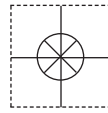


1 YEAR
WARRANTY



Ω OMEGA® **User's Guide**



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FPD3100 Series

1/4" - 1" Oval Gear Flowmeter for use with Corrosive Chemicals



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Installation

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To the Owner

Please read and retain this instruction manual to assist you in the operation and maintenance of this product.

This manual contains connection and operating instructions for the FPD Flowmeter series with Pulse outputs.

Models with a Liquid Crystal Display have an additional LCD instruction manual supplied. If you need further assistance, contact your local representative or distributor for advice.

This Flow Meter has incorporated the oval rotor principal into its design. This is proven to be a reliable and highly accurate method of measuring flow.

Exceptional repeatability and high accuracy over a wide range of fluid viscosities and flow rates are features of the oval rotor design.

With a low pressure drop and high pressure rating oval rotor flow meters are suitable for both gravity and (in-line) pump applications.

IMPORTANT INFORMATION



FLUID COMPATABILITY

Before use, confirm the fluid to be used is compatible with the meter. Refer to Industry fluid compatibility charts or consult your local representative for advice.



AIR PURGE / LINE PRESSURE

To prevent damage caused by air purge slowly fill the meter with fluid.

To reduce pressure build-up turn off the at the end of each day.



STRAINER

To prevent damage from dirt or foreign matter it is recommended that a Y or Basket type mesh strainer be installed as close as possible to the inlet side of the meter.

When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance. Contact your local representative for advice.



REED SWITCH

The reed switch can cause inaccurate rate counts when used with high speed counters.

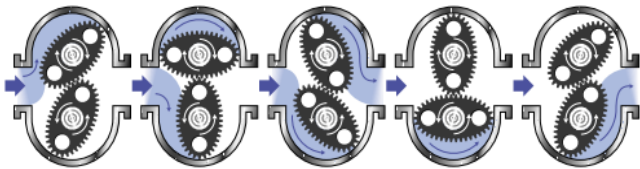
It is advised that a low speed counter is used or alternatively a denounce circuit be installed.

OPERATING PRINCIPLE

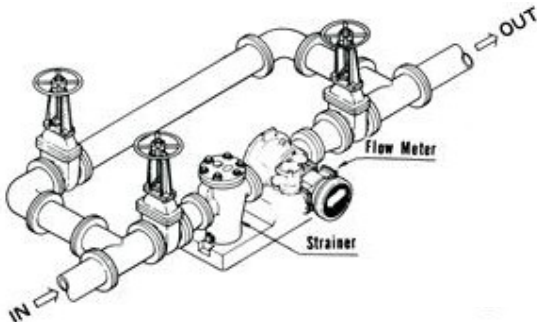
Fluid passing through the meter causes the rotors to turn, as shown below.
One of the rotors (the active rotor) is fitted with magnets.

The passing of the magnets are picked up by the sensing elements (Reed and Hall Effect sensors) located in the Pulser Circuit Board.
The excitation of these switches provides a 'Raw Pulse Output' which relates to the K-Factor.
(e.g. $KF\ 36 = 36\ \text{pulses per litre of fluid passed}$)

This Pulse Output Signal can either be fed directly to an external receiving element (e.g. Data Logger or PLC) or alternatively to an LC Display which conditions the Pulse input signal to display volume of fluid passed. (e.g. *Display 1 Litre per for every 36 pulses received*)



INSTALLATION PROCEDURE



1. It is recommended that when setting up pipe work for meter installations, a bypass line be included in the design. This provides the facility for a meter to be removed for maintenance without interrupting production. (see figure above)
2. Use thread sealant on all pipe threads.
3. For pump applications ensure pipe work and Meter have the appropriate working pressure rating to match the pressure output of the pump. Refer to Meter Specifications section for further details.
4. Install a wire mesh strainer, Y or basket type as close as possible to the inlet side of the meter.
Meter 1/4" 74 micron / 200 mesh
Meter 1" 250 micron / 60 mesh

5. Note: The Flowmeter can accept flow in any direction.
6. The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to diagram below for correct installation)



Do Not Install Meter This Way

Note: Incorrect installation can cause premature wear of meter components.
The LC display may be removed by loosening the 4 mounting screws and be orientated as required.

