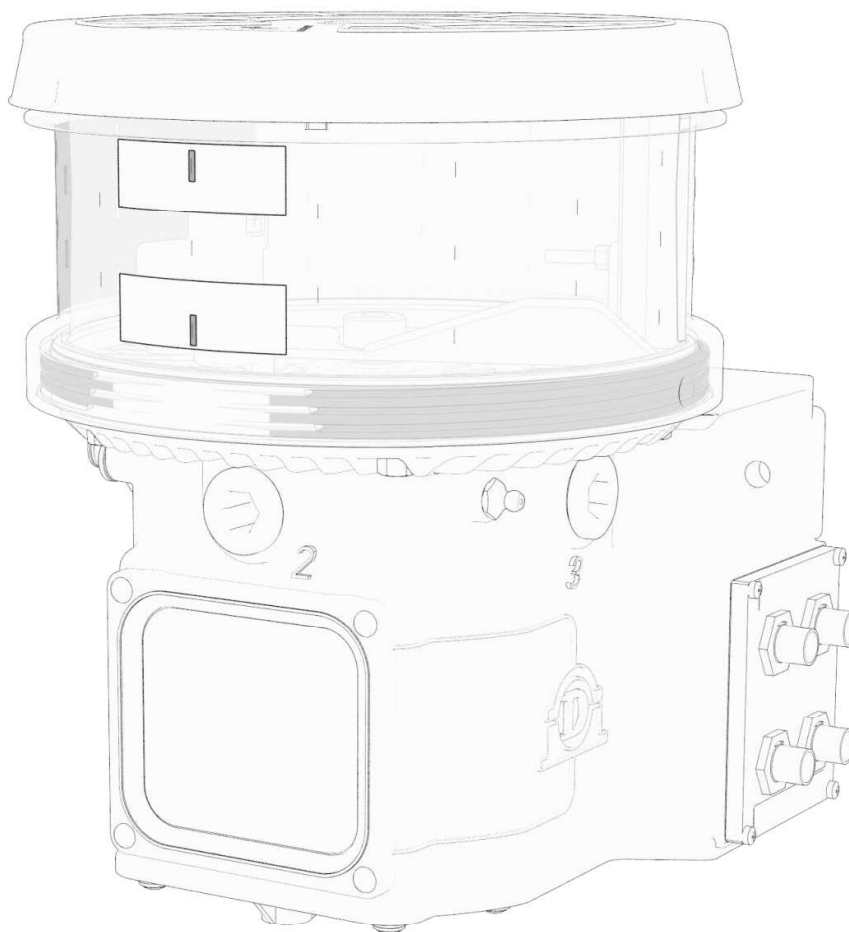


Electric Lubrication pump for fixed and mobile applications

User Operating and Maintenance Manual

Original Instructions



Manual drawn up in accordance with EC
Directive 06/42

C2114IE WK 28/22

1. INTRODUCTION

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

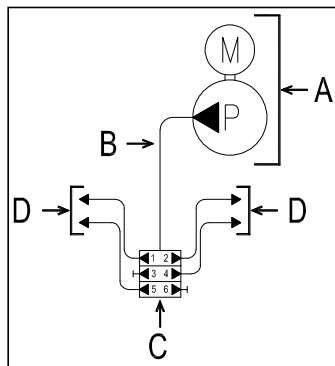
It is important that this document is read and maintained in a place that anyone operating the Bravo is able to consult it if necessary.

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 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 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 ELECTRIC GREASE PUMP

BRAVO 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 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 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 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 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 three operating modes for the controller version. (Refer to 5.1 paragraph)

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 (20 RMP) *			2,8 cm³/min (0.17 in³/min)									
			5,2 cm³/min (0.31 in³/min)									
			0,4 ÷ 2,8 cm³/min (0.02 ÷ 0.17 in³/min) - Adjustable									
Working pressure			280bar (4061psi)									
Integrated By-pass pressure (if present)			320 bar ±30 bar (4641 psi ±435 psi)									
Reservoir Capacity			2 – 5 – 8 litres (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 (IP 69K with special equipment)									
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			• 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+ $\frac{1}{2}$	1mm²		65		10A					
0039820 (M12)	150V	4	0,5mm²		68		4A					
0039823 (Amphenol)	1680V	17+PE	1mm²		65		6A					
0038962 (IP69K)	600V	3	0,5mm²		69K		7,5A					
0039834 (IP69K)	600V	4	0,5mm²		69K		7,5A					

