FLOW MASTER

VOLUMETRIC FLOW METER
FOR CONTROLLING THE FLOW OF LIQUIDS.
MANUAL OR MOTORIZED ADJUSTMENT

User and Maintenance Manual

Warranty information

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1. INTRODUCTION

This manual refers to ***FLOW MASTER*** volumetric flow device.

You can find additional copies and newer revisions of this document from our website http://www.dropsa.com. Alternatively contact one of our Sales Offices.

This *User and Maintenance Manual* contains important information on health and safety issues for the personnel.

It is recommended to attentively read this manual and carefully keep it in good condition so that it is always available to personnel requiring to consult it.

2. GENERAL DESCRIPTION

FLOW MASTER is a volumetric flow meter, which constantly monitors lubrication.

Flow meter precise monitoring, without calibrations or adjustments, is due to volumetric measurements not dependent on lubricant temperature or viscosity.

FLOWMASTER is a modular system consisting of two elements:

- Base
- Metering module

MODULAR SYSTEM
The base is common to all size modules, which are also interchangeable. The modular construction makes it possible to built assys (base and metering module) of 20 modules or more.

OPERATING PRINCIPLE
A “satellite”, which rotates with a fixed orbital movement, is operated by the liquid passage through the metering module. An inductive sensor picks up each orbital movement and transmits a signal to an electronic reader. The operator can read the output of the metering module in litres/min or in rev/min directly from the *FACT 2000* device-display or from a PC monitor.

VISUAL INDICATION OF THE FLOW OF LIQUID
A “satellite”, built in the module body, rotating with an orbital movement indicates the fluid velocity. The flow output is neither reduced nor interrupted even if the “satellite” stops.

3. PRODUCT - MACHINE IDENTIFICATION

Machine identification red label is located on the front side of the unit and contains machine serial number.

4. TECHNICAL CHARACTERISTICS

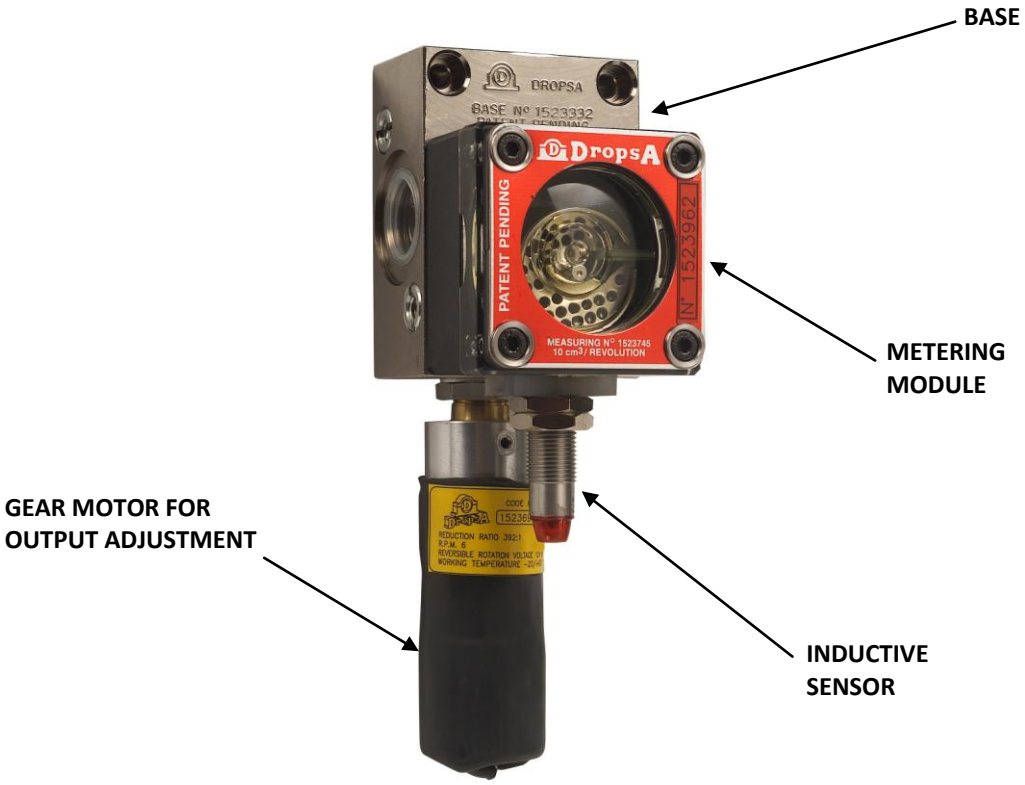
Base and metering module	
Fluid maximum viscosity (at lubricant operating temperature)	1000 cSt (4628 SUS)
Operating temperature	-20 °C ÷ +60 °C (-4 °F ÷ +140 °F)
Minimum pressure (continuous working)	6 bar (88.2 psi)
Maximum pressure (intermittent working; maximum operating time: 1 hour)	20 bar (294 psi)
Base threads	-Inlet G"1/2 UNI-ISO 228/1- - Outlet G" 3/8 UNI-ISO 228/1 -
Seals	O-Ring in Viton
Bases and metering modules	Stainless steel AISI 316 or aluminium
Cover	Transparent polyamide
Maximum distance between a flow meter and the Electronic Control Equipment	15 metres (16.4 yard) It is advisable the use of a shielded cable