7. Do not over tighten meter connections. .
8. It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.
9. Test the system for leaks.
10. Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate is noted to be decreasing.

Maintenance Procedures

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly, with the exception for repair or maintenance to the LC Display or PCB where there is no necessity to isolate the meter from flow. Refer to the exploded parts diagram on subsequent pages for item numbers.

- 1) Pulse Caps Models: Undo the conduit connector, remove pulse cap (item 9) and remove the wires from the pulse terminal board (item 5).
- 2) Standard LC Display: Mark the display orientation with a marking pen, unscrew the four large screws on top of the LC Display. Carefully separate the LC Display from the plastic housing and disconnect the wires from the pulse terminal block. (Refer to additional LCD instruction manual accompanying these instructions). Remove the mounting adaptor plate and gasket.
- 3) Loosen the cap head screws (Item 7) that hold down the meter cap (Item 4), remove the screws, washers and lift off the cap.
- 4) Remove the o-ring (Assembly Item 2) from the o-ring groove in the meter cap (Assembly Item 4).
- 5) Remove rotors (Item 3).

Reassembly

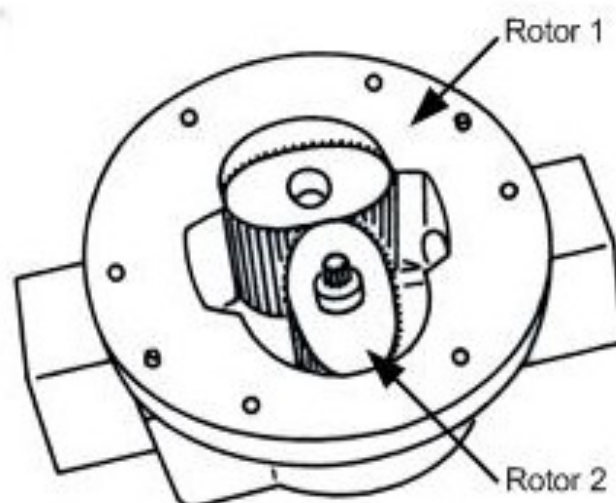
- 1) Before reassembling check the condition of the rotors (replace if necessary).
- 2) Check that the smooth side of the rotors (not the plug side) is facing you when inserting the rotors, the smooth side of the rotor is the magnet side. There is no difference between rotor one or rotor two.
- 3) Replace the rotors (Item 3) onto the shafts at 90 degrees to each other (refer Fig) and check their operation by turning either of the rotors. If the rotors are not in mesh correctly or do not move freely, remove one of the rotors and replace correctly at 90 degrees to the other rotor.
- 4) Re-check the operation of the rotors
- 5) Replace the o-ring (Item 2) into groove in the meter cap, if the o-ring has grown or is damaged in any way replace it with a new part.
- 6) Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap.

7) Insert the cap head screws (Item 7) and tighten in a diagonal sequence 1, 3, 2, 4, etc.

8) The replacement of cables and connectors are a reversal of the disassembly procedure, replace conduit fitting if required.

When replacing the Standard LC Display confirm the orientation marks made on disassembly are aligned then screw the register into place.

9) Test the meter by turning the rotors with a finger or by applying very low air pressure (no more than a good breath) to one end of the meter, before returning the meter to the line.



Rotors Must be 90° to each other

FLOWMETER SPECIFICATIONS

Series FPD3102		Metric	US
Flow Range	Below 5 cP	2 to 100 LPH	0.5 to 26 GPH
	5 to 1000 cP	0.5 to 100 LPH	0.13 to 26.4 GPH
K-Factor	Pulses per unit of measure	Refer to Flowmeter Data Plate	
Max Temperature	without Digital Display	-40°C - 80°C	-40°F - 176°F
	with –D or –D-A Digital Display	-20°C - 60°C	-4°F - 140°F
Maximum Operating Pressure ¹		500 kPa	75 psi
Accuracy of Reading		±0.25% available with reduced flow range ±0.5% standard	
1. Conforms to Directive 97/23/EC—Cat 1			