5. PUMP COMPONENTS

BRAVO GREASE



BRAVO OIL



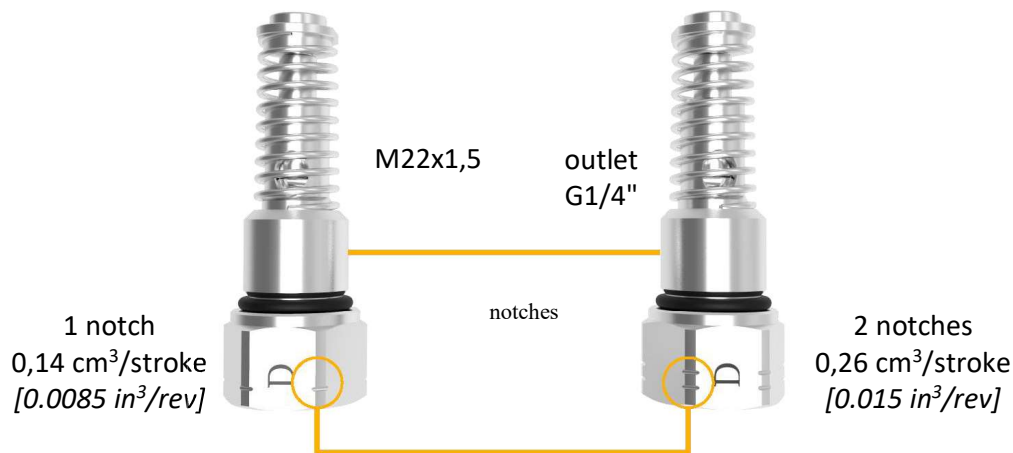


* NOTE: Pump output has been determined at the following conditions: Grease, NLGI 2, Standard environmental conditions (Temperature 20°C / 68°F, Pressure 1 ATM), Back pressure on outlet 50bar (735 psi) 12V e 24V voltage.



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

5.1 PUMPING UNITS IDENTIFICATION



*For use of the 5,2cc pumping unit contact Dropsa for assembly instructions and recommended versions.

*For use of nr.2 5,2cc pumping units, the assembly must be at 180° in the respective locations.

*It is possible to use a maximum of 2 5,22cc pumping units.

5.1.1 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 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.

5.2 MINIMUM LEVEL

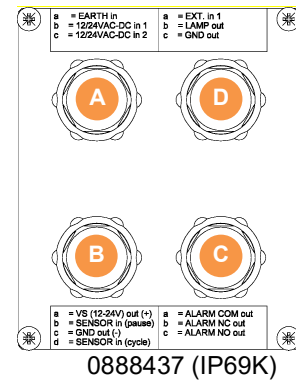
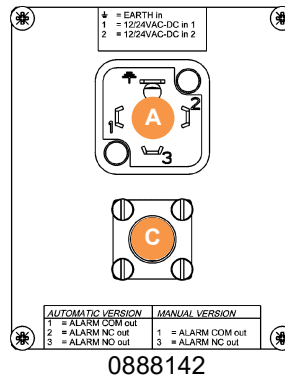
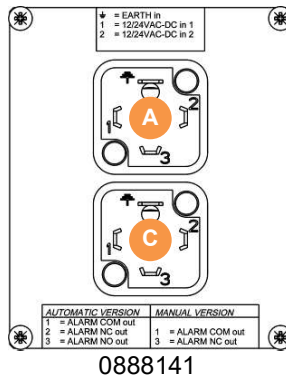
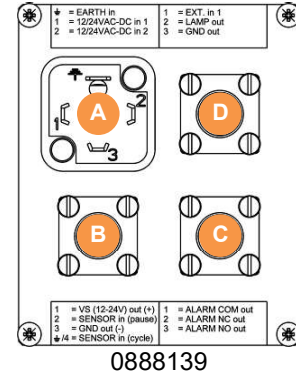
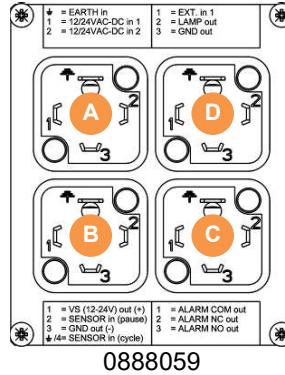
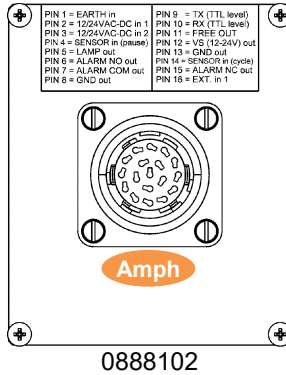
In manual version (no control board) the minimum level switch (Normally closed) opens when the minimum level is reached. With the automatic (controlled) version, a voltage free changeover contact NC/NA can be obtained to give a remote signal of minimum level.

