

# FEMTOPUMP MULTI-OUTPUT GREASE ELECTRIC PUMP

OPERATION AND MAINTENANCE MANUAL  
TRANSLATION OF ORIGINAL INSTRUCTIONS



Manual compiled in accordance  
with Directive 2006/42/EC and Directive 2014/34/EU

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# 1. INTRODUCTION

This user and maintenance manual is for the FemtoPUMP electric pump and contains important information to protect the health and safety of personnel who use this equipment.

The latest version of this manual is available from the Technical-Commercial Office or from our website: <http://www.dropsA.com>.

Please read this manual carefully and keep it in a safe place so that it is always available to operators who wish to consult it.

## 2. GENERAL DESCRIPTION

Central lubrication systems are designed for automatic lubrication of specially placed friction points. These systems considerably reduce the maintenance costs of the machines on which they are installed, eliminating downtime due to lubrication operations and extending the life of the lubricated components. Additionally, a centralized lubrication system makes it possible to reach all points that need to be lubricated at frequent intervals, especially those that would otherwise be hard to access.

The pump can be used to supply systems with different lubrication systems: centralised (Basic), direct to point (Multi-line) and single line (System 33V).

### 2.1. CENTRALISED LUBRICATION (BASIC)

The simplest configuration, consisting of the following components:

- Electric feed pump with tank (FemtoPUMP)
- Primary piping
- Multi-line distributor
- Secondary piping

Through the primary hose (from the pumping unit) the electric pump feeds a distributor which serves to distribute and control the flow of lubricant among the various friction points.

The modular system of the progressive feeder offers the advantage of flexibility for system design engineers as well as low-cost maintenance advantages.

The progressive system is mainly used for grease lubrication in total loss or circulation systems. High pressures and operation with very long piping are common requirements as are demanding environmental conditions.

The progressive system can also be used zoned, when irregular cycle conditions are required for different parts of the machine. The design parameters of a progressive system include many variables such as the volume and frequency of grease required for each point, the number of points, the operating conditions, the pump pressure, etc.

### 2.2. DIRECT TO POINT (MULTI-LINE) LUBRICATION

FemtoPUMP electric pumps lubricate the friction point directly without the need for any other flow metering devices. This makes for an economical, versatile and easy-to-use lubrication product.

FemtoPUMP is designed to supply single point lubrication systems in vehicles, plants and machinery of various kinds for grease use.

The pump is designed to be operated using a maximum of 8 pumping units, allowing the feeding of several independent lines. It is delivered as standard without pumping units, which must be ordered separately and selected from 5 models for the desired flow rate.

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### 2.3. FEATURES AND BENEFITS

The FemtoPUMP electric pump is a piston pump driven by an eccentric system with spring return, designed to operate with a maximum of 2 Basic and 8 Multi-line pumping units, allowing several independent lines to be fed. It is supplied as standard without pumping units, which must be ordered separately.

For all versions (with follower plate or stirring paddle) the pump is complete with a minimum level sensor.

Specifically, the minimum level system on the stirring paddle, given its flag configuration, significantly reduces the accumulation of grease at the bottom of the tank.

The tank for the version with follower plate is made of transparent plastic material. The maximum level is signalled visually. A sensor for maximum level signalling can be fitted with the appropriate conversion kit.

The electrical connection includes an AMP DIN 72585 connector for the power supply and an M12 connector for the output signals.

The electronic version has an LTC (Lubricate Time Control) timer card for cycle time control.

The manual version has no circuit board but simply a minimum level control on the output connection.

The overall dimensions are considerably reduced and the fixing distances with slots allow a wide range of fastening.






















### 3. SAFETY AND PRECAUTIONS FOR USE

It is important to read this manual before performing any operation. It is always recommended that the safety regulations of the country in which the equipment is installed be observed and that specialised personnel be used in the various maintenance, use, installation, etc. operations required during the life of the equipment.

Safety instructions and symbols in accordance with ANSI Z535, ISO 3864 and ISO 7010 are used in this manual and are listed below:

WARNING TABLE			
WARNING	DAMAGE TO	DEFINITION	CONSEQUENCES
<b>HAZARD</b>	People	Indicates a dangerous situation which, if not avoided, will certainly result in death or serious injury.	Death or serious injury, paralysing.
<b>WARNING</b>		Indicates a dangerous situation which, if not avoided, could result in death or serious injury.	Possibly death or serious injury.
<b>CAUTION</b>		Indicates a dangerous situation which, if not avoided, could result in minor or moderate injury.	Possible slight to moderate injuries
<b>NOTICE</b>	Things	Indicates practices not related to personal injury. Suggestions or other information.	Damage to property not to persons

SYMBOL TABLE					
DANGER		PROHIBITION		OBLIGATION	
	General danger		Generic prohibition		Generic obligation
	Laser beam hazard		No smoking or open flames		It is mandatory to read the instructions
	Electricity hazard		Prohibited to enter with watches and metal objects		Hearing protection must be used
	Danger hot surface		Do not touch		Eye protection must be worn
	Danger vessel pressurised		Do not extinguish with water		It is mandatory to ensure the earth connection
	Danger of crushing hands				It is mandatory to disconnect the power supply
	Danger explosive area				Protective gloves must be worn

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## 4. PRODUCT IDENTIFICATION

A plate on the pump tank shows the product code, power supply voltages and basic specs.



### WARNING

It is forbidden to remove the pump name plate.



### NOTICE

The pump includes some components made from alloyed metals which have a lead content (CAS 7439-92-1) < 0.35% by weight.  
 See disposal chapter for details.

## 5. TECHNICAL SPECIFICATIONS

### GENERAL TECHNICAL CHARACTERISTICS

Pumping system		Type	spring-return cam
Flow rate:	Multi-line	cm <sup>3</sup> /cycle [in <sup>3</sup> /rev]	0.005 - 0.01 - 0.015 - 0.025 - 0.05 [0.0003 - 0.0006 - 0.0009 - 0.0015 - 0.003]
	Basic	cm <sup>3</sup> /cycle [in <sup>3</sup> /min]	0.19 [0.011] 0.14 [0.0085]
	Basic Reg.		0.03 - 0.2 [0.0018 - 0.012] 0.02- 0.14 [0.0012 ÷ 0.0085]
Maximum operating pressure	Multi-line	bar	200 [2900]
	Basic	[psi]	280 [4061]
Number of outputs (pumping units)	Multi-line	No.	8
	Basic		2
Discharge connection (pumping unit outlet)	Multi-line	Type	G1/8"
	Basic		G1/4"
Operating temperature		°C [°F]	-40 - +60 [-40 - +140]
Storage temperature		°C [°F]	-30 - +80 [-22 - +176]
Net weight		Kg [lb]	2.5[5.5]
Relative humidity		%	90
Tank capacity	Follower plate	Kg [gal US]	1 [0.26]
	Stirring paddle		4 [1.04]
Lubricant		NLGI	Grease 000 - 2
Degree of protection		IP	6K9k
Noise level		dB	<70
Power supply voltage		VDC	12-24
Maximum absorption		A	4 @12V – 2 @24V
Speed		RPM	17±4
Minimum/Maximum level		Type	NO/NC contact (in the absence of fluid) Reed (Maximum current 0.25A @ 120V)

Note: The use of Arctic grease is recommended when using the pump at temperatures below or equal to 0 °C.

### CIRCUIT BOARD TECHNICAL SPECIFICATIONS

Operating voltages	VDC	12 - 24 ±10%
Hardware features		Reverse polarity protection on power supply Protection against power supply disturbances (Spike) Remote indication of cycle status and alarm Cycle control via external sensor Starting with external inputs Reset/Extra-cycle via external button
3 Input signals	PNP	Same supply voltage
2 Output signals	NPN	Digital output, maximum 2 amps per output



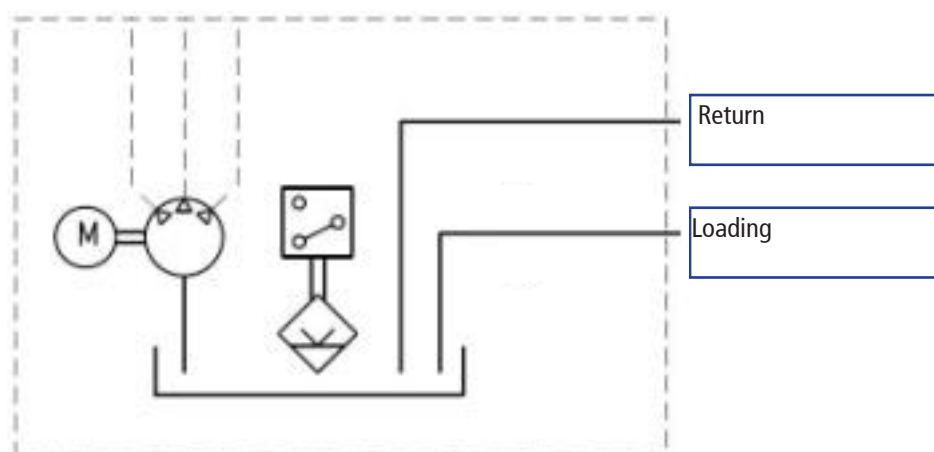
#### WARNING

Do not power the machine using voltages other than the ones indicated on the rating plate.

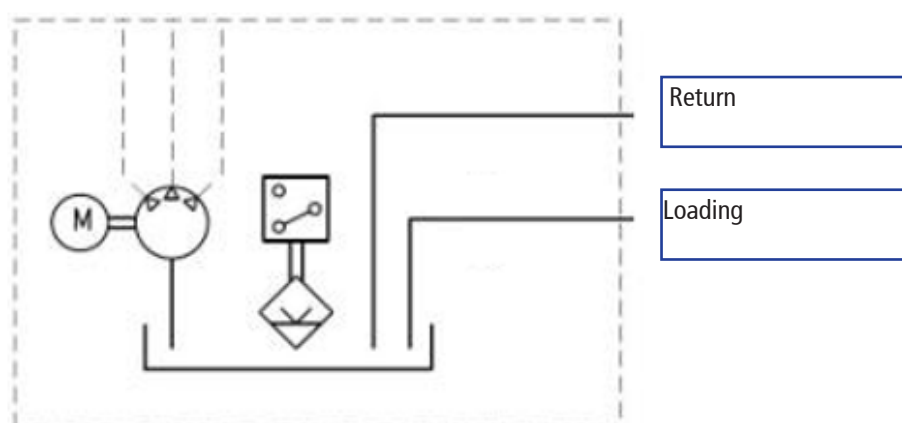
## 6. PARTS

The main components that make up the pump in the various versions, accessories and related options are shown below.

### 6.1. FEMTO PUMP WITH FOLLOWER PLATE

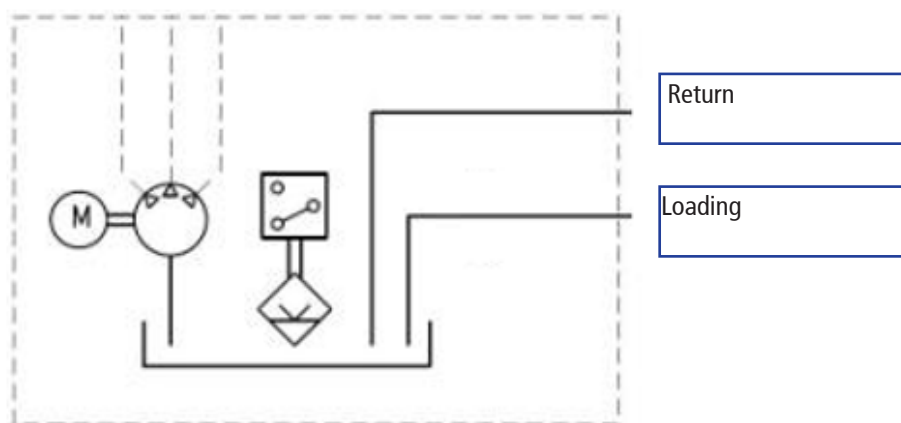


## 6.2. FEMTO PUMP WITH STIRRING PADDLE 1 L

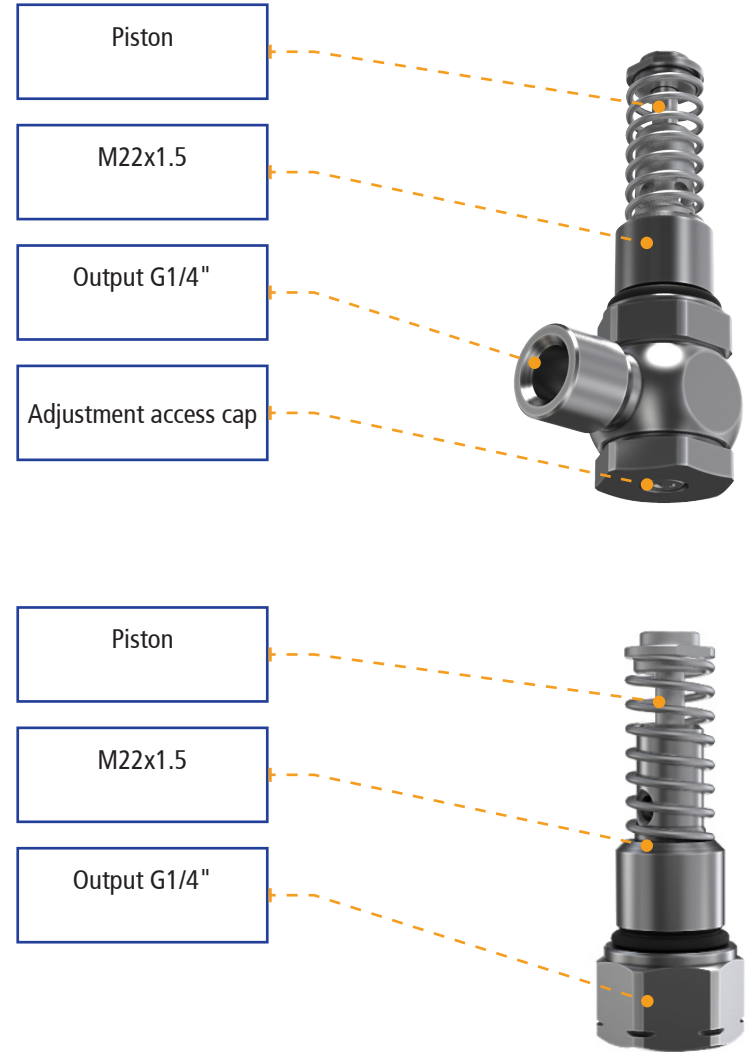


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### 6.3. FEMTO PUMP WITH STIRRING PADDLE 2 L



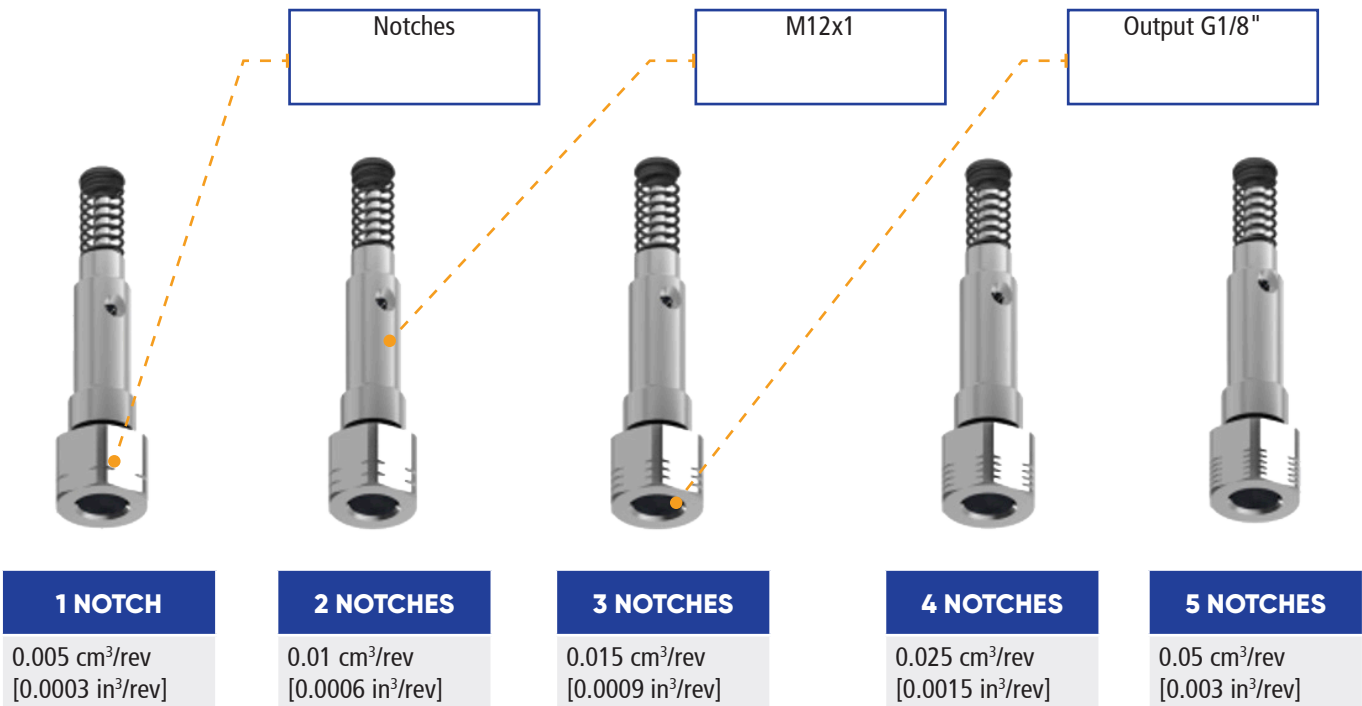
6.4. "BASIC" PUMPING UNITS



ADJUSTABLE FLOW RATE
Piston Ø7 0.6 - 4 cm <sup>3</sup> /min [0.037 - 0.24 in <sup>3</sup> /min]
Piston Ø6 0.4 - 2.8 cm <sup>3</sup> /min [0.02 - 0.17 in <sup>3</sup> /min]

FIXED FLOW RATE
Piston Ø7 4 cm <sup>3</sup> /min [0.24 in <sup>3</sup> /min]
Piston Ø6 2.8 cm <sup>3</sup> /min [0.17 in <sup>3</sup> /min]

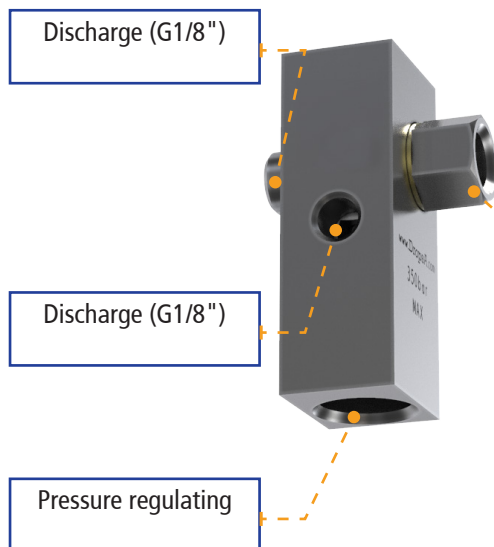
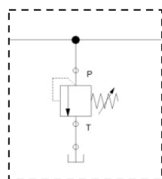
6.5. "MULTI-LINE" PUMPING UNITS



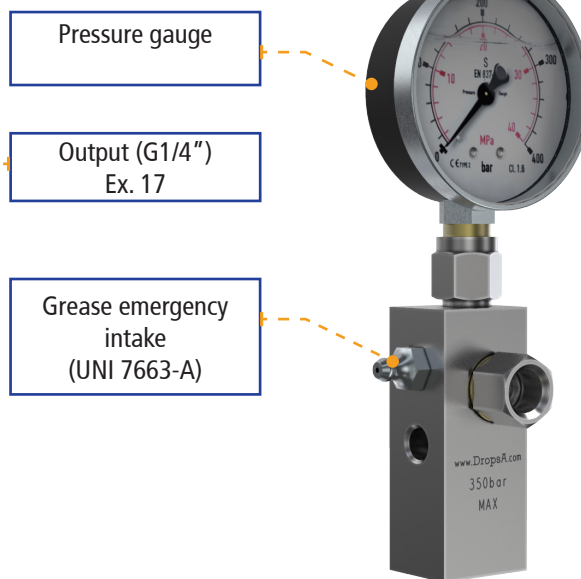
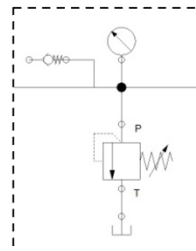
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## 6.6. KIT BY-PASS (OPTIONAL)

### WITHOUT PRESSURE GAUGE



### WITH PRESSURE GAUGE





## 7. UNPACKING AND INSTALLATION

### 7.1. UNPACKING

Once you have identified a suitable location for installation, open the packaging, take the pump out and make sure it has not been damaged during transport or storage. The packaging material does not require special disposal precautions, as it is not dangerous or polluting in any way. Refer to local regulations for proper disposal.

### 7.2. INSTALLATION OF THE PUMP

- The version with follower plate can be mounted in any position.
- Position the electric pump and secure it to its support using the Ø9mm (0.354in) slots with 3 suitable screws.
- Mount the pump so that the greaser for filling the tank and the circuit board panel (auto versions only) are easily accessible.
- Leave at least 100mm (3.94in) as a perimeter distance to other equipment or obstacles that prevent access to the pump.
- 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 submerged in liquid and/or in a particularly aggressive environment.
- Do not install the pump in an environment where there are explosive or flammable mixtures.
- Do not install the pump near heat sources or electrical equipment that may disrupt the correct operation of the electronics.
- Ensure that pipes and cables are properly secured and protected from impact.
- Check that the lubricant used is suitable for the temperatures in use, especially for temperatures below 0°C doubt, contact our Technical Sales Department for the correct choice of lubricant.

### 7.3. HYDRAULIC CONNECTIONS

The hydraulic connection point for installing the pump to the system is located on the pumping unit body with G1/4" thread for "Basic" pumping units and G1/8" thread for "Multi-line" pumping units. It is possible to have the return in the pump with G1/8" threads.

The pump can be installed in any position on the version with follower plate.

#### NOTICE

The pipe must reach the point to be lubricated in the shortest possible distance.

During hydraulic connection, make sure that the pumping unit cannot rotate (screwing/unscrewing itself) by holding it in position with a 16 mm spanner (Multi-line) and 27 mm spanner (Basic).

### 7.4. ELECTRICAL CONNECTION

The user is responsible for the electrical connection and for the clear identification of the power supply, input signal and output signal connection.

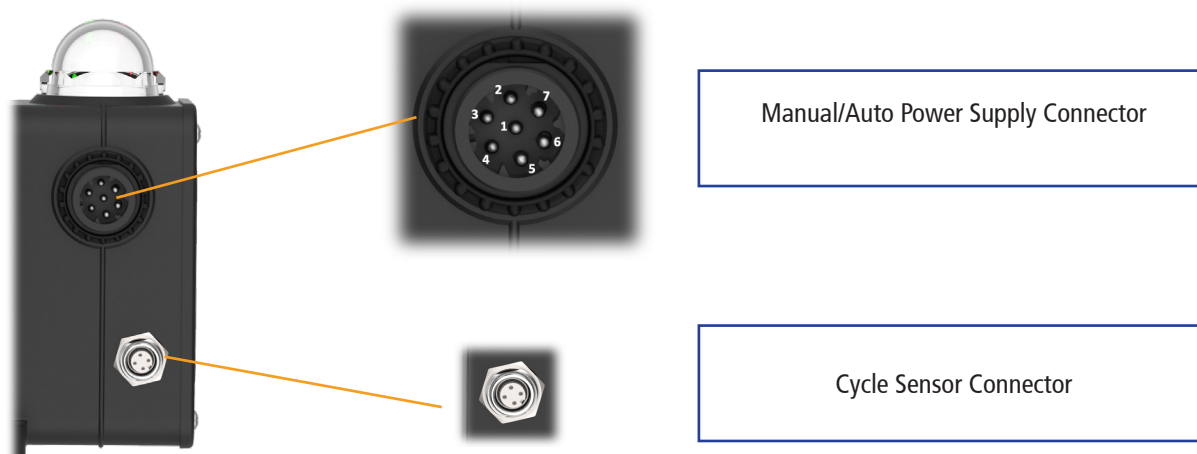
Connect the machine to the power line as indicated in this manual.

The plug connectors, power and signal cables must be of a cross-section and type suitable for the machine's power consumption and of a type that complies with current regulations. They can be ordered separately (see [12. ORDER INFORMATION](#))

#### NOTICE

Check that the electrical power supply of the pump matches that of the machine (label on the side of the tank).

### 7.4.1. CONNECTION DIAGRAM



#### MANUAL POWER SUPPLY CONNECTOR

1	VDC +
2	VDC -
3	COM. Level contact
4	N.O. Level contact in the absence of fluid
5	Not conn.
6	Not conn.
7	Not conn.

#### MANUAL POWER SUPPLY CONNECTOR

Pin	Description	Connection	Clean Contact
1	+	←	
2	-	←	
3	COM. Level contact	←	
4	N.O. Level contact in the absence of fluid	→	

#### AUTO POWER SUPPLY CONNECTOR

1	VDC +
2	VDC -
3	Not conn.
4	Alarm Status Output
5	Cycle Status Output
6	Reset Input
7	Stand-by Pulse Input

#### AUTO POWER SUPPLY CONNECTOR

Pin	Description	Connection	Connections diagram
1	+	←	
2	-	←	
3			
4	Alarm Status Output	→	
5	Cycle Status Output	→	
6	Reset Input	←	
7	Stand-by Pulse Input	←	

#### CYCLE SENSOR CONNECTOR (AUTO VERS.)

1 - Brown	VDC +
2 - White	Not conn.
3 - Blue	VDC -
4 - Black	Cycle Sensor Input

#### CYCLE SENSOR CONNECTOR

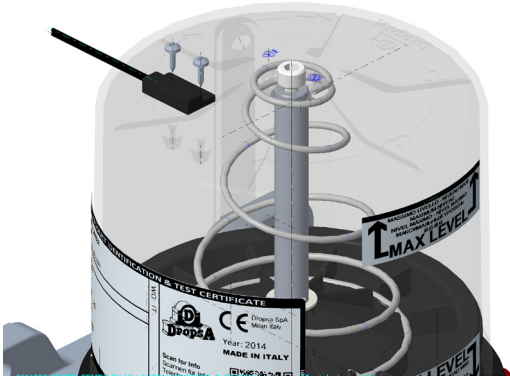
Pin	Description	Connection	PNP	CONTACT
1	+	→		
2				
3	-	→		
4	Cycle Sensor Input	←		

## NOTICE

Pins 1 and 3 of the cycle sensor connectors supply the same voltage as the ends of the power connector. This voltage is used to power the sensor directly.

### 7.5. INSTALLING THE MAXIMUM LEVEL ALARM, ONLY FOR VERSIONS WITH FOLLOWER PLATE (OPTIONAL)

Screw the alarm sensor into the appropriate seats on the tank, keeping the connection wires towards the pump fastenings.



### 7.6. INSTALLING PUMPING UNITS/PLUGS

The pumping units are not included in the pump, they must be purchased separately, choosing the appropriate codes. The plugs are included with the pump, already mounted in the pumping unit holes.

To install the pumping units:

- Locate the most correct position, distributing them evenly over the holes present. (FX versions only)
- Remove the plugs from the holes using a 16mm fixed or 6mm spanner (Multi-line) and 12mm spanner (Basic).
- Screw in the pumping units and tighten with a torque of 5Nm (Multi-line) and 9Nm (Basic) using a 16mm spanner (Multi-line) and 27mm spanner (Basic).
- **CAUTION:** Insert the pump into the predetermined outlet, paying particular attention when inserting the pump unit and ensure that it does not cross-thread.

## 8. INSTRUCTIONS FOR USE

### 8.1. ACTIONS TO BE PERFORMED BEFORE START-UP

- The unit can only be operated by qualified personnel.
- Do not submerge the pump in liquid or use it in a particularly aggressive or explosive/flammable environment unless it has been prepared for this purpose by the supplier in advance.
- Use safety gloves and goggles as instructed on the lubricant safety data sheet.
- DO NOT use aggressive lubricants on NBR seals. When in doubt, contact DropsA S.p.A. Technical Office for a detailed data sheet on recommended lubricants.
- Do not ignore health hazards, and follow hygiene rules.
- Always use tubes/hoses that are suitable for the operating pressure.
- Check the integrity of the pump.
- Check and fill the tank. If the lubricant is below the minimum level, follow the procedure in section [7.2.1. TANK FILLING](#) to refill.
- Check that the pump is at the correct operating temperature and tubes/hoses are free of air bubbles.
- Check that electrical devices are properly connected.

To determine the maximum operating pressure, it is necessary to know the pressure drop of the pipe connected to the pumping units, depending on the length, operating temperature and type of lubricant.

Depending on these variables, to ensure correct dispensing to the point, it is always necessary to check that the pressure drop of the piping added to the pressure required at the point to be lubricated is not greater than the maximum pressure that can be dispensed to the pump discharge.

#### NOTICE

To prevent malfunctions and voiding the warranty, it is advisable to refill with impurity-free lubricant only using the dedicated filling system.

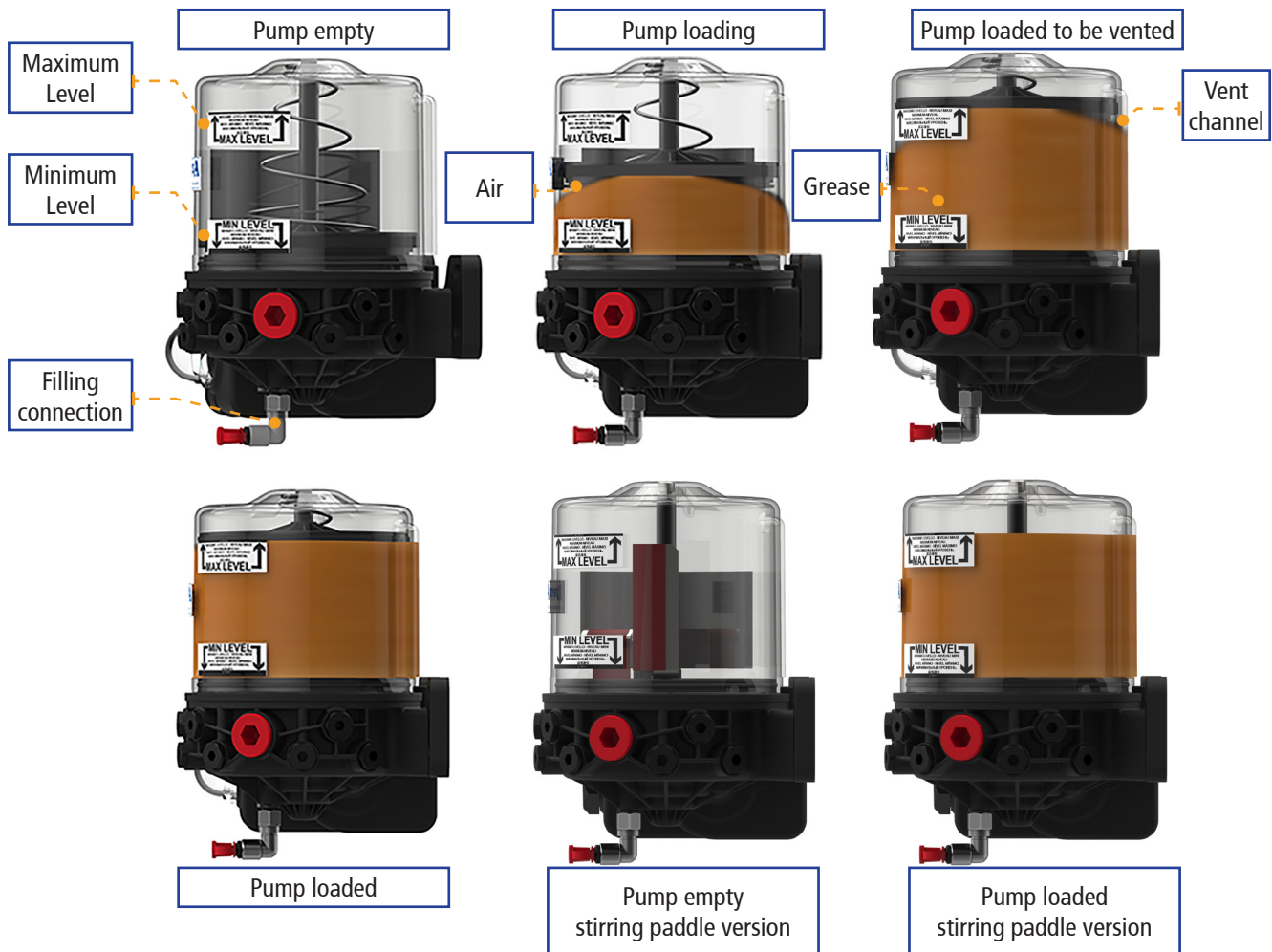
### 8.2. LUBRICANT FILLING

Check that all pumping unit housing holes/plugs have been filled.

#### 8.2.1. TANK FILLING (FOLLOWER PLATE VERSION)

The tank is filled using the dedicated device complete with filter to be interfaced to the filling connection. A filling KIT with a manual pump can also be used, interfaced with an adapter on the M22 thread where the Basic pumping unit is not present. In the case of a first filling (with the pump completely empty, without any grease remaining from the previous filling), it is necessary to keep the pump vertical in order to eliminate any air present in the tank. Reaching and slightly exceeding the point coinciding with the line slightly placed on the maximum level plate (the lubricant comes from below) will open the vent hole which will allow the air to escape.

It is possible that, if the pre-set maximum level line is exceeded by a large amount, lubricant may leak out of the vent channel. The leakage will cease as soon as the presser returns to the working position once the surplus volume has been discharged. Subsequently, filling can also be carried out with different orientations, making sure that the maximum level line is not exceeded. If this happens, lubricant will again leak from the vent channel.



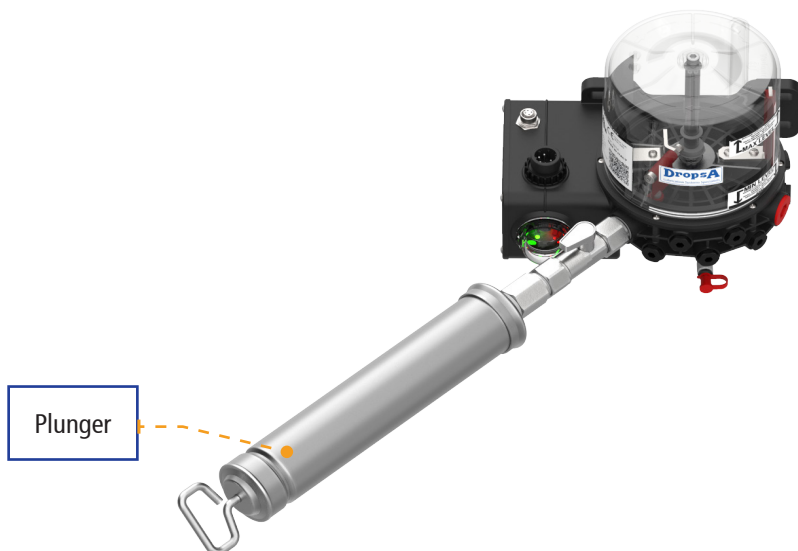
### 8.2.2. TANK FILLING (STIRRING PADDLE VERSION)

The tank must be filled using the dedicated device complete with filter to be interfaced to the filling connection. A manual filling KIT can also be used, interfaced on the M22 thread where the Basic pumping unit is not present. During filling, air will be discharged directly from the hole in the vent channel. If the Max. level line is exceeded, lubricant will leak from the vent channel.

### 8.2.3. TANK FILLING WITH MANUAL PUMP KIT (ALL VERSIONS)

Fit, where available, the fittings for connecting the manual filling pump.

Open the tap, connect the pump to the appropriate fitting and operate the pump plunger, close the tap and detach the cartridge.



### 8.3. ADJUSTABLE PUMPING UNIT SETTING

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

- Ensure that there is no residual pressure in the discharge tube.
- Remove the adjustment access plug using a 4-mm Allen wrench (see [5.4. "Basic" PUMPING UNITS](#)).
- Turn the pumping unit sleeve using a 4-mm Allen wrench inserted into the grub screw on the inside.
- Each full rotation of the wrench corresponds to approx. 0.03 cc/cycle with an adjustment range of 0.4 to 2.8 cc/min or corresponds to approx. 0.04 cc/cycle with an adjustment range of 0.6 to 4 cc/min for a total of 4 rotations.
- Check the presence and integrity of the copper seal (replace if necessary).
- Replace the plug using a 4-mm Allen wrench.

### 8.4. EXTERNAL BY-PASS KIT INSTALLATION

The optional external By-Pass-Kit is only designed for use with pumping units in positions A and B (see [14.2.2 "Basic"](#)).

The By-Pass can be fitted in different solutions (see [6.6 "Optional By-Pass-Kit"](#)).

Piping and connection fittings are the responsibility of the installer.

Proceed as follows for installation and use:

- Ensure that there is no residual pressure in the discharge tube.
- If connected, unscrew the discharge pipe from the pumping unit while holding it with the 27 mm spanner.
- Screw the By-Pass kit onto the pumping unit while holding it with the 27 mm spanner.
- Connect the outlet to the recycling or filling port at the bottom of the pump with the appropriate fittings.
- Reconnect/connect the discharge pipe while holding the By-Pass fitting with the 17 mm spanner.
- Once in operation, pressure can be adjusted by screwing/unscrewing the screw at the bottom of the kit.

## 8.5. SETUP

- Check the setting data set on the control panel (if present).
- Press the start button of the machine to which the pump is connected.
- Check that the pump is running.
- Check that the machine is adequately lubricated (if there is any doubt as to whether it is working properly, contact the DropsA S.p.A. Technical Office to request a test procedure).

## 8.6. START UP

There are no specific regulations, the pump is electrically powered by a system that controls its drive and operates the minimum level contact if the LTC board is not present.

To operate the lubrication system, please refer to the operating and control instructions of the machine on which the pump is installed.

## 9. LUBRICATION CONTROL PRINCIPLE (AUTOMATIC VERSION)

### 9.1. CYCLE OPERATION

In this version, the pump is fitted with an electronic board for lubrication control. The control board, located inside the motor housing, gives the pump total autonomy in managing lubrication cycles, alarms and controls. Furthermore, the pump is equipped with three digital inputs for controlling the lubrication cycle, and two digital outputs for monitoring lubrication status and alarms.

The Femto automatic lubrication control unit can be programmed to operate according to the Work-Stand-by lubrication principle.

This principle is based on three fundamental concepts:

- Pre-Lube
- Work
- Stand-by

#### A. Pre-Lube

If enabled via switch 1 of the Config dip-switch this phase involves execution of an entire lubrication cycle immediately after the pump has been supplied.

If pre-lubrication is not enabled, the pump will resume operation from the state before being switched off.

#### B. Work

This phase consists of a time during which the equipment performs lubrication. During this time, if enabled via switch 5 of the Config dip-switch, it is possible for the device to check the actual lubrication via an external cycle sensor. If there has been no change in the sensor status during the lubrication phase, it will only be signalled that lubrication is not correct (the cycle continues to run) via the alarm LED and the corresponding alarm output.

#### C. Stand-by

In this phase, the lubrication system is inactive until the next lubrication phase.

This phase can be set either in time mode (switch 1 of the Config dip-switch to Off) or input mode (switch 1 of the Config dip-switch to On). In both modes (Timed - Impulses), the pause count will start as soon as the lubrication phase has ended. The pump in this phase will remain stopped until the time runs out or the inputs are reached, depending on the type of pause chosen.

### START PUMP



If Config - Switch 1  
dip-switch to ON



## 10. SETTINGS OF LUBRICATION CONTROL

### 10.1. DESCRIPTION OF PARTS

The pump is equipped with a configuration dip-switch, two dip-switches for adjusting the lubrication time and the stand-by phase and two LEDs for operation and alarm status.



## 10.1.1. CONFIG. DIP-SWITCH

CONFIG. DIP-SWITCH				
Switch	Function	Switch Status	Function Status	Description
1	Start from		Last State	After powering up the pump, the lubrication cycle will resume from the state before shutdown
			Pre-lubrication	After supplying the pump, a new lubrication cycle will begin
2	Pause		Time	The pause is of the time type
			Inputs	The pause is of the input type
3	Pause		Scale 1	The pause value scale is 1 (Minutes)
			Scale 2	The pause value scale is 2 (Hours)
4	Work		Scale 1	The work value scale is 1 (Seconds)
			Scale 2	The work value scale is 2 (Minutes)
5	Cycle Control		Off	The pump performs no control on the cycle sensor
			On	The pump monitors the actual displacement of the cycle sensor during the lubrication phase
6	Minimum Level		Off	The pump does not stop at minimum level
			On	Pump stops at minimum level

### 10.1.2. STAND-BY DIP-SWITCH

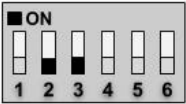
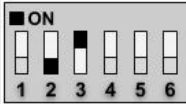

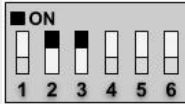
This dip-switch can be used to configure the pause time/inputs. The desired time/input can be set using the combination of one or more switches and the chosen scale via the Config dip-switch.

The table below shows the values of each individual switch.

#### NOTICE

At least one active switch must be present for proper operation

#### STAND-BY DIP-SWITCH

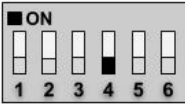
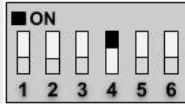
Stand-by Switch	Timed mode		Impulse mode	
	Config	Config	Config	Config
	 Scale 1 (Minutes)	 Scale 2 (Hours)	 Scale 1	 Scale 2
1	1	0.5	1	50
2	2	1	2	100
3	4	2	4	200
4	8	4	8	400
5	16	8	16	800
6	32	16	32	1600
	1 to 63 minutes, step 1 minute	0.5 to 31.5 hours, step 30 minutes	1 to 63 inputs, step 1 input	50 to 3150 inputs, step 50 inputs

### 10.1.3. WORK SWITCH

This dip-switch can be used to configure the lubrication time. To set the desired time, the combination of one or more switches and the chosen scale can be set via the Config dip-switch.

The table below shows the values of each individual switch.

#### WORK DIP-SWITCH

Work switch	Config	Config
	 With scale 1 (Seconds)	 With scale 2 (Minutes)
1	1	1
2	2	2
3	4	4
4	8	8
5	16	16
6	32	32
	1 to 63 seconds, step 1 second	1 to 63 minutes, step 1 minute

#### 10.1.4. CYCLE LED

The green 'Cycle' LED, depending on the current status of the pump, lights up in different modes. If the pump is in 'Stop' the light will remain off, if it is lubricating the light will remain on instead if the pump is paused the light will be flashing.

#### 10.1.5. ALARM LED

The red 'Alarm' LED lights up if there is a problem with the pump, and based on the number of flashes the operator can tell what kind of alarm has occurred. If the LED flashes once per second, it means that the level alarm is present. If it flashes twice, it means that the cycle sensor control is enabled but a cycle has been completed without any change in sensor status.

To restore correct pump operation, either press the external reset button or switch the pump off and on again.

#### 10.1.6. FIRST START-UP

Before starting to feed the pump, remember to fill the lubricant tank according to the instructions in section 7.2.1. and proceed as follows:

1. Open the inspection window in front of the dip-switches
2. Set all dip-switches to the chosen mode
3. Close the inspection window
4. Connect all connectors to the pump
5. Feed the pump
6. At power-up, the system will read the switch setting and start with that configuration. To make a change to the dip-switches, see section 9.3.

#### 10.1.7. CHANGING SETTINGS



To change the dip-switch setting, proceed as follows:

1. Disconnect the pump power supply
2. Open the inspection window in front of the dip-switches
3. Adjust dip-switches
4. Close the inspection window
5. Switch the pump power back on

## 11. PROBLEMS AND SOLUTIONS

Below is a diagnostic table highlighting the main faults, probable causes and possible solutions to be implemented immediately (contact DropsA).

If any issues and/or problems cannot be resolved, contact the DropsA Technical Office rather than search for the fault by disassembling the components of the pump.

DIAGNOSTICS TABLE		
FAULT	CAUSE	SOLUTION
Pump Motor does not operate.	There is no power supply.	Check the power supply system.
	Controller board does not function.	Replace the controller board  .
Pump is operating but no lubricant reaches points.	Pipes are disconnected.	Check the tubes/hoses and connections to the fittings. Replace the worn pipes.
	The progressive distributor is blocked	Clean or replace the distributor
The lubricant is distributed to the lubrication points in irregular doses.	Distributor valves are incorrectly connected to the lubrication points.	Check doses with the system diagram.
The pump starts the greasing phase but ends it immediately.	The motor is defective.	Let it cool down for a few minutes and then try again, if the problem persists replace the motor  .
The pump does not dispense lubricant.	The tank is empty.	Refill and check any low level alarms.
	Air bubbles in the lubricant.	Disconnect the primary tube/hose from the pumping unit connection. Operate the pump according to the manual/ automatic operating cycle until lubricant comes out of the fitting completely free of air bubbles.
	Use of unsuitable lubricant.	Some lubricants are not suitable for automatic pumping systems. Replace the grease.
	Blocked pumping unit.	Disassemble the pumping unit and check for contamination. Clean and reinstall or replace.
	Worn pumping unit.	Replace the pumping unit.
	Pumping unit check valve worn.	Replace the pumping unit.

### CAUTION





Operations to be carried out by DropsA specialists only.

## 12. MAINTENANCE PROCEDURES

The pump does not require special equipment for inspection and/or maintenance. In any case, it is recommended to use equipment and PPE suitable for use (gloves, goggles, etc.) and in good condition in accordance with current regulations to avoid personal injury or damage to parts of the pump.

The unit has been designed and built to require minimal maintenance. It is, however, advisable to always keep the equipment body clean and periodically check the tube/hose joints to promptly detect any leaks.

	<div style="background-color: orange; color: white; text-align: center; padding: 5px;"><b>! WARNING</b></div> <p>Ensure that the electrical, hydraulic and pneumatic supplies are disconnected before carrying out any maintenance work.</p>	
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### 12.1. SCHEDULED MAINTENANCE

The following table lists the periodic checks, frequency and action to be performed by the maintenance technician to ensure the efficiency of the system over time.

CHECK	FREQUENCY	PROCEDURE
Tube/hose attachments	After the first 500 hours Every 1,500 hours	Check the connection to the fittings. Check that components are correctly affixed to machine
Tank level	As needed	Top up the lubricant level in the tank

## 13. DISPOSAL

During pump maintenance, or in the event of its demolition, do not dispose of polluting parts in the environment. Refer to local regulations for their correct disposal. When dismantling the pump, the identification plate and any other documents must be destroyed.

### NOTICE

The pump contains the following items made of AlCu6 BiPb, 11SMnPb37 and 11SMnPb30: Guide Rod 1Kg 0890039 Guide Rod 2Kg 0890035, BRAVO-PUMPING UNIT D7 0880104, D6 0888156, BRAVO-PUMPING UNIT D7 ADJUSTABLE 0880060, D6 ADJUSTABLE 0888555, PUMPING UNIT 0.005cc - 1 NOTCH 0890034, PUMPING UNIT 0.010cc - 2 NOTCHES 0890033, PUMPING UNIT 0.015cc - 3 NOTCHES 0890032, PUMPING UNIT 0.025cc - 4 NOTCHES 0890031, PUMPING UNIT 0.050cc - 5 NOTCHES 0890030  
These components have a lead content of more than 0.1% w/w and must therefore be disposed of according to current regulations.

## 14. ORDER INFORMATION

### 14.1. PUMP ORDERING CODE

TYPE	VOLTAGE	TANK	MANUAL VERSION (WITHOUT CONTROLLER)	AUTOMATIC VERSION (WITH INTEGRATED CONTROLLER)
Femto	12 VDC	1KG	0891111	0891131
		2KG	0891112	0891132
		4KG	0891114	0891134
		4L	0891115	0891135
		1KG Version with follower plate disc	0891113	0891133
	24 VDC	1KG	0891121	0891141
		2KG	0891122	0891142
		4KG	0891124	0891144
		4L	0891125	0891145
		1KG Version with follower plate disc	0891123	0891143

### 14.2. BASIC/MULTI-LINE PUMPING UNIT CODES

CODE	TYPE	FLOW RATE	NOTES	ID
0880104	BASIC	4 cm <sup>3</sup> /min	Fixed	1
0888156		2.8 cm <sup>3</sup> /min	Fixed	2
0888555		0.4 - 2.8 cm <sup>3</sup> /min	Adjustable	3
0880060		0.6 - 4 cm <sup>3</sup> /min	Adjustable	4
0890034	MULTI-LINE	0.005 cm <sup>3</sup> /rev	1 notch	1
0890033		0.010 cm <sup>3</sup> /rev	2 notches	2
0890032		0.015 cm <sup>3</sup> /rev	3 notches	3
0890031		0.025 cm <sup>3</sup> /rev	4 notches	4
0890030		0.050 cm <sup>3</sup> /rev	5 notches	5

### 14.2.1. FACTORY-PRE-SET PUMPS

The above identification string has been split into the following five sections:

PRODUCT ID CODE				ORDER CODE			PUMPING UNIT CONFIGURATION	POSITION A BASIC PUMPING UNITS	POSITION B BASIC PUMPING UNITS	MULTI-LINE SELECTION	MULTI-LINE POSITION										MAXIMUM LEVEL KIT	LTC CONFIGURATION
0	8	9	1	A	B	C	P	9	2	Q	0	1	2	3	4	5	0	0			MAX	DIP-01001-100000-010100

FEMTO	1
12 V MANUAL	1
24 V MANUAL	2
12 V AUTOMATIC	3
24 V AUTOMATIC	4
1KG STIRRING PADDLE	1
2KG STIRRING PADDLE	2
1KG FOLLOWER PLATE	3
4KG STIRRING PADDLE	4
4L OIL	5
NO PUMPING UNIT	P
PUMPING UNIT/FILLING KIT	
WITHOUT PUMPING UNIT	0
BASIC 0.19 CM <sup>3</sup> /REV (0880104)	1
BASIC 0.14 CM <sup>3</sup> /REV (0888156)	2
BASIC 0.03 - 0.2 CM <sup>3</sup> /REV (0880060)	3
BASIC 0.02 - 0.14 CM <sup>3</sup> /REV (0888555)	4
FILLING KIT	9

DEFAULT STATUS	START = LAST STATE PAUSE = 1 INPUT WORK = 10 SEC.
MAX	WITHOUT MAXIMUM LEVEL KIT WITH MAXIMUM LEVEL KIT
0	WITHOUT PUMPING UNIT
1	PUMPING UNIT 0.005 CM <sup>3</sup> /REV (0890034)
2	PUMPING UNIT 0.010 CM <sup>3</sup> /REV (0890033)
3	PUMPING UNIT 0.015 CM <sup>3</sup> (0890032)
4	PUMPING UNIT 0.025 CM <sup>3</sup> /REV (0890031)
5	PUMPING UNIT 0.050 CM <sup>3</sup> /REV (0890030)
Q	NO PUMPING UNIT MULTI-LINE



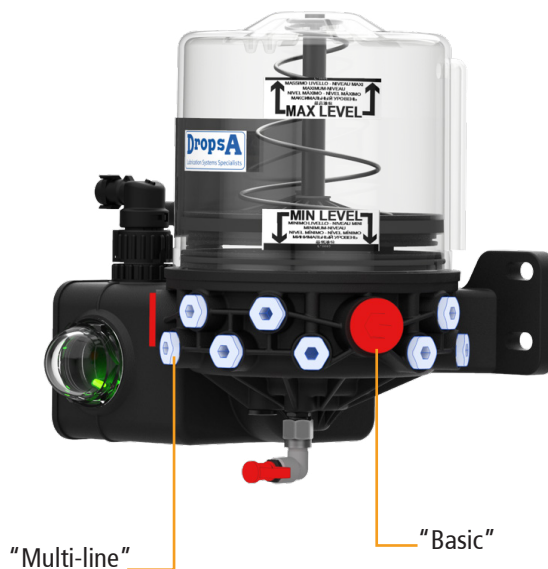
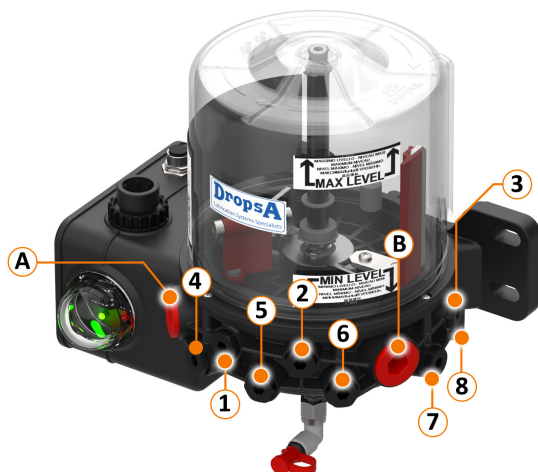
- SECTION 1: Product ID Code + Order Code.  
7 digit string which identifies the series (0891) of the FEMTO pump and the "basic" order code
- SECTION 2: Basic Pumping Units.  
Up to 3 digit string that indicates whether or not the Basic pumping units and filling kit are included. Positions A and B indicate the type and position of the pumping units/ filling kits.
- SECTION 3: Multi-line Pumping Units.  
Up to 9 digit string that indicates whether or not the Multi-line pumping units are included and their position.
- SECTION 4: Maximum Level Kit.  
Up to 2 digit string that indicates whether or not the maximum level sensor kit is included.
- SECTION 5: LTC configuration.  
24 digit string that indicates the standard setting of the LTC configuration (not considered in the configurator).  
Examples Pag.28.

### 14.2.2. POSITION OF BASIC/MULTI-LINE PUMPING UNITS & REFILLING KIT (ALL VERSIONS)

The position of the pumping units is defined:

Alphanumeric character = Pump element "Basic"

Numeric character = Pump element "Multiline"



Example of ordering with pumping units:

FIRST EXAMPLE: 0891111P10

- Femto PUMP
- Power supply 12Vdc manual
- Tank capacity 1Kg with Stirring paddle
- N°1 pumping unit with a capacity of 0.19 cm<sup>3</sup> per revolution in pos.(A)

SECOND EXAMPLE: 0891123P11Q11000000MAX

- Femto PUMP
- Power supply 24Vdc Manual
- Tank capacity 1Kg with Follower Plate
- N°1 pumping unit with a capacity of 0.19 cm<sup>3</sup> per revolution in pos.(A)
- N°1 pumping unit with a capacity of 0.19 cm<sup>3</sup> per revolution in pos.(B)
- N°1 pumping unit multi-line with a capacity of 0.05 cm<sup>3</sup> per revolution in pos.(1)
- N°1 pumping unit multi-line with a capacity of 0.05 cm<sup>3</sup> per revolution in pos.(2)
- Max level Kit

## 15. SPARE PART KITS AND ACCESSORIES

### OPTIONAL KITS AND ACCESSORIES

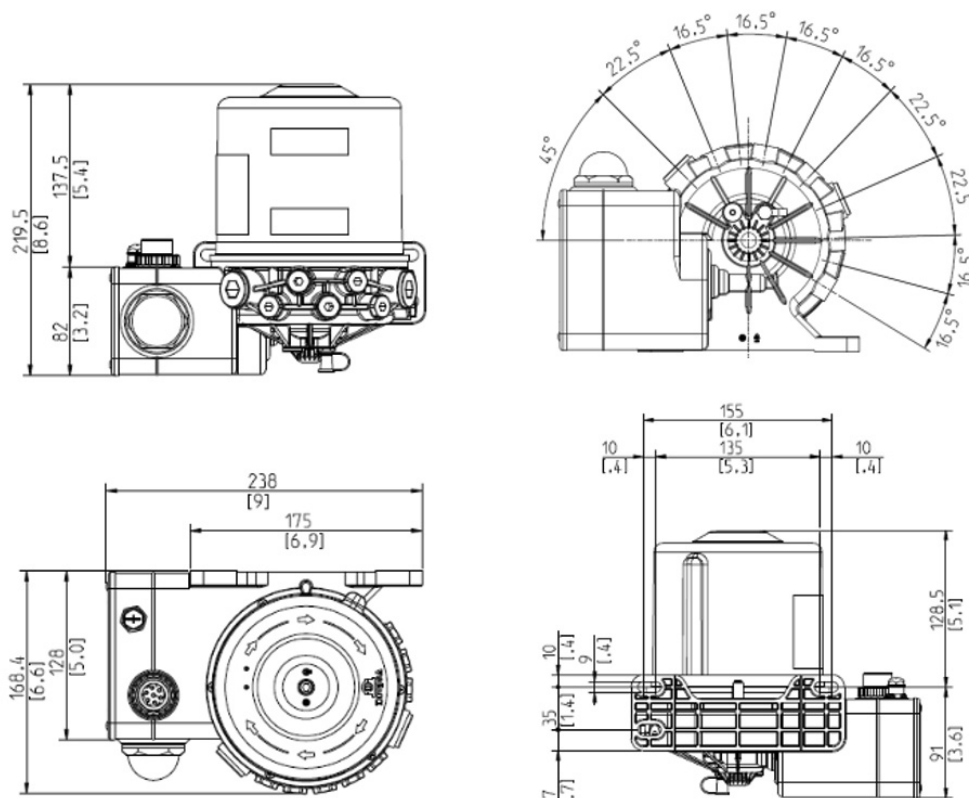
CODE	DESCRIPTION
3133723	Cartridge-loading-kit
0890014	Maximum level sensor kit, only for versions with follower plate (optional)
0888572	External by-pass with pressure gauge
0888163	External by-pass without pressure gauge
0039137	M12 connector - 90° 5m cable
0039138	M12 connector - 90° 10m cable
0039139	M12 connector - 90° 15m cable
0039999	M12 connector - 90° without cable
0039169	M12 connector - dir. without cable
0888610	Connector wiring DIN 72585 5m
0888633	Connector wiring DIN 72585 10m
0888634	Connector wiring DIN 72585 15m
5717203	Nylon-Hose 6.6 6X4 L=130mm To be specified when ordering. (By-pass connection)
3084566	Push-in 90 g1/8 d6 (By-pass connection)
3084760	Push-in-dir 1/8 ø6 (By-pass connection)

### SPARE PARTS

CODE	DESCRIPTION
0890011	2Kg Follower plate + seals kit
0890012	1Kg Tank kit + seals kit
0888185	Pumping unit replacement plug (Multi-line)
3234300	Pumping unit replacement plug (Basic)
3235999	Inspection window
3236000	Blind Plug
1639281	LTC control card
0039086	Connector ring din 72585

## 16. OVERALL DIMENSIONS

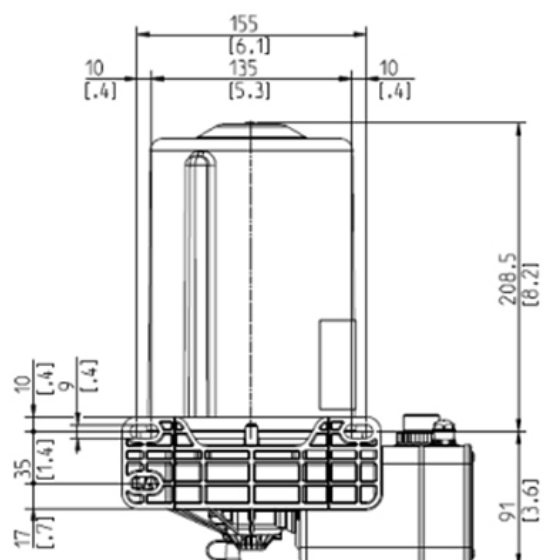
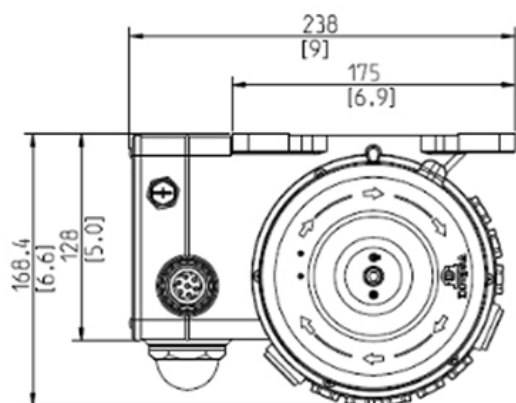
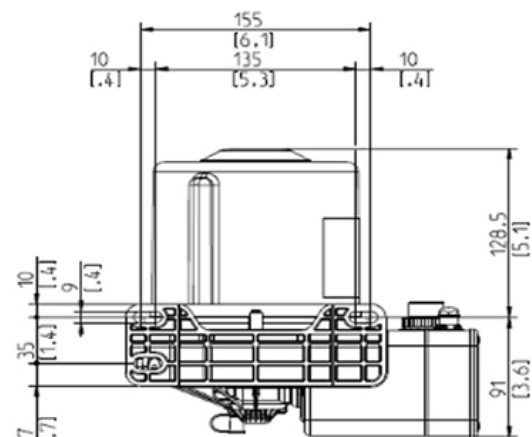
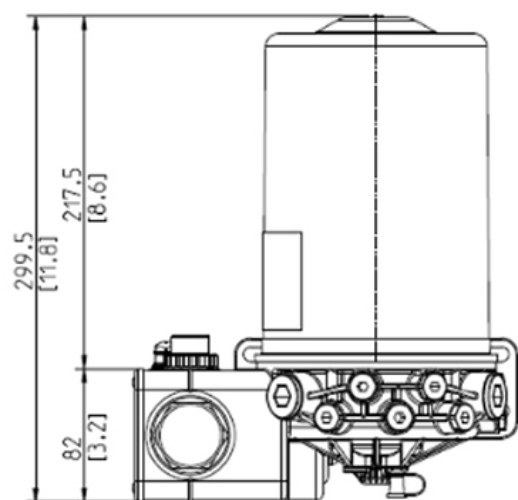
### 16.1. 1 KG FEMTO PUMP ALL VERSIONS



Dimensions in: mm [in]

C2387IE WK 24/24

## 16.2. 2 KG FEMTO PUMP ALL VERSIONS






Dimensions in: mm [in]

## 17. HANDLING AND TRANSPORT

Before shipping, the pumps are carefully packed in a cardboard box. When transporting and storing the equipment, pay attention to the orientation indicated on the box. Upon receipt, check the packaging for damage and store the pump in a dry place.

## 18. PRECAUTIONS FOR USE

- **Electrical power supply**  
No work should be carried out on the machine unless it has been disconnected from the power supply, ensuring that nobody can reconnect it while work is being carried out. All installed equipment (electrical and electronic) must be connected to the earth line.
- **Flammability**  
The lubricant generally used in lubrication circuits is not a flammable liquid. However, all necessary related precautions must be taken to prevent it coming into contact with hot parts or open flames.
- **Pressure**  
Before any work is carried out, check that there is no residual pressure in any branch of the lubricating circuit, which could cause oil splashes when fittings or parts are removed.
- **Noise level**  
The equipment does not emit noise exceeding 70 dB (A).

CAUTION		
		
CAUTION: Warnings about the risks involved in using a lubricant pump should be read carefully. The user must be familiar with operation through the Operation and Maintenance Manual.		

### 18.1. LUBRICANTS

A comparison table is shown between the NLGI (National Lubricating Grease Institute) and ASTM (American Society for Testing and Materials) classification for greases, limited to the values affecting the FemtoPUMP pump.

For further information on the technical specifications and safety measures required, see the Product Safety Data Sheet (Directive 93/112/EEC) for the type of lubricant chosen and supplied by the manufacturer.

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

### NOTICE

The pump is designed to work with lubricants with a maximum NLGI 2 grade. Use lubricants compatible with NBR seals. Any residual lubricant used for assembly and testing is NLGI grade 2.

## 19. PRECAUTIONS FOR USE

Verification of compliance with the essential safety requirements and the provisions of the Machinery Directive was carried out using the prepared check lists contained in the technical dossier.

Three types of lists were used:

- Compliance with essential safety requirements (2006/42 EC - Machinery Dir.).
- Risk assessment (EN ISO 12100).
- Electrical safety requirements (EN 60204-1).

The hazards that have not been completely eliminated but considered acceptable are listed below:

- Low-pressure lubricant splashes may occur during maintenance. (Maintenance must therefore be carried out using appropriate PPE).
- Contact with lubricant during maintenance or tank filling. Protection against direct or indirect contact with lubricant must be provided by the machine user. (See requirements for using suitable PPE in accordance with current regulations)
- Use of unsuitable lubricant. The lubricant characteristics are shown both on the pump and in this User and Maintenance Manual (if in doubt, contact the DropsA Technical Office):

FLUIDS THAT ARE NOT PERMITTED	
FLUIDS	HAZARDS
Lubricants with abrasive additives	High consumption of contaminated parts
Lubricants with silicone additives	Seizing of the pump
Petrol, solvents, flammable liquids	Fire, explosion, damage to the gaskets
Corrosive products	Pump corrosion, harm to people
Water	Pump oxidation
Food substances	Contamination

## DropsA S.p.A.

Via Benedetto Croce, 1  
20055 Vimodrone (MI), Italy  
Tel: +39 02 250 79 1  
Fax: +39 02 250 79 767  
[www.DropsA.com](http://www.DropsA.com)

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20055 Vimodrone (MI), Italy

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