Series FPD3103		Metric	US
Flow Range	Below 5 cP	25 to 500 LPH	6.6 to 132 GPH
	5 to 1000 cP	15 to 500 LPH	4 to 132 GPH
Nominal K-Factor	Pulses per unit of measure	Refer to Flowmeter Data Plate	
Max Temperature	without Digital Display	-40°C - 80°C	-40°F - 176°F
	with –D or –D-A Digital Display	-20°C - 60°C	-4°F - 140°F
Maximum Operating Pressure ¹		500 kPa	75 psi
Accuracy of Reading		±0.25% available with reduced flow range ±0.5% standard	
1. Conforms to Directive 97/23/EC—Cat 1			

Series FPD3105		Metric	US
Flow Range	Below 5 cP	8 to 70 LPM	2 to 18.5 GPM
	5 to 1000 cP	3 to 80 LPM	0.8 to 21 GPM
Nominal K-Factor	Pulses per unit of measure	Refer to Flowmeter Data Plate	
Max Temperature	without Digital Display	-40°C - 80°C	-40°F - 176°F
	with –D or –D-A Digital Display	-20°C - 60°C	-4°F - 140°F
Maximum Operating Pressure ¹		1000 kPa	150 psi
Accuracy of Reading		±0.25% available with reduced flow range ±0.5% standard	
1. Conforms to Directive 97/23/EC—Cat 1			

ELECTRICAL SPECIFICATIONS

Pulser Board/Sensor Specifications

There are two sensors on each PCB

1x Reed Switch 1x Hall Effect Output

Output Signals	Standard Pulse Meter		2x Digital (Square Wave)
Reed Switch ² (Mechanical Sensor)	Current	Maximum ²	500mA
	Voltage	Maximum ²	30V DC
	Contact Rating	Maximum ³	10W
Hall Effect IC ² (Electronic Sensor)	Maximum Sensor Supply Current		7.5mA
	Maximum Output Current		25mA
	Operating Voltage		4.5V to 24V DC
	Transistor Type		Open-Collector NPN

2. Voltage & current specifications apply per sensor (not combined).

3. Contact rating maximum is 10W. Neither current nor voltage maximums should be exceeded in achieving this.

WIRING DIAGRAM



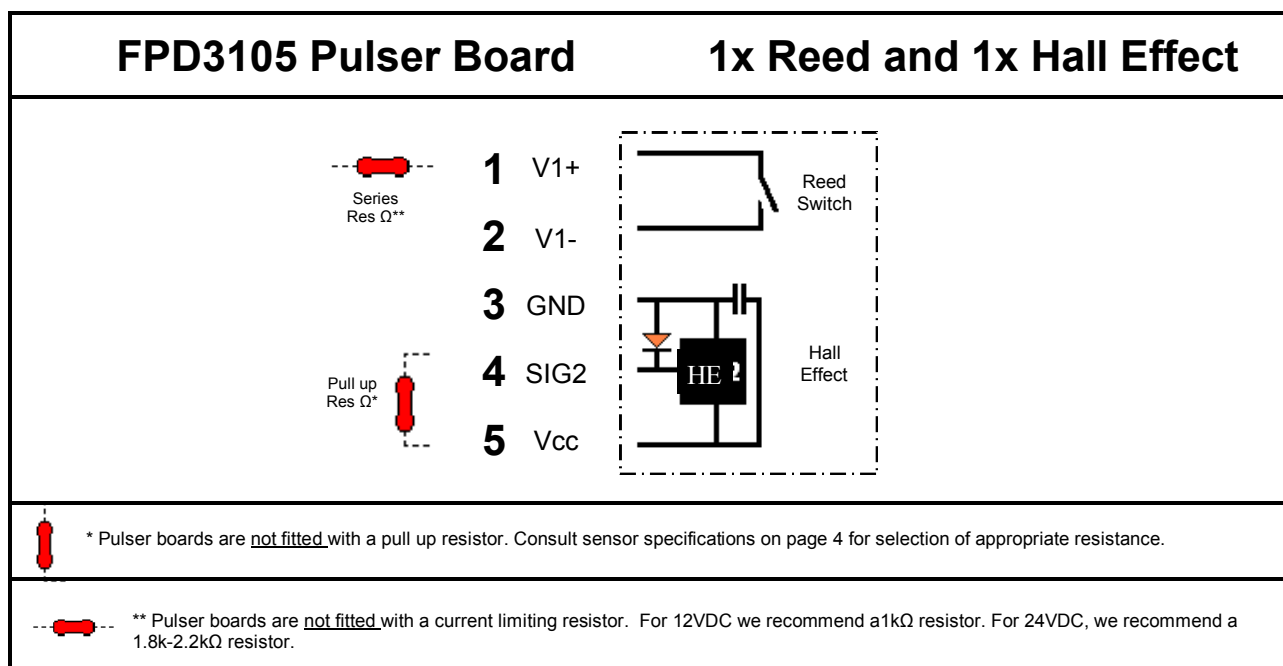
Please read this information carefully before installation