5.3 CONNECTIONS & WIRING

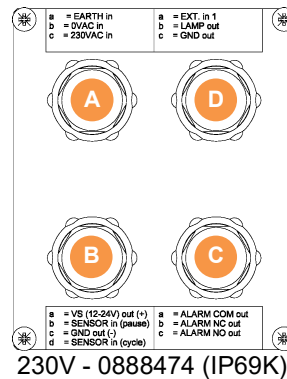
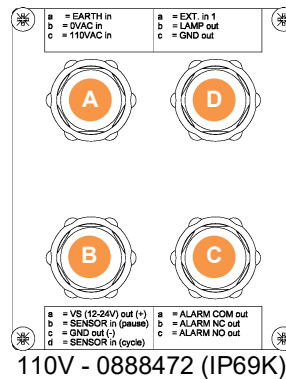
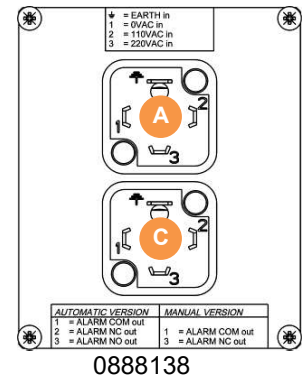
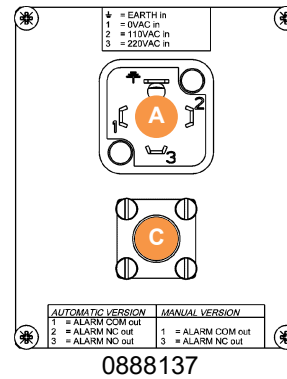
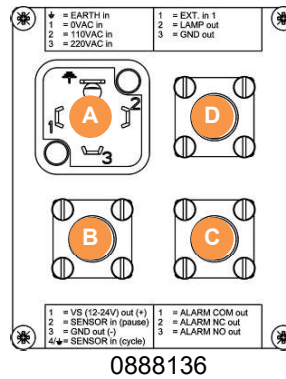
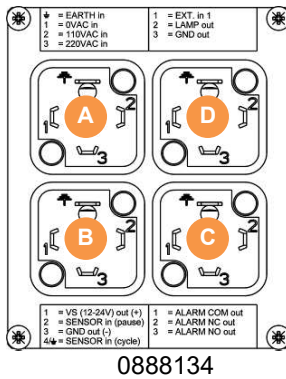
Different connectors and wiring are available as standard by fitting a selection of connector plates. It is also possible for custom settings for OEM clients.

6.8.1 Connector Types

VERSIONS 12V/24V



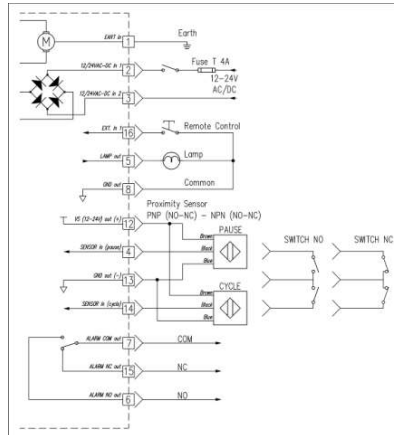
VERSIONS 110V/230V -50Hz/60Hz



Wiring

Amph

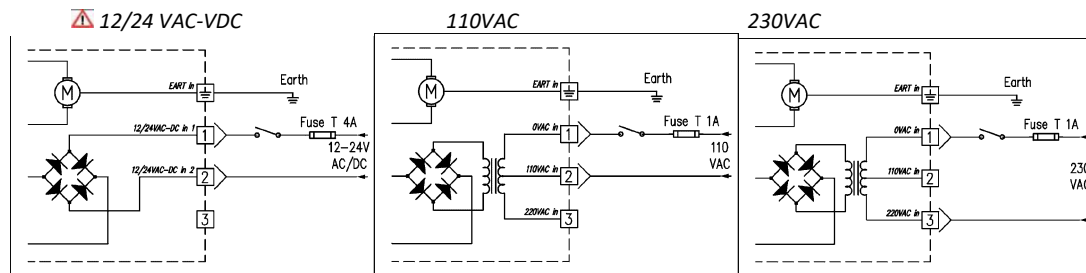
MULTIPOLE Connector



Wiring

A

POWER SUPPLY

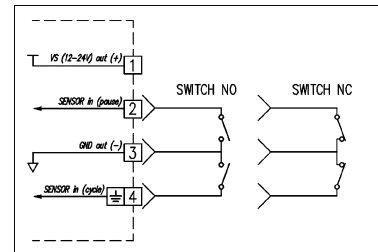
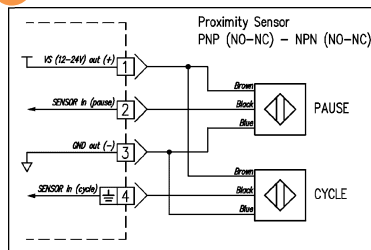


⚠ On 12/24 VAC-VDC manual version do not connect earth terminal

Wiring

B

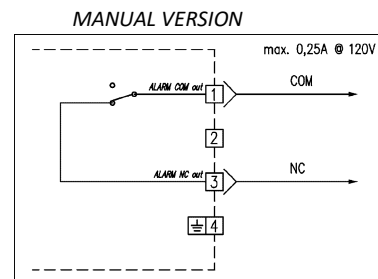
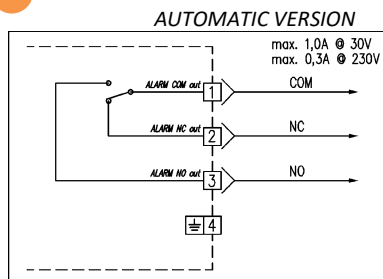
CYCLE SENSOR



