider switch cycles per lubrication cycle	1 cycle	1 / 9999	Count on Close
	Time out (min. secs) : Time allowed for Cycle counter to complete before indicating cycle alarm	1 min	1 sec / 30 min	
	Motor DUTY. Allows reduction in pump output by adjusting motor speed	100	100 / 50	
	Operating Mode: OFF Pump remotely controlled. No cycle parameters			
	Motor DUTY. Allows reduction in pump output by adjusting motor speed	100	100 / 50	














(*) NOTE:

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

Count on Close: Counter considers count on closed inputs.














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

PROGRAMMING SEQUENCE		
STEP	BUTTONS	OPERATION
1	 Hold for 3 seconds.	Enters programming mode
2	  As required	Select OPERATING MODE as described above
3		Confirms the selection
4	  As required	Select the PARAMETER to change
5		Confirms selection
6	  as required	Increment/Decrement VALUE/SETTING of PARAMETER
7		Confirm value/setting and return to menu
8	 Hold for 2 seconds.	Save settings and exit programming mode/



NOTE: To modify the operating parameters repeats steps 4 to 7 for all necessary values and then follow step 8 to save and exit.

During programming mode, if no button is pressed for 20 seconds or alternitavely is UP and DOWN arrows are held simultaneously for 3 seconds this will exit Programming mode without saving the values.






SPECIAL FUNCTIONS AND PARAMETERS		
BUTTONS	DISPLAY	DESCRIPTION
 +  + 		Reset to default parameters for the current OPERATING MODE
 + 		Display total hours worked in hours
		Display total hours worked in minutes
		Display total hours in PAUSE state
		Display total minutes in PAUSE state

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 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.
	Distributor valves are blocked.	Clean or replace.
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.
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 replace.
	Worn pump element.	Replace pump element.
	Pump element Check worn.	Replace pump element.
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.

ALARM CODES		
MESSAGE	ALARM	REMEDY
	Low lubricant level in reservoir	Refill with clean lubricant
	Pump Motor Blocked	Verify problems on stress on motor unit (eg foreign objects blocking correct operation)
	Pump Motor Over-load	Allow system to cool. Verify as per previous point.
	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
	Eprom Error	Electronic Board memory error. Board requires replacement

NOTE:

To cancel an error message press .

9. MAINTENANCE PROCEDURE

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

The Bravo pump does not necessitate any special tool for operation and maintenance. When working with the Bravo 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 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

"BRAVO" Pump

AUTOMATIC VERSION						
Operating Voltage	GREASE			OIL		
	Reservoir 2Lt. (0.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (0.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)
110V/230V	0888400	0888401	0888402	0888415	0888416	0888417
12V/24V	0888403	0888404	0888405	0888418	0888419	0888420
MANUAL VERSION						
Operating Voltage	GREASE			OIL		
	Reservoir 2Lt. (0.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (0.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)
110V/230V	0888406	0888407	0888408	0888421	0888422	0888423
12V	0888409	0888410	0888411	0888424	0888425	0888426
24V	0888412	0888413	0888414	0888427	0888428	0888429