Hall Effect:

Hall effect sensors require an external pull up resistor to be fitted by the installer for correct operation. Powering a Hall effect sensor without a resistor wired between the supply voltage and the signal line will result in damage to the sensor.

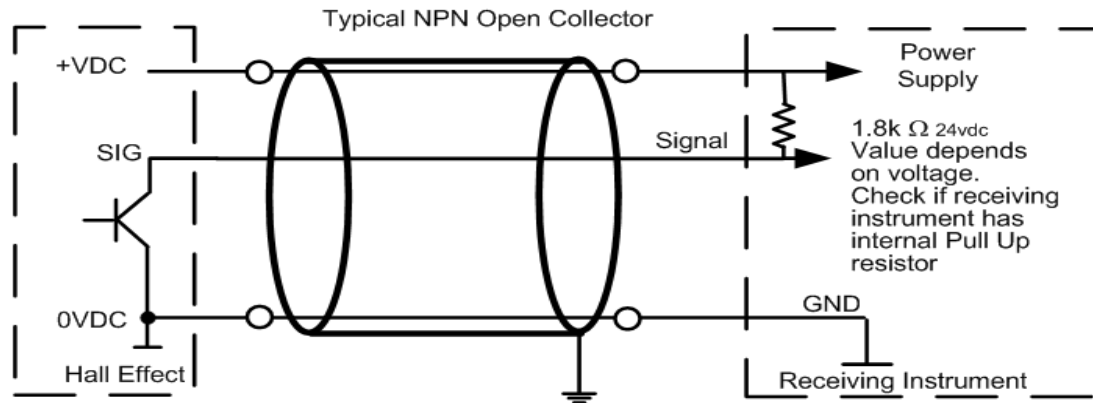
Reed Switch:

In order to protect the reed switch from over current, and to maximise life expectancy, we recommend limiting the current through the switch by fitting a series resistor in between the signal leg and the PLC/signal sensing device.



FPD3102/FPD3103 Wiring Connections and Diagram

Output Type		Wire	Function	Wire	Function	Wire	Function	Note
Reed/Hall	Reed	Green		Yellow				No Polarity Required
	Hall	Red	+ VDC	Black	Gnd (0V)	White	Signal	NPN Open Collector
Reed/Hall LCD	Reed	Black		Black				Connects to LCD
	Hall	Red	+ VDC	Black	Gnd (0V)	White	Signal	NPN Open Collector



DIGITAL DISPLAYS

The Flow meter series is supplied with either a Blind Pulser and Digital Display option.

If the Flow meter is supplied with an LC Display fitted, please consult the appropriate Instruction Manual, as advised below, for all programming and wiring instructions.

Analog Output (4-20mA)

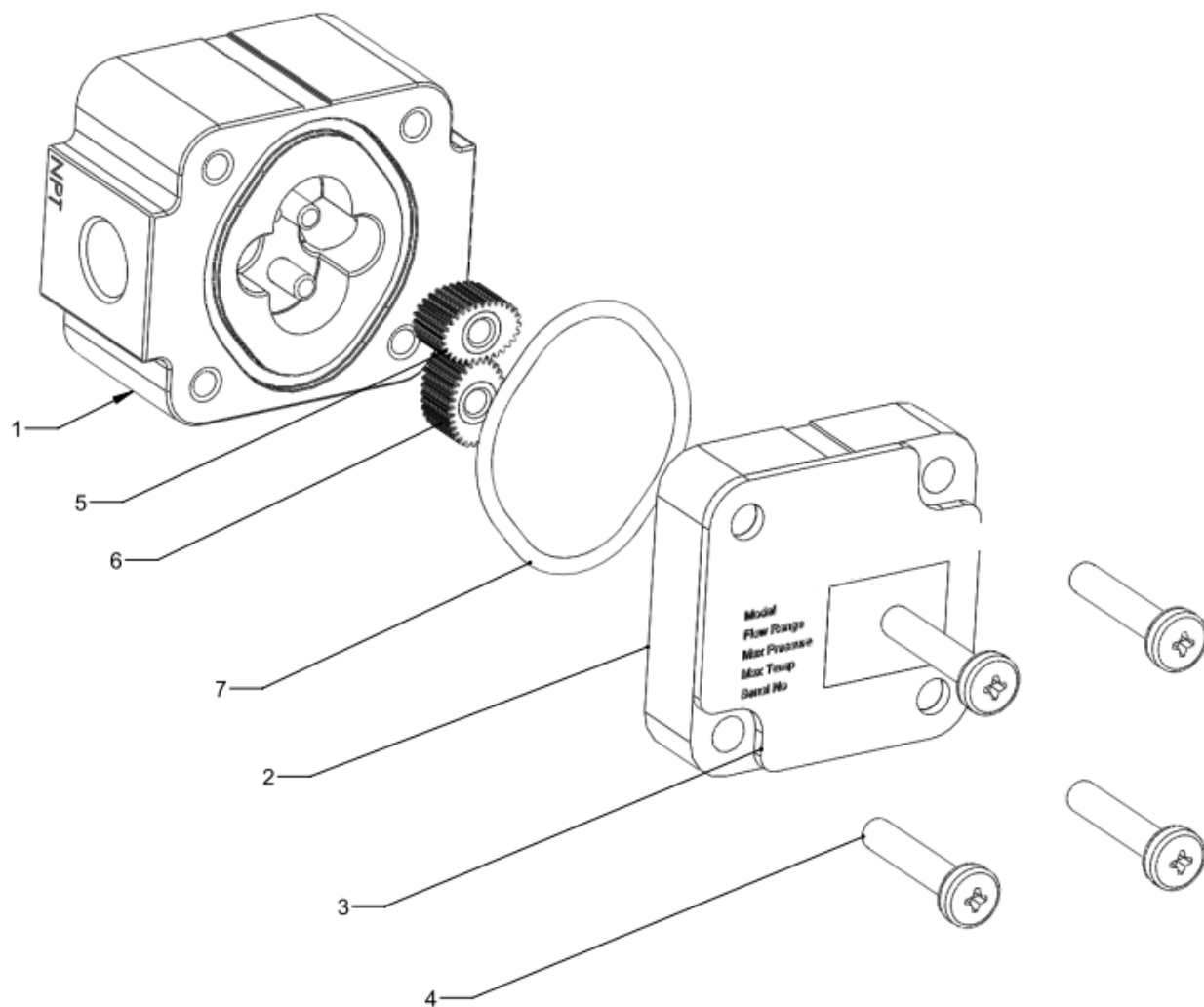
Analog outputs are available as an auxiliary display signal by including either of the following LC displays with your flowmeter. These may be fitted to the meter or remote (wall mount) types.

- FPD3100-D** 12mm LC Display (No output options)
- FPD3100-D-A** 12mm LC Display with analog output module

Troubleshooting Guide

Problem	Cause	Remedy
Fluid will not flow through meter	a) Foreign matter blocking rotors b) Line strainer blocked c) Damaged rotors d) Meter connections over tightened e) Fluid is too viscous	a) Dismantle meter, clean rotors (strainer must be fitted in line) b) Clean strainer c) Replace rotors (Strainer must be fitted in line) d) Re-adjust connections e) See specifications for maximum viscosity
Reduced flow through meter	a) Strainer is partially blocked b) Fluid is too viscous	a) Clean strainer b) See specifications for maximum viscosity
Meter reading inaccurate	a) Fluid flow rate is too high or too low b) Air in fluid c) Excess wear caused by incorrect installation	a) See specifications for minimum and maximum flow rates b) Bleed air from system c) Check meter body and rotors. Replace as required. Refer to installation instructions
Meter not giving a pulse signal	a) Faulty hall effect sensor b) Faulty reed switch c) Magnets failed	a) Replace PCB Board b) Replace PCB Board c) Replace magnets
LCD register not working	a) Battery not connected properly b) Battery flat c) Faulty wiring connections d) Faulty LC Display e) Faulty connection from LC Display	a) Check battery connections b) Replace battery c) Check wiring for loose or faulty connections d) Replace LC Display e) Check wiring connections