Wiring

C

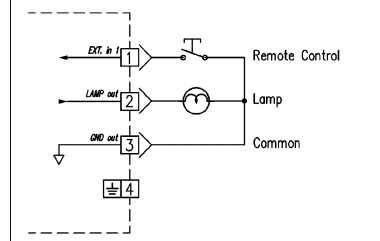
MINIMUM LEVEL



Wiring

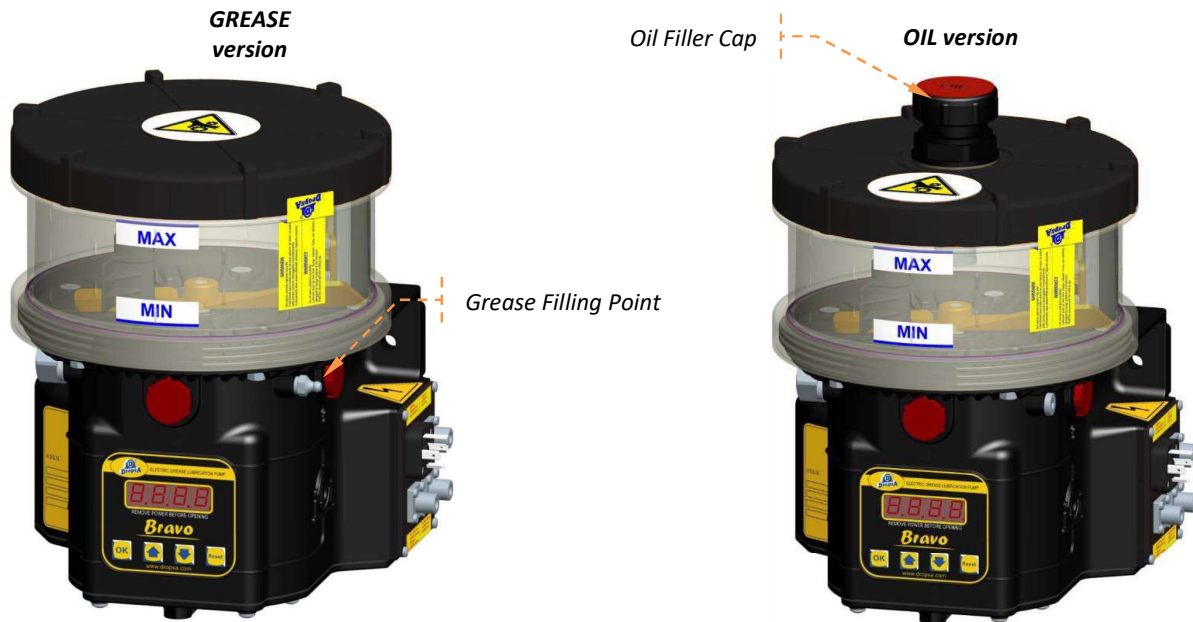
D

REMOTE CONTROL



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

7.5 CONFIGURATION

Automatic version
Control panel layout



Optional Remote Light Button



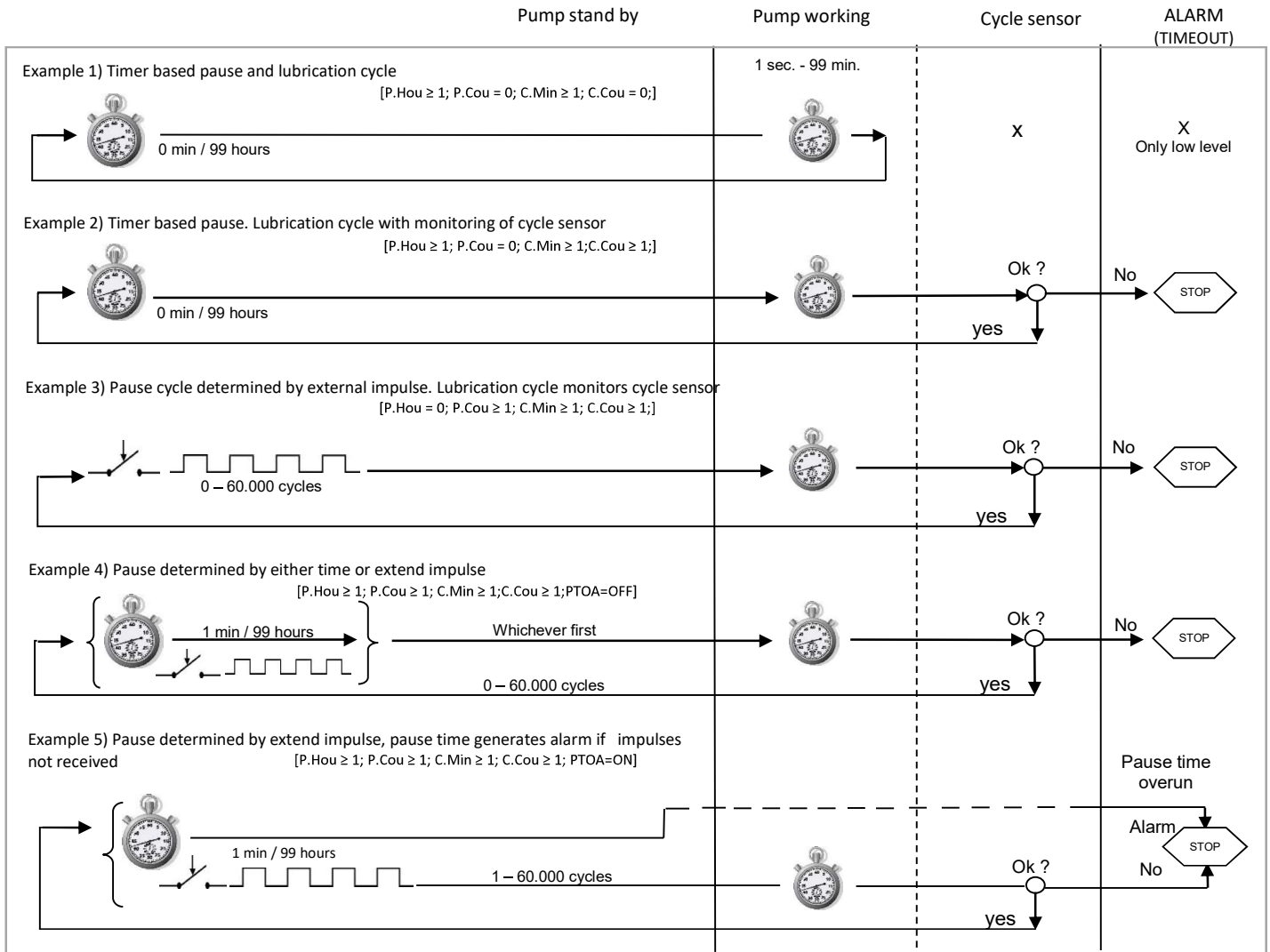
The light is constantly lit when the pump is running.

