FLOW MASTER II

VOLUMETRIC FLOW METER
FOR CONTROLLING THE FLOW OF LIQUIDS

User and Maintenance Manual

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Manual drawn up in accordance with
EC Directive 06/42

C2200IE WK 31/19

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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 build assembles (base and metering module) of 20 modules or more.

OPERATING PRINCIPLE
Liquid flowing through the meter module moves a "satellite" within a fixed rotation. Every rotation is monitored by an optical sensor that transmits the signal to a control device. The operator may read the liquid delivered in litres per minute or the revolutions number per minute directly from the FACT device-display or from a PC monitoring software.

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 IDENTIFICATION

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

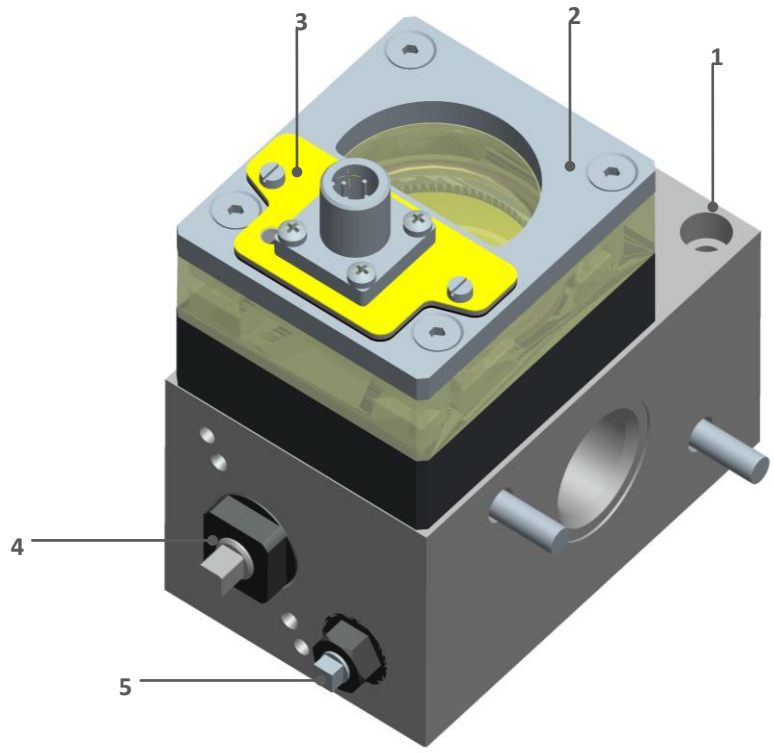
4. TECHNICAL SPECIFICATIONS

BASE AND METERING MODULE	
Fluid maximum viscosity (at lubricant operating temperature)	1000 cSt (4628 SUS)
Operating temperature	0°C ÷ +60 °C (32 °F ÷ +140 °F)
Minimum pressure (continuous working)	6 bar (88,2 p.s.i.)
Maximum pressure (intermittent working; maximum operating time: 1 hour)	20 bar (294 p.s.i.)
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	Aluminium
Cover	Transparent polyamide7PET
Maximum distance between a flow meter and the Electronic Control Equipment	500 metres (547 yard) It is advisable the use of a shielded cable

OPTICAL SENSOR	
Maximum output current	40 mA
Supply voltage	12-24V D.C.
Maximum switching frequency	40 Hz
Outputs	NPN o PNP
Protection grade	IP 65
Temperature	0°C ÷ +70 °C (32 °F ÷ + 140 °F)

5. COMPONENTS

METER PARTS	
1	Base
2	Metering module
3	Optical sensor
4	Flow rate adjustment screw
5	By-pass Valve



6. UNPACKING AND INSTALLATION

6.1 UNPACKING

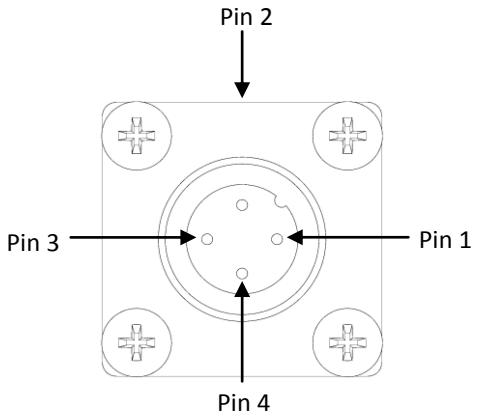
Once a suitable location has been found to install the unit remove the machine from the packaging. Check the device has not been damaged during transportation or storage. No particular disposal procedures are necessary, as packaging materials are not dangerous or polluting.

6.2 INSTALLING

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

***WARNING*: All the electric, electronic components, reservoirs and base structure must be grounded.**

- Connect inlet tubes par.11.3, Figure 1, pos. J) and oil output (par.11.3, Figure 1, pos. K).
- Connect the sensor wires to terminal board of the electronic control device (cable available as an accessory).



CONNECTOR (M12X1)	
PIN	*DESCRIPION*
1	V +
2	V -
3	NPN signal
4	PNP signal

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 with check valve
- 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:

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

7. PUMP OPERATIONS

Output of *FLOWMASTER* is easy adjusted using the adjustment needle (par.11.3, fig.1, pos. X).
In event of replacement of the flow satellite module, it is possible divert the flow directly to the output, isolating the module by activating the flow by-pass valve (optional - par.11.3, fig.1, pos. Y).

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	→Switch 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 good quality tooling, protective equipment (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 – optical sensor)

STANDARD VERSION	BY-PASS VERSION	FLOW MODULE FORM
Part Number	Part Number	
1525701	1525700	A (5-10 lt/min max)

11.2 COMPONENTS

BASE				
PART NUMBER		THREADS		MATERIAL
Standard version	by-pass version	Inlet	Outlet	
1525720	1525702	G ½ UNI-ISO	G 3/8 UNI-ISO	ALUMINIUM

PART NUMBER	MODEL	MAX FLOWRATE a 1000 rev/min litres/min. (cu.in.)/min.	MIN FLOWRATE a 50 rev/min. litres /min. (gall./min.)
1525704	A	10 (0,6)	0,25 (0,05)

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

11.3 ACCESSORIES

DESCRIPTION	PART N°	LENGTH
Sensor cable with connector	**0039830**	**2 mt**
	0039815	**5 mt**

11.4 PART NUMBER

FITTING WITH NUTS AND RING		
Ø tube		Part Number
mm	in.	
10	0,39	92374
12	0,47	92375
16	0,62	92376

FITTING WITH NUTS AND RING		
Ø tube		Part Number
mm	in.	
8	0,31	92363
10	0,39	92270
12	0,47	92254

FITTING WITH CHECK VALVE, NUTS AND RING		
Ø tube		Part Number
mm	in.	
8	0,31	92368
10	0,39	92369
12	0,47	92370

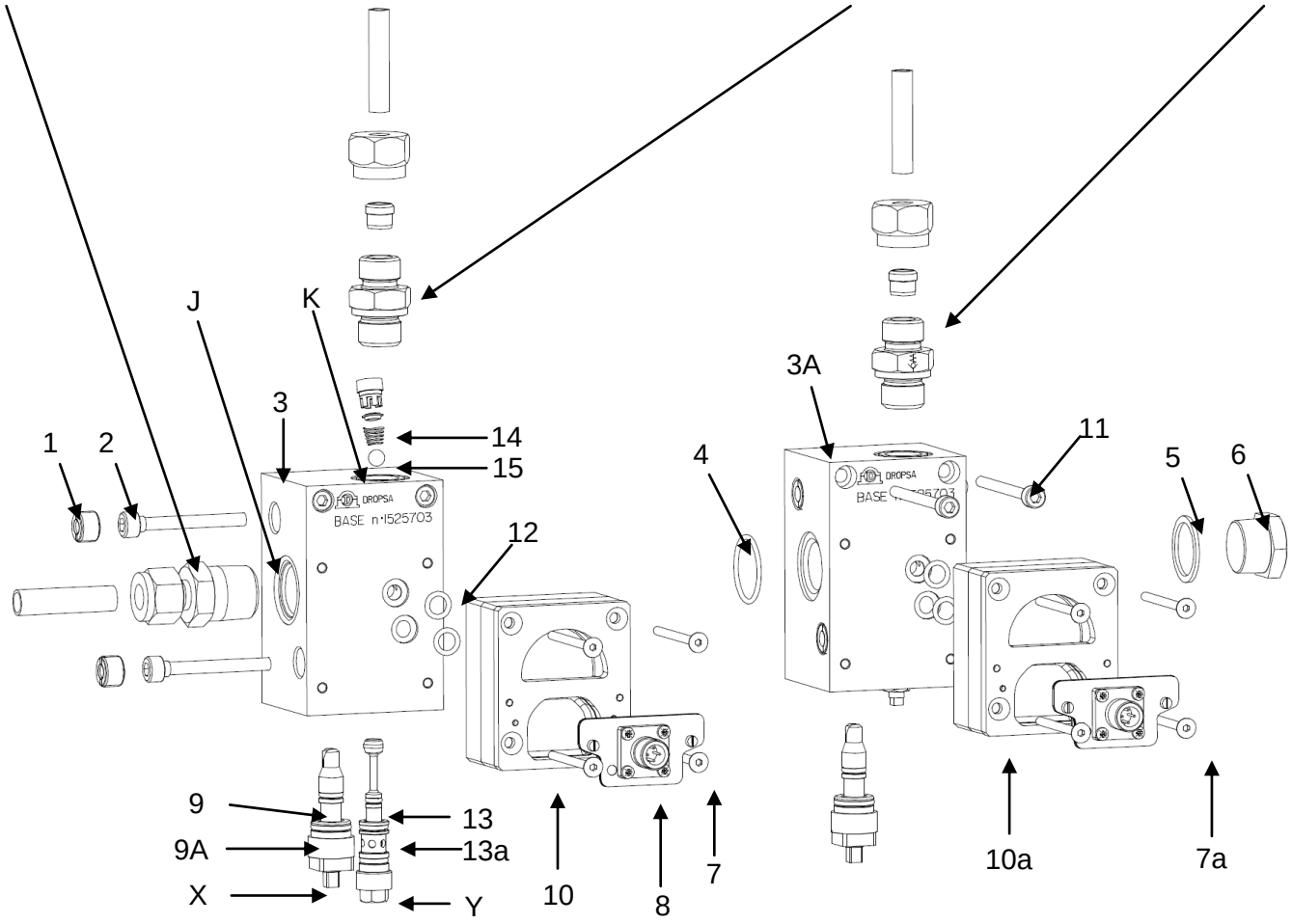


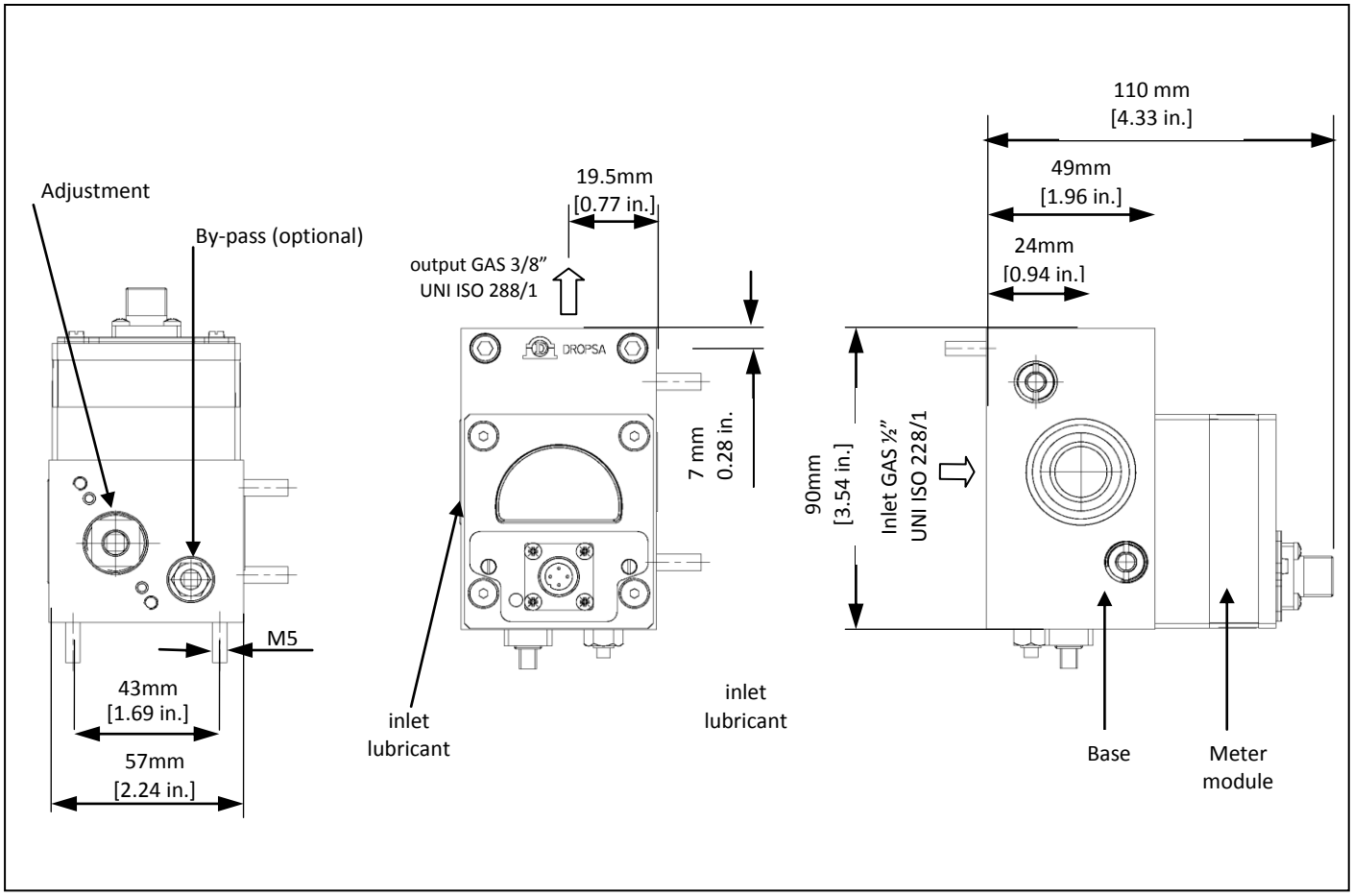
Fig.1

BY-PASS version

Version without BY-PASS

POS.	DESCRIPTION	PART N°ALUMINIUM	Q.TY
1	Grub screw	**1523343**	2
2	screw	**0014094**	2
3	Base completed with adjustment screw(X), by-pass (Y), grub (pos. 1), screws (pos. 2), O-Ring (pos. 4,12,9,9A,13,13A)	**1525702**	1
3A	Base complete with regulation screw (X), grub screws (pos. 1), screws (pos. 2), O-Ring (pos. 4,12,9,9A,13,13A)	**1525720**	1
4	O-Ring in Viton	**0058390**	1
5	Gasket	**3190318**	1
6	Plug - Threads G 1/4 UNI-ISO 228/1	**3234206**	1
7	Screw for metering module 5 cm³ (0,3 cu.in.)	**0021776**	4
7a	Screw for metering module 20 cm³ (1,22 cu.in.)	**0021777**	4
8	Optical sensor	**1639198**	1
9	O-Ring for adjustment valve	**0018805**	1
9a	O-Ring for adjustment valve	**0061103**	1
10	Metering module “A” 5 cm³ (0,3 cu.in.) completed with screws pos. 7	**1525704**	1
10a	Metering module “B” 20 cm³ (1,22 cu.in.) complete d with screws pos. 7a	**1525732**	1
*	O-Ring in Viton for Metering module	**1523353**	1
11	Screw	**0014084**	2
12	O-Ring in Viton	**1523349**	2
13	O-Ring for by-pass valve	**0018912**	1
13A	O-Ring for by-pass valve	**0018807**	1
14	Spring for non-return valve	**0281017**	1
15	ball for Non-return valve	**0020507**	1
X	Flow regulating screw set	**1525711**	1
Y	By-pass valve assembly	**1525708**	1

12. DIMENSIONS



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:

- The device is designed to operate with clean fluids not polluted by water. Presence of water can modify device reading.
- Operator's contact with lubricant during maintenance tasks:
  The operator must be provided with suitable personal protective clothing and devices.
- Use of incompatible lubricant:

FLUIDS EXPLICITY NOT ALLOWED	
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