Motor for output adjustment	
Supply voltage	12V DC
Reduction ratio	392:1 – Max torque: 3 Kg/cm (6.61 lb/cm)
Rev/min without load	6
Rev/min with max torque	5
Current consumption without load	15 mA
Current consumption with max torque	30mA
Revolution direction	reversible

Proximity Inductive Sensor	
Maximum output current	200 mA
Supply voltage	10 ÷ 30V D.C.
Maximum switching frequency	200 Hz
Current consumption at 24 V D.C.	<18 mA
Outputs	NPN or PNP
Protection grade	IP 67
Temperature	-25 °C ÷ +70 °C (-13 °F ÷ + 158 °F)

Proximity Inductor Sensor Electric Diagram	
	

5. MACHINE COMPONENTS



6. UNPACKING AND INSTALLING THE MACHINE

6.1 UNPACKING

Once a suitable location has been found to install the unit remove the machine from the packaging. Check the device has not been damaged during transportation or storage. No particular disposal procedures are necessary, as packaging materials are not dangerous or polluting.

6.2 INSTALLING

Install the flow meter on a proper support surface, free from impediments which could interfere with machine well functioning.

<u>WARNING</u>: All the electric, electronic components, reservoirs and base structure must be grounded.

The stainless steel option makes the *FLOW MASTER* suitable for applications in harsh, damp or corrosive environments.

- Connect inlet (par. 11.3, fig.1, pos. J) and outlet (par. 11.3, fig.1, pos. K) piping.
- Connect the inductive sensor cables (and the motor cables, for the motorized option) to the electronic control and monitoring equipment terminal strip (see ***FACT 2000*** *User and Maintenance Manual*).

To assemble flow meters in batteries, follow the instructions below:

1) Unscrew the two grub screws (par. 11.3, fig.1, pos.1) of the next flow meter.
2) Tighten the two screws (par. 11.3, fig.1, pos.2) to the previous flow meter. Pay attention to the O-Ring correct position to prevent damages during assembling.
3) Screw again the grub screws (par. 11.3, fig.1, pos.1) to the previous flow meter.

The above operations must be carried out for all the flow meters being assembled.

6.3 TECHNICAL INDICATIONS

It is recommended to use:

- Structural steel piping of proper dimensions
- Grip-ring pipe fittings (To assembly: block pipe fittings and tighten pipes using a vice)
- An inlet filter with a proper filter grade (not over 90µ), *Dropsa part N°3130309*

If the machine is operated for the first time:

1. Decrease oil pumping unit pressure and ensure that all the connections are correct and there are no leaks.
2. Increase pressure progressively to suit individual flow requirements.