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.

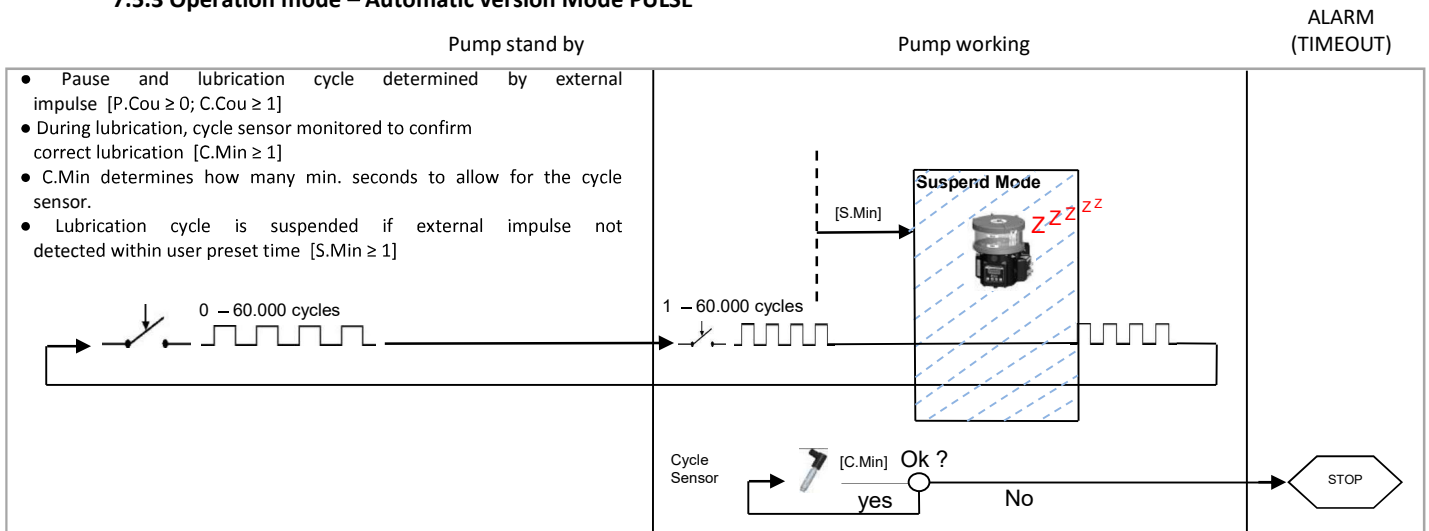
7.5.1 Operating mode: MANUAL VERSION

The Bravo 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, 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.