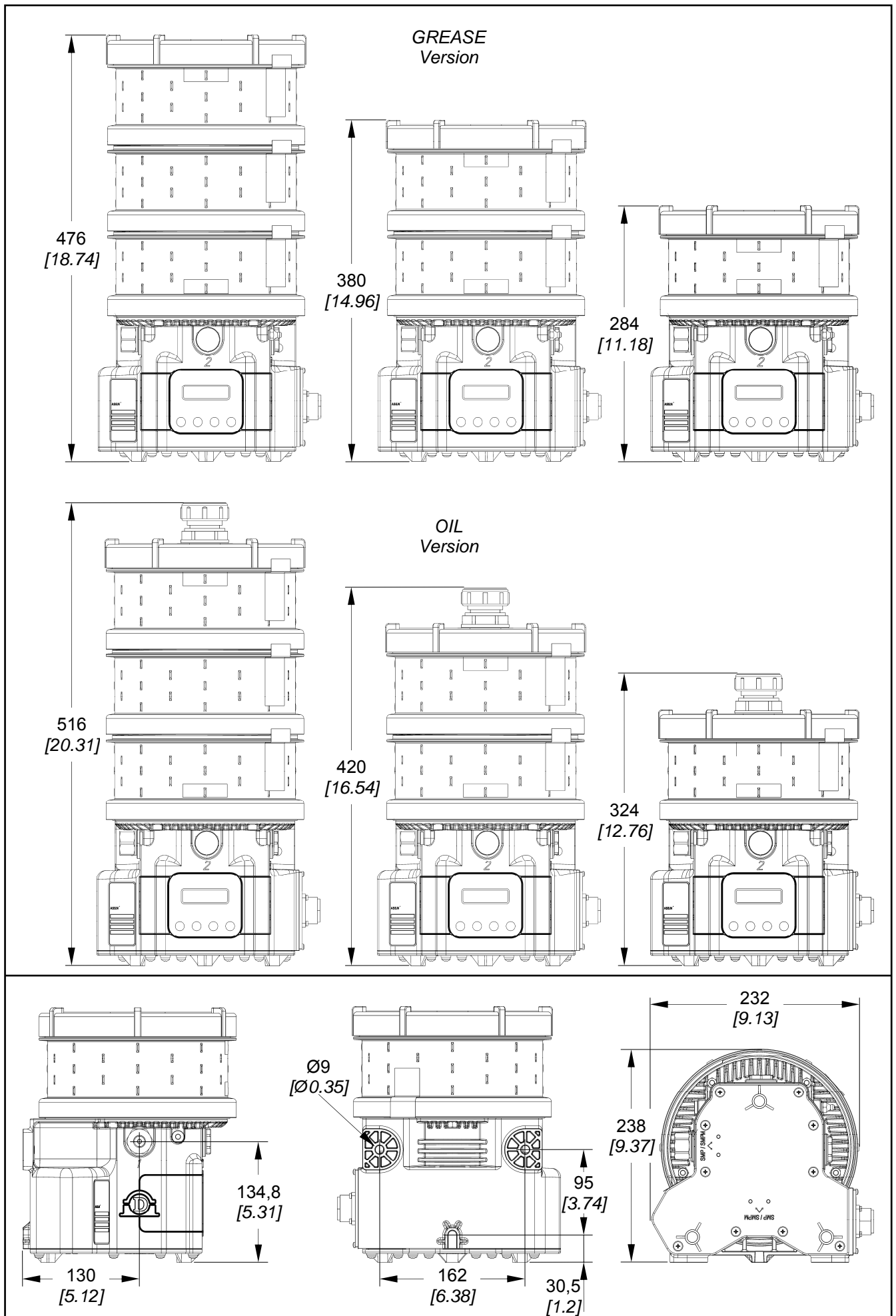
Connector base and female connector plug module (optional)

AUTOMATIC VERSION 12V/24V			
CONNECTION		FEMALE CONNECTOR (optional)	
Part No.	Description	Part No.	Description
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	Connector "MPM"
		0039999	Connector "M12"
0888142	Base Connector "MPM x 1 + M12 x 1"	0039976	Connector "MPM"
		0039999	Connector "M12"
AUTOMATIC VERSION 110V/230V			
CONNECTION		FEMALE CONNECTOR (optional)	
Part No.	Description	Part No.	Description
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	Connector "MPM"
		0039999	Connector "M12"
0888137	Base Connector "MPM x 1 + M12 x 1"	0039976	Connector "MPM"
		0039999	Connector "M12"
MANUAL VERSION 12V/24V			
CONNECTION		FEMALE CONNECTOR (optional)	
Part No.	Description	Part No.	Description
0888141	Base Connector "MPM x 2"	0039976	Connector "MPM"
0888142	Base Connector "MPM x 1 + M12 x 1"	0039976	Connector "MPM"
		0039999	Connector "M12"
MANUAL VERSION 110V/230V			
CONNECTION		FEMALE CONNECTOR (optional)	
Part No.	Description	Part No.	Description
0888138	Base Connector "MPM x 2"	0039976	Connector "MPM"
0888137	Base Connector "MPM x 1 + M12 x 1"	0039976	Connector "MPM"
		0039999	Connector "M12"

OPTIONAL

Part No.	Description	CODICE	Description
0039433	Remote control switch and lamp 12V	0888058	Pump element Ø6mm with integrated PSV
0039434	Remote control switch and lamp 24V	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 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.

Noise

Pump does not produce excessive noise, less than 70 dB(A).

14.1 Lubricants



NOTE:

The pump has been designed to operate with grease max NLGI 2 or Oil min 42cst(oil version).

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 and cSt (Centi stokes) e SUS (Saybolt Universale) for Oil

GREASE		OIL	
NLGI	ASTM	cSt	SUS
000	445 – 475	46	213.3
00	400 – 430	70	323
0	355 – 385	100	462.6
1	310 – 340	150	694.2
2	265 – 295	220	1018
For further technical information and on safety information consult the lubricant MSDS Safety data sheet or equivalent document supplied by the lubricant manufacturer .		320	1480
		450	2082
		700	3239
		1000	4628

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 (Machine Dir. - att. 1, part 1).
- 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.

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

16. WARRANTY

All products manufactured and marketed by Dropsa are warranted to be free of defects in material or workmanship for a period of at least 12 months from date of delivery. Extended warranty coverage applies as follows:

Complete system installation by Dropsa: 24 Months.

All other components: 12 months from date of installation; if installed 6 months or more after ship date, warranty shall be maximum of 18 months from ship date.

If a fault develops, notify us giving a complete description of the alleged malfunction. Include the part number(s), test record number where available (format xxxxxx-xxxxxx), date of delivery and installation and operating conditions of subject product(s). We will subsequently review this information and, at our option, supply you with either servicing data or shipping instruction and returned materials authorization (RMA) which will have instructions on how to prepare the product for return. Upon prepaid receipt of subject product to an authorized Dropsa Sales & Service location, we will then either repair or replace such product(s), at our option, and if determined to be a warranted defect, we will perform such necessary product repairs or replace such product(s) at our expense.

Dropsa reserves the right to charge an administration fee if the product(s) returned are found to be not defective.

This limited warranty does not cover any products, damages or injuries resulting from misuse, neglect, normal expected wear, chemically caused corrosion, improper installation or operation contrary to factory recommendation. Nor does it cover equipment that has been modified, tampered with or altered without authorization.

Consumables and perishable products are excluded from this or any other warranty.

No other extended liabilities are stated or implied and this warranty in no event covers incidental or consequential damages, injuries or costs resulting from any such defective product(s).

The use of Dropsa product(s) implies the acceptance of our warranty conditions. Modifications to our standard warranty must be in made in writing and approved by Dropsa.

17. DECLARATION OF COMPLIANCE WITH CE STANDARDS

Dropsa

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Centralized Lubrication Engineers and Component Manufacturers
Gli Specialisti Della Lubrificazione Dal 1946

DICHIARAZIONE **CE** DI CONFORMITÀ Allegato II A, della Direttiva 98/37/CE

La Sottoscritta Milena Gavazzi, in qualità di legale rappresentante del fabbricante della Società Dropsa S.p.A., con sede legale in Milano, Via Visconti di Modrone, 2.

DICHIARA, sotto la propria esclusiva responsabilità,

che la macchina denominata “**Pompa BRAVO**” **cod. 08884...**
è conforme alle condizioni previste dalle Direttive CEE:

- 98/37 Direttiva Macchine
- 2004/104 e 2006/28 Autoveicoli
- 89/336 Compatibilità elettromagnetica
- 2006/95 Bassa tensione

poiché rispetta tutti i requisiti essenziali di sicurezza e sanitari che le concernono, ed in riferimento alle seguenti norme armonizzate:

- EN 61000-6-4 Compatibilità elettromagnetica – norma generica di emissione.
- EN 61000-6-2 Compatibilità elettromagnetica – norma generica di immunità.
- EN 60204 Sicurezza degli equipaggiamenti elettrici delle macchine.
- EN 60034 Macchine rotanti.
- EN 12100-1/2 Sicurezza del macchinario – concetti fondamentali/principi di progettazione.
- EN 1050 Sicurezza del macchinario – principi per la valutazione del rischio.
- EN 982 Sicurezza del macchinario. Requisiti di sicurezza relativi a sistemi e loro componenti per trasmissioni oleoidrauliche e pneumatiche. Oleoidraulica.
- EN 11200 Rumore emesso dalle macchine e dalle apparecchiature.
- EN 894-1/2/3 Requisiti ergonomici per la progettazione dei dispositivi di informazione e di comando.

Vimodrone (MI), 29/10/2007

Il legale rappresentante

Modello dichiarazione CEE conforme a quanto previsto dalla norma EN 45014

Sede Legale: Via Visconti di Modrone, 2 – 20122 Milano – Cap. Sociale €. 1.548.000 - C.C.I.A. 931863 – Cod. Fiscale e P.IVA 03384750158

18. DISTRIBUTORS



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