7. PUMP OPERATIONS

MANUAL OPTION

Output adjusting of the *manual FLOWMASTER* is easy: through the use of two needle valves the output adjustment can be coarsely (par. 11.3, fig.1, pos. X) or finely adjusted (par. 11.3, fig.1, pos. Y).

To *coarsely adjust*:

1. Unlock the locknut of the needle valve.
2. Close the f*ine adjustment* valve (par. 11.3, fig.1, pos. Y), by turning clockwise with a M3 allen spanner.
3. Increase or decrease the output by turning counterclockwise or clockwise, with a M5 allen spanner, the *coarse adjustment* valve (par. 11.3, fig.1, pos. X).

It is advisable to make the *fine adjustment* only after the coarse adjustment, as follows:

- Increase or decrease the output by turning counterclockwise or clockwise, with a M3 allen spanner, the *fine adjustment* valve (par. 11.3, fig.1, pos. Y) to suit individual flow requirements.

The *fine adjustment* valve (par. 11.3, fig.1, pos. Y) only is used for the size "A" module.

7.1 MOTORIZED OPTION

To adjust *motorized FLOWMASTER* output:

- Close the *fine adjustment* valve (par. 11.3, fig.1, pos. Y) and let the electronic control equipment start automatically in line with the setting data.

8. TROUBLESHOOTING

The following diagnostic table indicates the main anomalies, which may be encountered, the probable causes and possible solutions.
If you cannot solve the problem, do not attempt to disassemble parts of the machine but contact the Engineering Department of DROPSA S.p.A., pointing out anomaly details.

ANOMALY	PROBABLE CAUSE	SOLUTION
No signal transmitted by the flow meter	• Wrong electrical connection	→ Check sensors (and motor, for the motorized option) electrical connections on the control equipment terminal strips
Blocked satellite	• Impure oil in the circuit	→ Check and clean the oil output circuit filtering cartridges. Replace them, if necessary
Abnormal satellite rotation	• Cold oil in the circuit	→ Act on the pumping system electrical resistance
	• Low pressure	→ Increase pressure
Oil leakage	• Worn O-ring seals	→ Replace the seals. (see machine parts drawing, par. 11.3)

9. MAINTENANCE PROCEDURE

FLOW MASTER has been designed and constructed to require a minimum of maintenance.
For an easy maintenance, it is advised to assemble the machine in an adequate location.

- To facilitate maintenance tasks without interrupting the operation of the machine, it is recommended to provide the flow meter with an input ball valve to disconnect parts of the system.
- Periodically check pipe-joints to detect possible leaks.
- Always keep the machine unit clear to readily detect possible leaks.
- Periodically (once a year or when required) replace the refilling filter, *part n°: 3130139*.

The machine does not require any special tool for check or maintenance tasks. However, it is recommended the use only of appropriate and in good conditions tooling, protective devices (gloves) and clothing (626/94 and DPR 547/55) to avoid injury to persons or damage to machine parts.

***WARNING*: Before any maintenance procedure, be sure that power, hydraulic and pneumatic supplies are off.**

10. DISPOSAL

During maintenance or disposal of the machine care should be taken to properly dispose of environmentally sensitive items. 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

11.1 Assembly (base –metering module – inductive sensor)

Manual option SERIAL N°		Motorized option	METERING MODULE	MATERIAL
NPN output	PNP output	SERIAL N°	MODEL	
1523730	1523870	1523950	A	STAINLESS STEEL
1523740	1523880	1523960	B	
1523750	1523890	1523970	C	
1523732	1523872	1523952	A	ALUMINIUM
1523742	1523882	1523962	B	
1523752	1523892	1523972	C	

11.2 Components

BASE				
PART N°		THREADS		MATERIAL
Manual option	Motorized option	Inlet	Outlet	
1523330	1523630	G ½ UNI-ISO	G 3/8 UNI-ISO	STAINLESS STEEL
1523332	1523632			ALUMINIUM