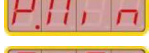
7.6 PROGRAMMING THE ELECTRICAL CONTROLLER

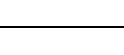
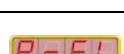
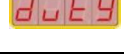
PROGRAMMING SEQUENCE		
STEP	BUTTONS	OPERATION
1	 hold for 5 seconds.	Enter programming mode
2	 or 	Select PARAMETER to change
3		Confirm the selection and view the current value
4	 or 	Increment/Decrement VALUE/SETTING of PARAMETER
5		Confirm value/setting and return to menu
6	 hold for 2.5 seconds.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

SPECIAL FUNCTIONS AND PARAMETERS		
BUTTONS	DISPLAY	DESCRIPTION
 + 		Lock key board. Reset is operating
 + 		Unlock keyboard
 +  +  Release 		Reset the default values in the active 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

OPERATIONAL PARAMETERS					
DISPLAY	DESCRIPTION	MODE	DEFAULT	RANGE	NOTES
		CYCLE PULSE OFF			Cycle 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: ■ 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, the minimum level is excluded.	CYCLE PULSE OFF	ON	ON-OFF	



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.

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.
	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 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. ⚠

⚠ : 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 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

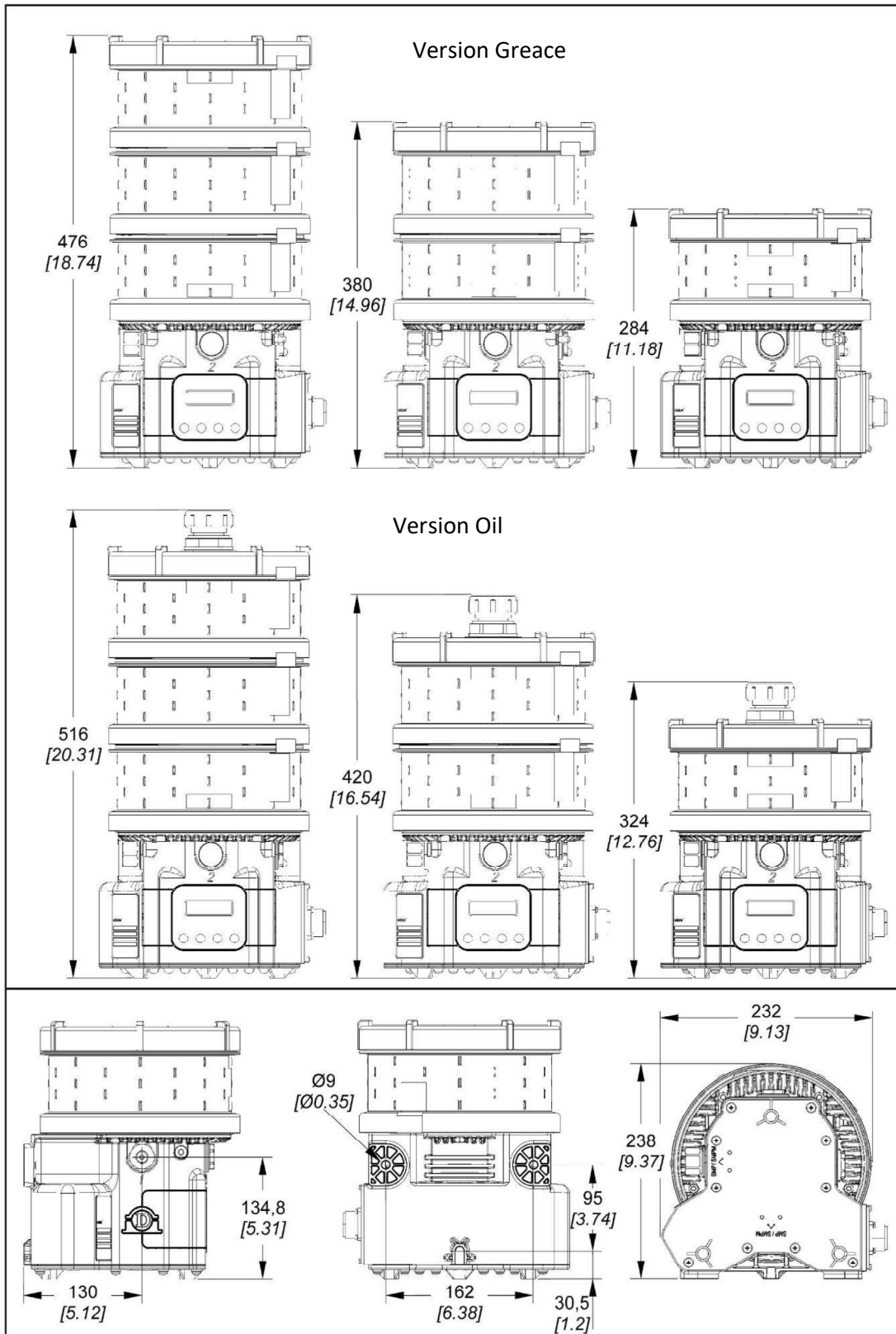
During maintenance or disposal of the machine care should be taken to properly dispose of environmentally sensitive items such as oils or other lubricants. Refer to local regulations in force in your area. When disposing of this unit, it is important to ensure that the identification label and all the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



NOTE:

To cancel an error message press  and .