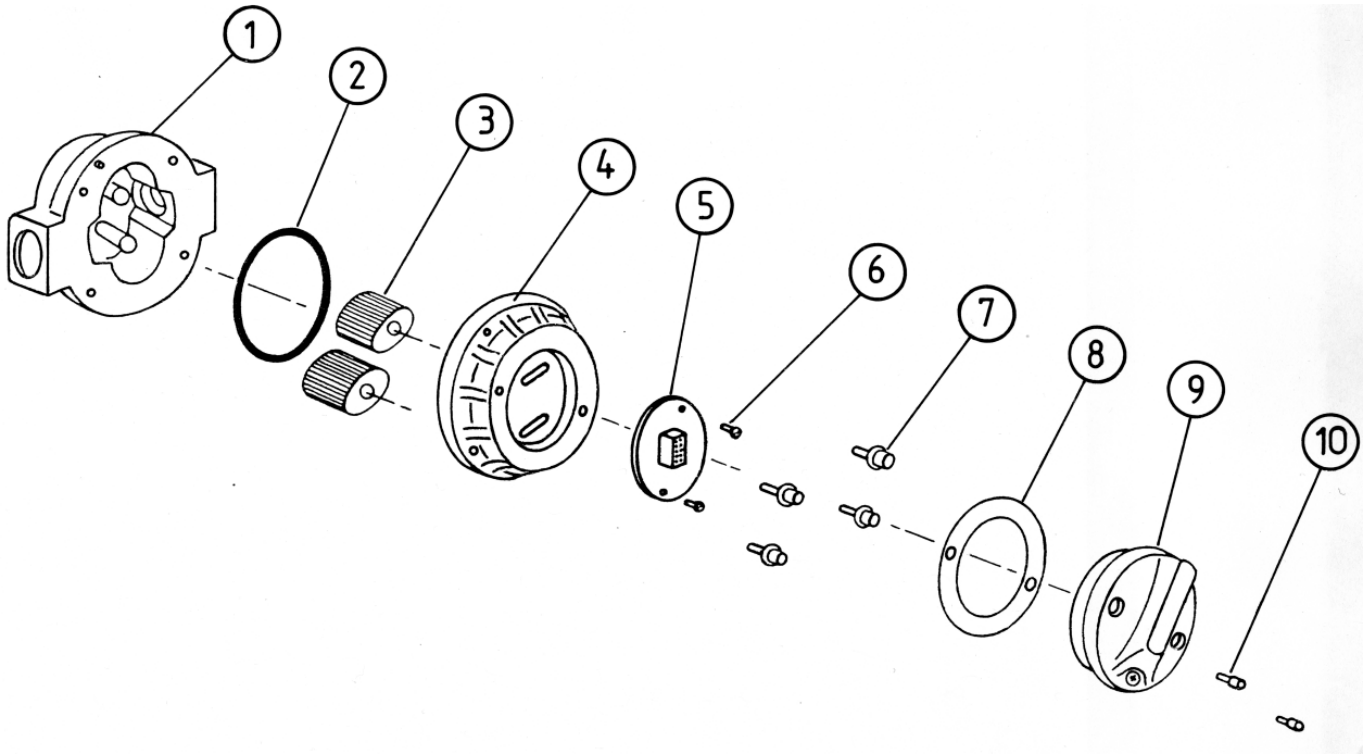
EXPLODED DIAGRAM Models 3102 and 3103



PARTS IDENTIFICATION

Item No.	Part Description
1	Meter Body
2	Meter Cap (PCB)
3	Legend Plate
4	Meter Cap Mounting Screws
5 & 6	Rotors
7	O-Ring

EXPLODED DIAGRAM Models 3105



PARTS IDENTIFICATION

Item No.	Part Description
1	Meter Body
2	O-Ring
3	Rotors
4	Meter Cap
5	Printed Circuit Board
6	PCB Mounting Screws
7	Meter Cap Screws
8	Pulser Cap Gasket
9	Pulser Cap
10	Pulser Cap Screws

SPARE PARTS KITS

There are 4 **Spare Kit** options available for the purchase of replacement components:

- Pulser Kit (PKit) - Replacement PCB.
- Rotor Kit (RKit) - Complete Rotor assembly
- Seal Kit (SKit) - Complete set of O-Rings/Gaskets

SPARES KIT		FPD3102	FPD3103	FPD3105
PULSER KIT	Reed / Hall Effect	FPD3102-Pulser	FPD3103-Pulser	FPD3105-Pulser
ROTOR KIT		FPD3102-Rotor	FPD3103-Rotor	FPD3105-Rotor
SEAL KIT		FPD3102-Seal	FPD3103-Seal	FPD3105-Seal

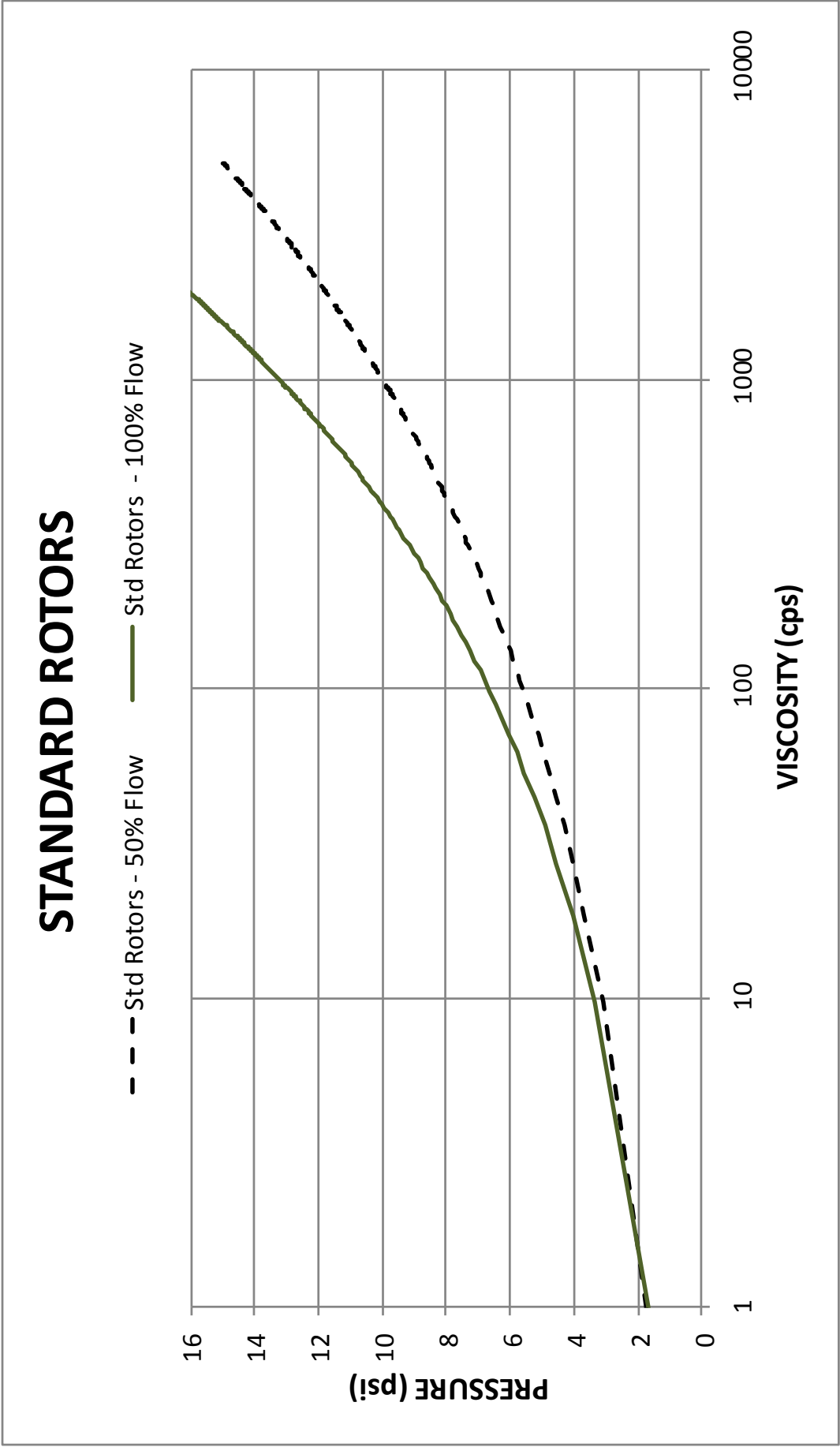
WETTED PARTS

METER COMPONENTS	FPD3102	FPD3103	FPD3105
METER BODY	PPS	PPS	PPS
METER CAP	PPS	PPS	PPS
ROTORS	PPS	PPS	PPS
ROTOR SHAFTS	Hastelloy C	Hastelloy C	Hastelloy C
O-RINGS	FFKM	FFKM	K

K - FEP/PTFE Encapsulated

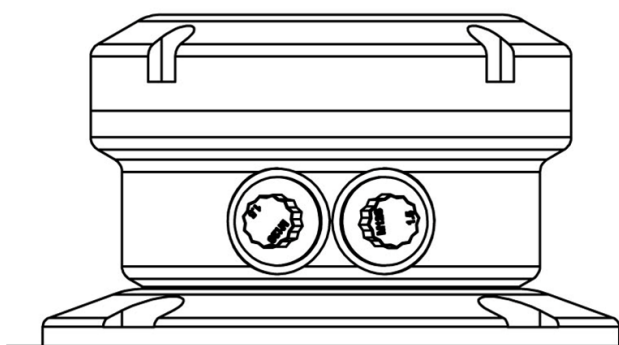
FFKM - Perfluoroelastomer

PPS - Polyphenylene Sulphide (PPS Resin)

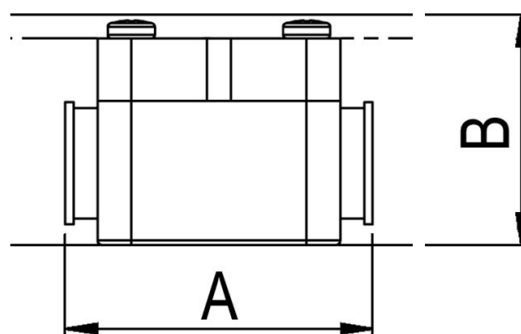


Face to Face Dimensions (A)		Register Height (B)	
RC / NPT	64mm	Pulser	59mm
		Digital Display Types -D and -D-A	116mm

Digital Display
Type -D or -D-A



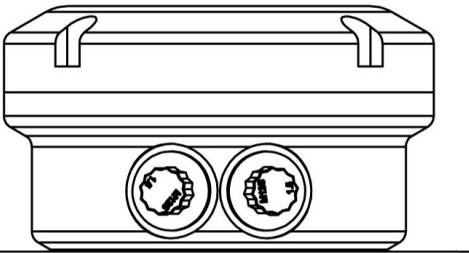
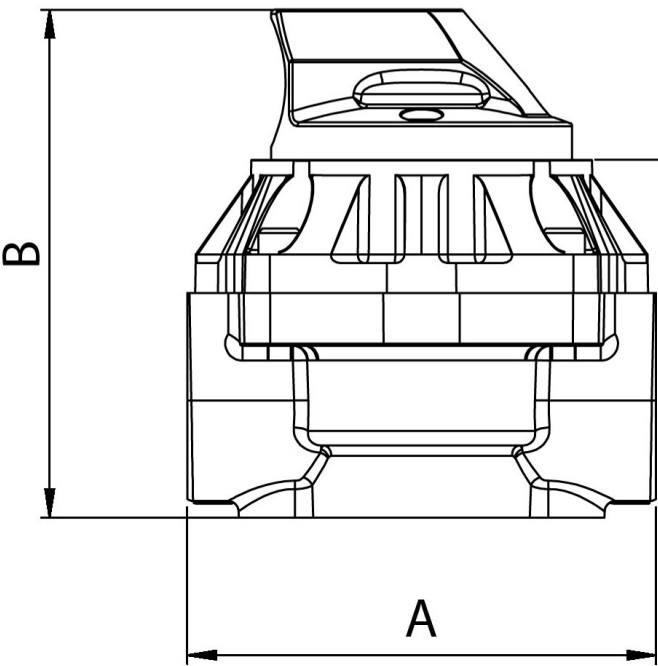
Pulser



Face to Face Dimensions (A)		Register Height (B)	
RC / NPT	109mm	Pulser	119mm
		Digital Display Types -D and -D-A	141mm

Pulser

Digital Display
Type -D or -D-A



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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