METERING MODULE						
PART N°						
NPN output	PNP output	MODEL	MATERIAL	FLOWRATE cm³/min. (cu.in.)/min.	MIN FLOWRATE at 50 rev/min. litres/min. (galls/min.)	MAX FLOWRATE at 1000/min. litres/min. (galls/min.)
1523734	1523874	A	STAINLESS STEEL	5 (0.3)	0.25 (0.05)	5 (1.1)
1523735	1523875		ALUMINIUM			
1523744	1523884	B	STAINLESS STEEL	10 (0.61)	0.5 (0.11)	10 (2.2)
1523745	1523885		ALUMINIUM			
1523754	1523894	C	STAINLESS STEEL	20 (1.22)	1 (0.22)	16 (3.52) 800 rev/min.
1523755	1523895		ALUMINIUM			

INDUCTIVE SENSOR	
PART N°	
NPN output	PNP output
1523739	1523812

***NOTICE*: Pre-mounted groups are available for flowrates greater than 20 lt/min. (4.4 galls/min.): for example: part n° 1524475.**

11.3 Spare parts

Connector for pipe, complete with nut and ring			
Ø Pipe		Part N°	
		for stainless steel base	for aluminium base
mm	in.		
10	0.39	530051	92374
12	0.47	530052	92375
16	0.62	530045	92376

Connector for pipe, complete with nut and ring			
Ø Pipe		Part N°	
		for stainless steel base	for aluminium base
mm	in.		
8	0.31	530050	92363
10	0.39	530042	92270
12	0.47	530043	92254

Connector with check valve, complete with nut and ring			
Ø Pipe		Part N°	
		for stainless steel base	for aluminium base
mm	in.		
8	0.31	530063	92368
10	0.39	530064	92369
12	0.47	530065	92370

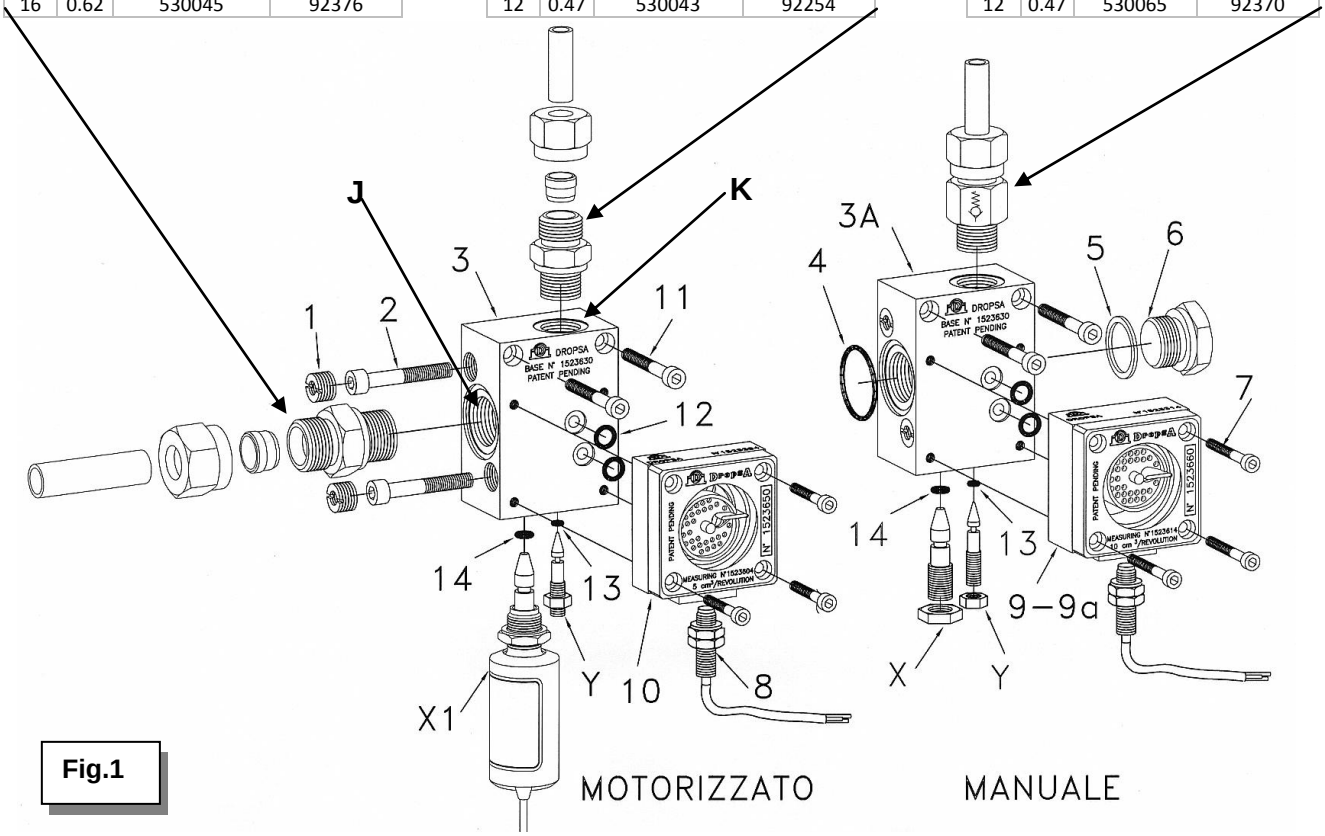


Fig.1

Pos.	Description	Part N° (stainless steel)	Part N° (aluminium)	Q.ty
1	Grub screw	675217	1523343	2
2	Screw	675230	14093	2
3	Base, threads UNI-ISO, completed with motor (X1), screws (Y), grub screws (pos. 1), screws (pos. 2), O-Ring (pos. 4,12,13,14)	1523630	1523632	1
3A	Base threads UNI-ISO completed with grub screws (pos. 1), screws (X) and (Y), screws (pos. 2), O-Ring (pos. 4,12,13,14)	1523330	1523332	1
4	O-Ring in Viton	1523352	1523352	1
5	Gasket	3190319	3190318	1
6	Plug - Threads G 1/4 UNI-ISO 228/1	3234207	3234206	1
7	Screw for metering module “A” 5 cm³ (0.3 cu.in.)	14165	14069	4
7	Screw for metering module “B” 10 cm³ (0.61 cu.in.)	14175	12769	4
7	Screw for metering module “C” 20 cm³ (1.22 cu.in.)	14177	14176	4
8	Sensor	1523739	1523739	1
9	Metering module “B” (completed with screw pos. 7)	1523744	1523745	1
9a	Metering module “C” (completed with screw pos. 7)	1523754	1523755	1
10	Metering module “A” (completed with screw pos. 7)	1523734	1523735	1
*	O-Ring in Viton for metering module	1523353	1523353	1
11	Screw	14157	14081	2
12	O-Ring in Viton	1523349	1523349	2
13	O-Ring in Viton for fine adjustment valve	1523354	1523354	1
14	O-Ring in Viton for coarse adjustment valve (motorized)	1523397	1523397	1
X1	Output adjustment unit with ratiomotor	1523692	1523691	1

* O-Ring is built-in for 9 - 9a – 10 modules.

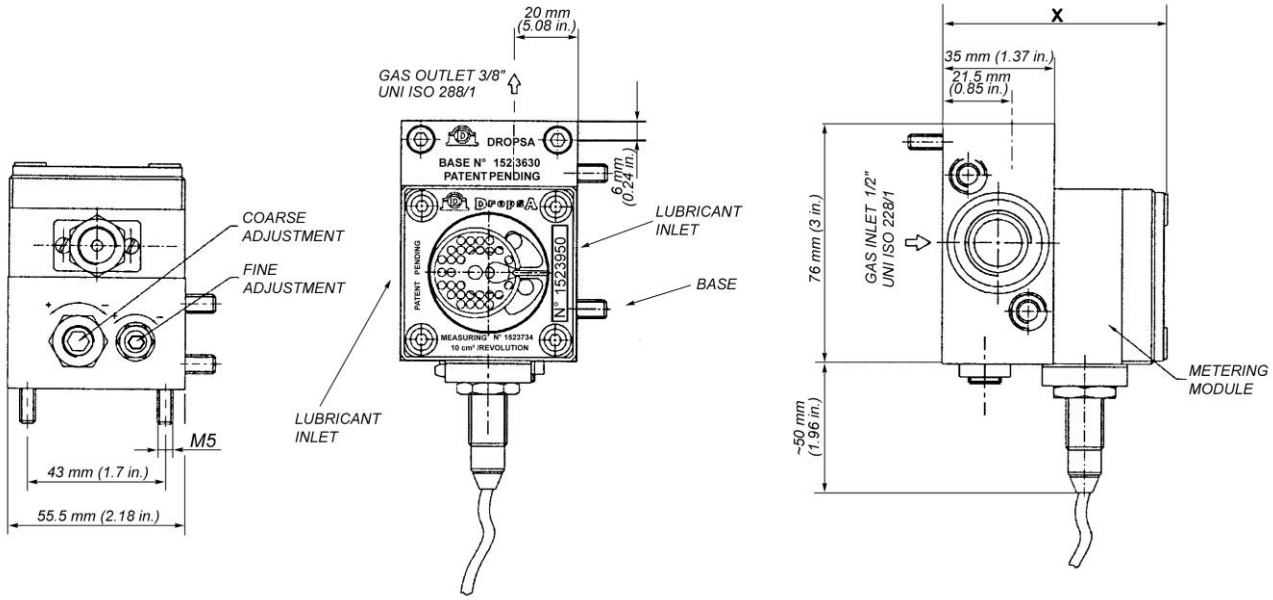
O-Ring Pos. 4 must be mounted only between base and base.

Screws (Pos. 11), Gasket (Pos. 5) and Plug (Pos. 6) must be ordered separately.

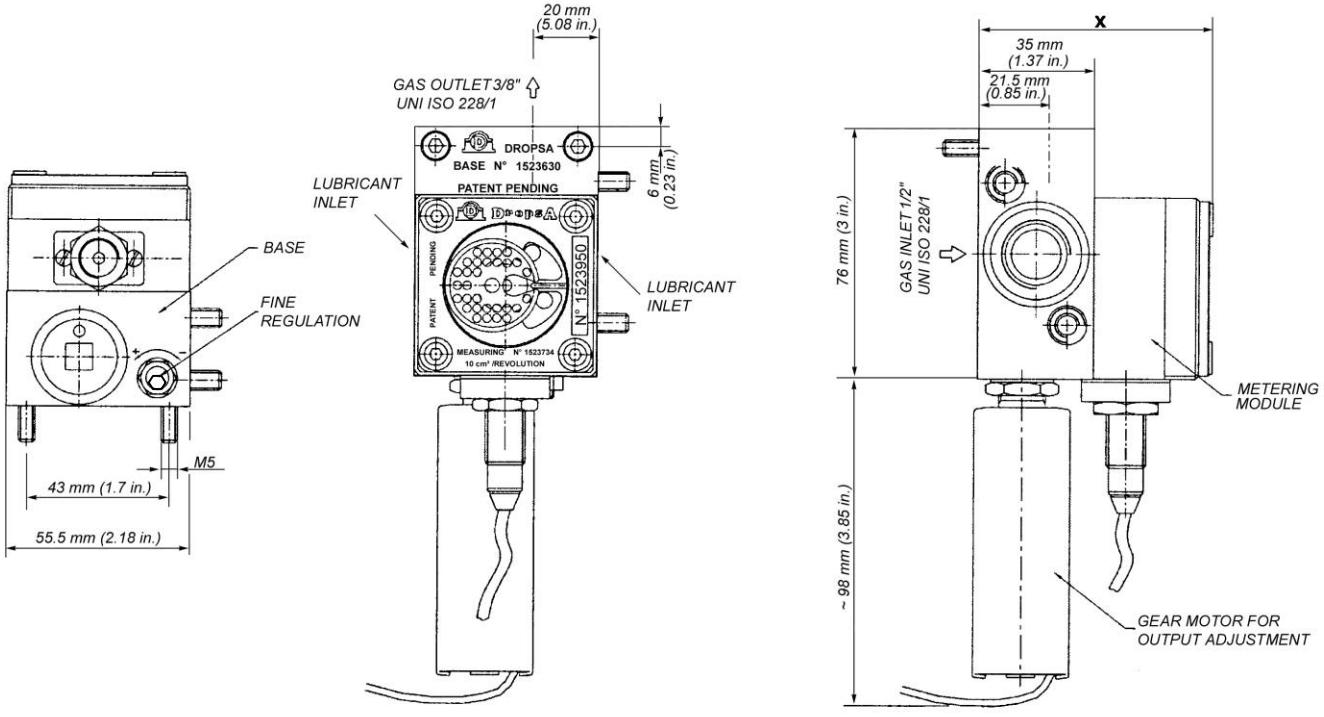
12. DIMENSIONS

Depth "X" Module metering	mm	in.
"A"	60	2.36
"B"	67.5	2.65
"C"	82	3.22

12.1 Manual *FLOW MASTER*



12.2 Motorized *FLOW MASTER*



13. HANDLING AND TRANSPORTATION

Given the low weight and small dimensions of the machine, it is not necessary the use of material handling equipment.

Prior to shipping, the machine is carefully packed in cardboard packing.

During transportation and storage, pay attention to the side on the cardboard packing.

On receipt, check that the packing is not damaged and then, storage the machine in a dry location.

CAUTION: **During storage, machine components can withstand temperatures –20 °C ÷ +60 °C (-4 °F ÷ +140 F°). However, in order to avoid damages, machine starting should occur at a minimum temperature of +5 °C (+41 °F).**

14. OPERATING HAZARDS

It is necessary to read carefully about the instructions and the risks involved in the use of lubrication components. The operator must know machine functioning and dangers through the user manual.

Power supply
Any type of intervention must not be carried out before the unplugging of the machine from the 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.

Inflammability
The lubricant generally used in lubrication systems is not normally inflammable. 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 and vibrations
FLOW MASTER does not produce excessive noise, less than 70 dB(A).

15. PRECAUTIONS

No particular operating hazards characterize the *FLOW MASTER*, except for the following precautions:

- **Operator's contact with lubricant during maintenance tasks:**
  The operator must be provided with suitable personal protective clothing and devices.
- **Use of incompatible lubricant:**

MAIN NO COMPATIBLE FLUIDS

Fluids	Dangers
Lubricants containing abrasive components	Premature wear of pump
Lubricants containing silicon	Pump failure
Petrol – solvents – inflammable liquids	Fire – explosion –seal damage
Corrosive products	Pump damage - danger to persons
Water	Pump oxidization
Food Products	Contamination of the product

16. WARRANTY INFORMATION

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, date of 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 out 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

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AN ISO 9001 APPROVED COMPANY

DICHIARAZIONE CE DI CONFORMITÁ/DECLARATION OF COMPLIANCE WITH STANDARDS/ DECLARATION DE CONFORMITE/ KONFORMITÄTSERKLÄRUNG DES STANDARDS /DECLARACIÓN DE CONFORMIDAD/ DECLARAÇÃO DE CONFORMIDADE

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che il prodotto denominato/that the product called/ le produit appelè/ das Produkt mit dem Namen/ el producto que se llama/ o produto chamado:

Descrizione/ Description/ Description/ Beschreibung/ Descripción/ Descrição:	**Misuratore di portata Volumetric flow meter**
Nome Commerciale/ Product Name/ Dénomination/ Handelsname/ Denominación/ Denominação:	Flowmaster
Versioni/ Versions/ Versions/ Versionen/ Versiones/ Versões:	All versions
Codici/ Codes/ Códigos/:	1523730-1523740-1523750-1523732-1523742-1523752-1523870-1523880-1523890-1523872-1523882-1523892-1523950-1523960-1523970-1523952-1523962-1523972

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person authorized to compile the Technical File care of Dropsa S.P.A.

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Vimodrone (MI), Gennaio 2012

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