12. DIMENSIONS



Dimensioni 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:

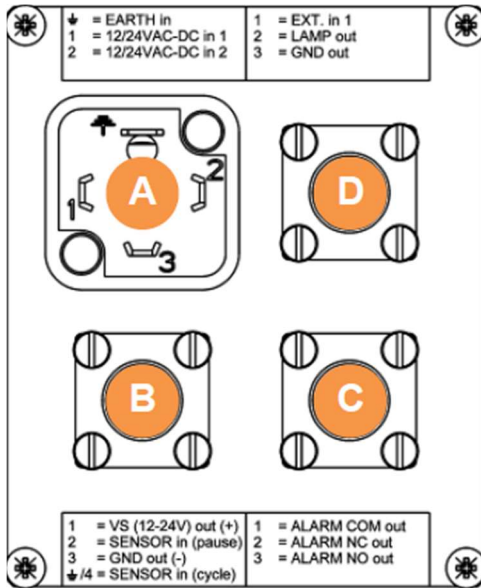
The pump has been designed to operate with grease max NLGI 2 or Oil min 46cst (oil version). Always use lubricants compatible with NBR (Buna) Rubber seals.

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

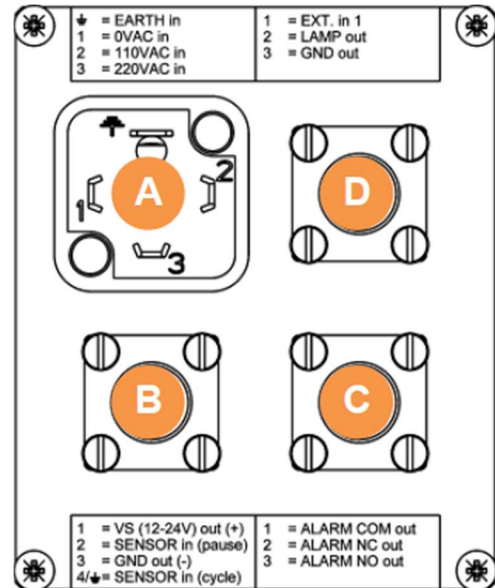
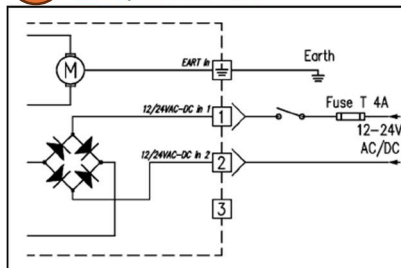
GREASE		OIL	
NLGI	ASTM	cSt	SUS
000	445 – 475	46	213.3
00	400 – 430	70	323
0	355 – 385	100	462.6
1	310 – 340	150	694.2
2	265 – 295	220	1018
For further technical information and on safety information consult the lubricant MSDS Safety data sheet or equivalent document supplied by the lubricant manufacturer.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

Bravo Pump Automatic Version: IAI standard Wiring Information



0888139

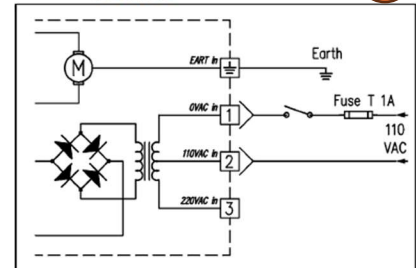
A 12/24 VAC-VDC



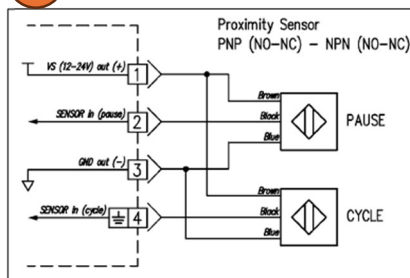
0888136

110VAC

A



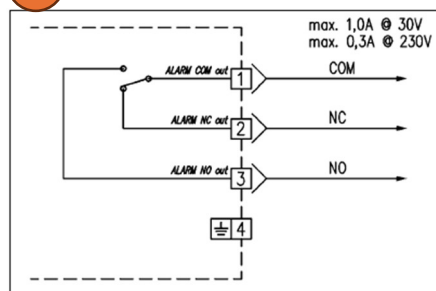
B



Ultrasonic 2 prox sensor with EVC M12 cable:

- 1 – Brown +24VDC out
- 2 – White (not used)
- 3 – Blue GND (-) out
- 4 – Black PNP input

C



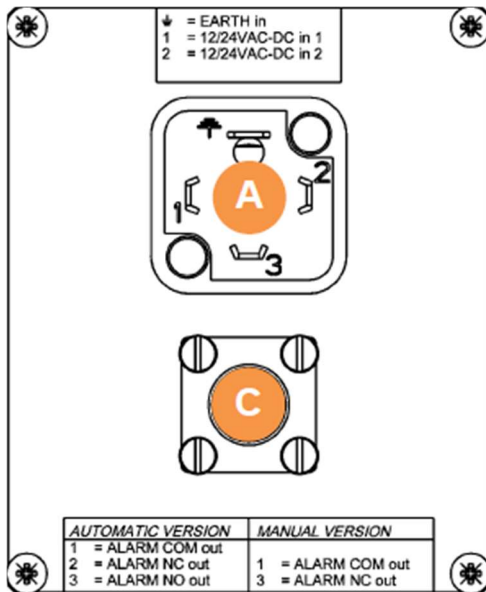
Multiple alarm Output:

Dry Contacts – requires voltage on COM

Max 1.0A @ 30V

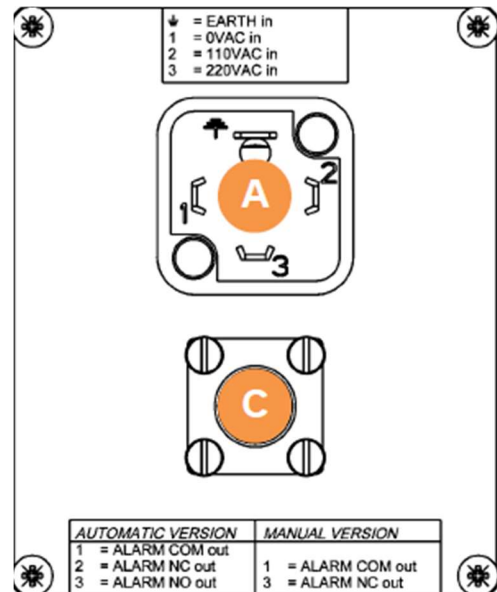
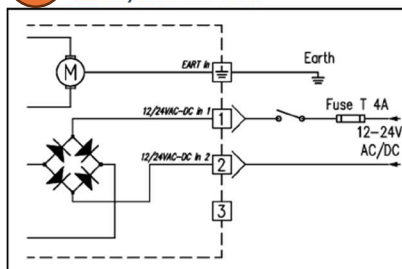
Max. 0.3A @ 230V

Bravo Pump Manual Version: IAI standard Wiring Information



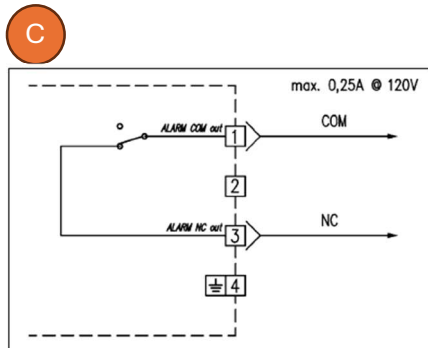
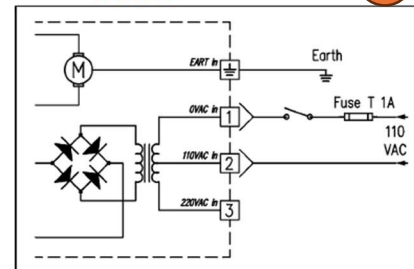
0888142

12/24 VAC-VDC



0888137

110VAC



Low Level alarm Output:

Dry Contacts – requires voltage on COM

Max 0.25A @ 120AC

Industrial Autolube Ordering Information

AUTOMATIC VERSION						
Operating Voltage	Grease			Oil		
	Reservoir 2Lt. (.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)
110V/230V	888400	888401	888402	888415	888416	888417
12V	888403-12	888404-12	888405-12	888418-12	888419-12	888420-12
24V	888403-24	888404-24	888405-24	888418-24	888419-24	888420-24

MANUAL VERSION						
Operating Voltage	Grease			Oil		
	Reservoir 2Lt. (.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)	Reservoir 2Lt. (.53gal)	Reservoir 5Lt. (1.32gal)	Reservoir 8Lt. (2.11gal)
110V/230V	888406	888407	888408	888421	888422	888423
12V	888409	888410	888411	888424	888425	888426
24V	888412	888413	888414	888427	888428	888429

Connector Plates:		
	110V/230V	12V-24V
Automatic	888136	888139
Manual	888137	888142

Additonal Parts:	
Description:	Part Number:
Bravo Pump Mounting Bracket	Bravo Pump Mounting Bracket
Reservior Extention	888116
Reservior O-Ring	18921
2.8 cm ³ /min Pump Element without bypass	888058
5.2 cm ³ /min High Output Pump Element without bypass	880104
2.8 cm ³ /min Pump Element with external relief	888058R
5.2 cm ³ /min High Output Pump Element with external relief	880104R
External Relief Assembly	888163
Oil Filler Cap	3234046
Oil Low Level Float	888147
BSPT to JIC Adaptor Str (fill port)	38015-02-04
BSPT to JIC Adaptor Str	38015-04-04
BSPT to JIC Adaptor 90	15936-04-04
BSPP to FNPT Adaptor	36008-04-04
BSPP to FNPT Adaptor Seal	00036-04

Bravo Pump Repair Request

Industrial Autolube International Inc.

Red Deer, AB

Phone: (403)-754-3646

Fax: (403)-358-3647

Customer PO#:	
Date:	

Customer Information:	
Company Name:	
Phone Number:	
Email:	
Contact Name:	

Description of issues:	Yes	No	Description
Pump element(s) working			
Reservoir cracks			
Alarm			
Other issue not specified above:			
Troubleshooting steps taken:			

For Internal use:	
Received by:	Date: