



GREAT PLAINS INDUSTRIES, INC.

Positive displacement flowmeters GM001 series instruction manual

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM001 Series meters. For models with display, an additional manual is supplied. If you need further assistance, contact your local representative or distributor for advice.

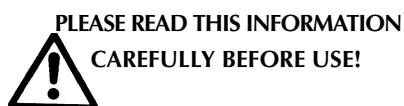
This Flowmeter has incorporated the oval rotor principal into its design. This has proven to be a reliable and highly accurate method of measuring flow. Exceptional repeatability and high accuracy over a wide range of fluid viscosities and flow rates are features of the oval rotor design. With low pressure drop and high pressure rating means oval rotor flow meters are suitable for both gravity and pump (in-line) applications.

GM001 Series Flowmeters are available in Aluminium or 316 Stainless Steel.



Standard rotors are made from 316 Stainless Steel.

Operation



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!
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.

To prevent damage from dirt or foreign matter it is recommended that a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

Note:

To prevent damage to the meter slowly

fill the system with fluid (this will prevent damage caused by air purge). Failure to do this could damage the meter.

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

Installation

1. Use thread sealant on all pipe threads.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane. Flow is bi-directional.
3. GPI recommends use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or overtightening meter connections can cause meter damage.

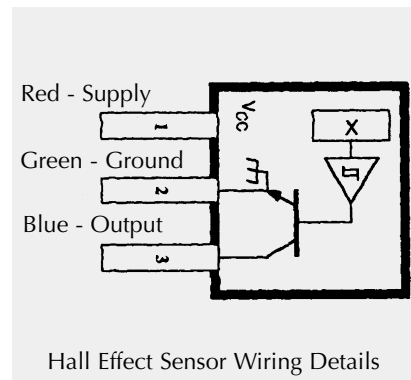
Pulser details

Hall Effect Sensor Specifications;

- 1 4.5V to 24V (4.6 ~ 9mA) operation needs only an unregulated supply.
- 1 Open collector 25mA output NPN compatible with digital logic.
- 1 Reverse battery protection.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .

Reed Relay Specifications;

- 1 Two wire SPST N/O.
- 1 Switching voltage 150VDC maximum current 0.25 AMPS.
- 1 Rating 3 watts.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .



Maintenance

Disassembly:

1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove four (4) screws (Item 3) and remove the meter body cover (Item 2).
3. Remove o-ring (Item 5) and inspect (replace o-ring if damaged).
4. Remove rotors (Item 4), clean and inspect (replace rotors if damaged).

Reassembly:

1. Place rotors (Item 4) into the meter body. The rotors should be at 90° to each other.
- Note: The rotor with magnets must be placed in the body on the same side as the groove on the body (refer to diagram).
2. Lightly rotate the rotors (Item 4) by hand (they must rotate freely).
 3. Install o-ring (Item 5).
 4. Replace the meter cap (Item 2).

Note: The groove on the cover must line up with the groove on the meter body (refer to diagram).

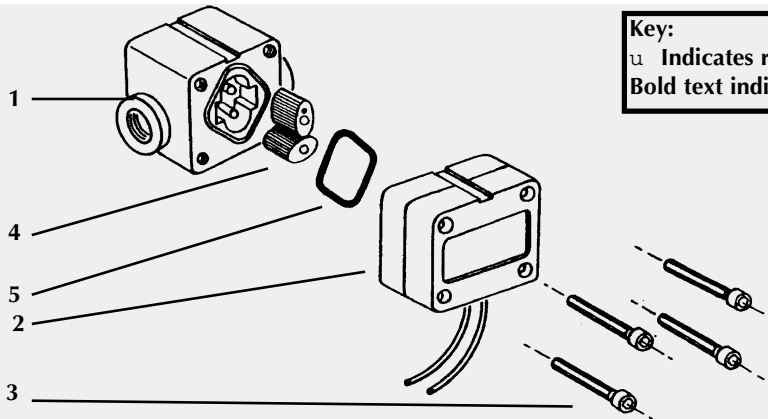
5. Replace four screws (Item 3).



CAUTION:

Care must be taken not to overtighten the screws (Item 3) or damage may occur.

Display parts listing



Key:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS600BS	Meter Body Assy. (BSP) Stainless Steel
1	1		MS600NS	Meter Body Assy. (NPT) Stainless Steel
1	1		MS605BS	Meter Body Assy. (BSP) Aluminium
1	1		MS605NS	Meter Body Assy. (NPT) Aluminium
2	1	u	MS3R-S	Meter Cap Hall Effect Sensor Aluminium
2	1	u	MS3S-S	Meter Cap Hall Effect Sensor Stainless Steel
2	1	u	MS3R-SR	Meter Cap Reed Switch Aluminium
2	1	u	MS3S-SR	Meter Cap Reed Switch Stainless Steel
3	4	u	MS98s	Screws Aluminium
3	4	u	MS113s	Screws Stainless Steel
4	2	u	MS601S	Rotor Set Stainless Steel
5	1	u	BS127Vs	O-ring (Viton)
5	1	u	BS127Ps	O-ring (Perfluoro Elastomer)

Meter specifications

Meter Type

Flow Ranges (Litres/hr or US Gall./hr)

Above 5 centipoise

Below 5 centipoise

Accuracy of Reading

Maximum Viscosity

Max. Operating Pressure

Maximum Operating Temperature

Pulse Type

Pulses per Litre/US Gallons

Meter Dimensions (Width x Height)

Meter Dimensions Port Face to Face

Weight

Wetted Components

Stainless Steel Models

0.5 to 50 / 0.132 to 13.2

2 to 50 / 0.528 to 13.2

+/- 1%

1000 Centipoise

1000kPa/150PSI/10Bar

120°C / 248°F

Hall Effect Sensor/Reed Switch

1547/5855.4

50x50mm / 1.97" x 1.97"

67mm / 2.63"

602g / 21.23oz

316 SS, Sapphire

Aluminium Models

0.5 to 50 / 0.132 to 13.2

2 to 50 / 0.528 to 13.2

+/- 1%

1000 Centipoise

500kPa/75PSI/5Bar

80°C / 176°F

Hall Effect Sensor/Reed Switch

1547/5855.4

50x50mm / 1.97"x1.97"

60mm / 2.36"

308g / 10.86oz

6061 Alum., 316 SS, Sapphire

Trouble shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through the meter	A) Foreign matter blocking rotors B) Line strainer blocked C) Damaged rotors D) Meter connections over tightened	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
Reduced flow through the meter	A) Line strainer partially blocked B) Fluid is too viscous	A) Clean strainer B) Maximum viscosity 1000 centipoise
Meter reading inaccurate	A) Fluid flowrate is too low or too high B) Air in fluid C) Excess wear caused by incorrect installation	A) See specifications for min. and max. flowrates B) Bleed air from system C) Check meter body and rotors
Meter not giving a pulse signal	A) Faulty hall effect sensor or reed switch B) Faulty magnet C) Rotors installed in wrong position	A) Replace meter cap B) Replace rotors C) Refer to correct rotor positioning - assembly instructions.

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

a.)The product has been altered or modified outside the warrantor's duly appointed representative;

b.)The product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its address below no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive displacement flowmeters **GM002 series instruction manual**

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM002 Series meters. For models with display, an additional manual is supplied. If you need further assistance, contact your local representative or distributor for advice.

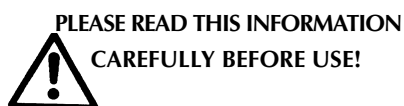
This Flowmeter has incorporated the oval rotor principal into its design. This has proven to be a reliable and highly accurate method of measuring flow. Exceptional repeatability and high accuracy over a wide range of fluid viscosities and flow rates are features of the oval rotor design. With low pressure drop and high pressure rating means oval rotor flow meters are suitable for both gravity and pump (in-line) applications.

GM002 Series Flowmeters are available in either PPS (Polyphenylene Sulfide)



Aluminium or 316 Stainless Steel. Standard rotors are made from 316 Stainless Steel. Optional PPS rotors with Hastalloy C Shafts available on PPS models only.

Operation



**PLEASE READ THIS INFORMATION
CAREFULLY BEFORE USE!**

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.

To prevent damage from dirt or foreign matter it is recommended that a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

Note:

To prevent damage to the meter slowly

fill the system with fluid (this will prevent damage caused by air purge). Failure to do this could damage the meter.

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

Installation

1. Use thread sealant on all pipe threads.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane. Flow is bi-directional.
3. GPI recommends use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or overtightening meter connections can cause meter damage.

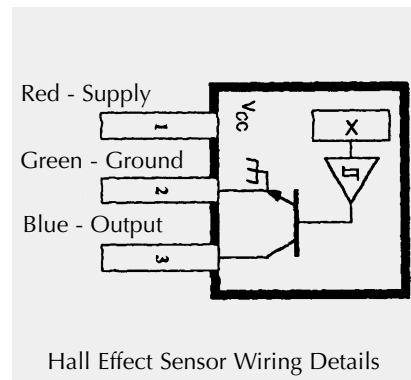
Pulser details

Hall Effect Sensor Specifications;

- 1 4.5V to 24V (4.6 ~ 9mA) operation needs only an unregulated supply.
- 1 Open collector 25mA output NPN compatible with digital logic.
- 1 Reverse battery protection.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .

Reed Relay Specifications;

- 1 Two wire SPST N/O.
- 1 Switching voltage 150VDC maximum current 0.25 AMPS.
- 1 Rating 3 watts.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .



Maintenance

Disassembly:

1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove four (4) screws (Item 3) and remove the meter body cover (Item 2).
3. Remove o-ring (Item 5) and inspect (replace o-ring if damaged).
4. Remove rotors (Item 4), clean and inspect (replace rotors if damaged).

Reassembly:

1. Place rotors (Item 4) into the meter body. The rotors should be at 90° to each other.
- Note: The rotor with magnets must be placed in the body on the same side as the groove on the body (refer to diagram).
2. Lightly rotate the rotors (Item 4) by hand (they must rotate freely).
 3. Install o-ring (Item 5).
 4. Replace the meter cap (Item 2).

Note: The groove on the cover must line up with the groove on the meter body (refer to diagram).

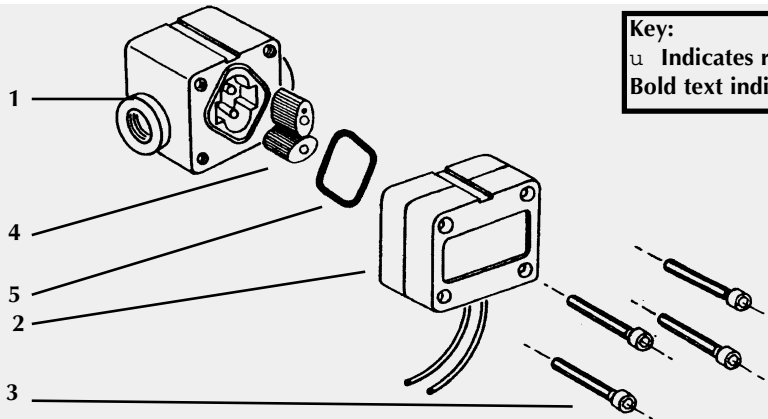
5. Replace four screws (Item 3).



CAUTION:

Care must be taken not to overtighten the screws (Item 3) or damage may occur.

Display parts listing



Key:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS1R-1S	Meter Body Assy. (BSP)
1	1		MS1R-1C	Meter Body Assy. (BSP) Hastalloy C Shafts
1	1		MS1S-1S	Meter Body Assy. (BSP) Stainless Steel
1	1		MS1R-2S	Meter Body Assy. (NPT)
1	1		MS1R-2C	Meter Body Assy. (NPT) Hastalloy C Shafts
1	1		MS1S-2S	Meter Body Assy. (NPT) Stainless Steel
1	1		MS1AL-1S	Meter Body Assy. (BSP) Aluminium
1	1		MS1AL-2S	Meter Body Assy. (NPT) Aluminium
2	1	u	MS3R-S	Meter Cap Hall Effect Sensor
2	1	u	MS3S-S	Meter Cap Hall Effect Sensor Stainless Steel
2	1	u	MS3R-SR	Meter Cap Reed Switch
2	1	u	MS3S-SR	Meter Cap Reed Switch Stainless Steel
3	4	u	MS98s	Screws
3	4	u	MS113s	Screws Stainless Steel
4	2	u	MS6s	Rotor Set
4	2	u	MS6-1s	Rotor Set Stainless Steel
5	1	u	BS127Vs	O-ring (Viton)
5	1	u	BS127Ps	O-ring (Perfluoro Elastomer)

Meter specifications

Meter Type

Flow Ranges (Litres/hr or US Gall./hr)

Above 5 centipoise

Below 5 centipoise

Accuracy of Reading

Maximum Viscosity

Max. Operating Pressure **Ryton Models**

SS Models

Maximum Operating Temp. **Ryton Models**

SS Models

Pulse Type

Pulses per Litre/US Gallons

Meter Dimensions (Width x Height)

Meter Dimensions Port Face to Face

Weight

Ryton Models

SS Models

Wetted Components

SS Models

Ryton Models

SS & Ryton Models

2 to 100 / 0.53 to 26.4

5 to 100 / 1.32 to 26.4

+/- 1%

1000 Centipoise

500kPa/75PSI/5Bar

1000/kPa/150PSI/10Bar

80°C / 176°F

120°C / 240°F

Hall Effect Sensor/Reed Switch

1000/3785

50x50mm / 1.97" x 1.97"

65mm / 2.58"

240g / 8.5oz

600g / 21.2oz

316 SS, Zirconia Bush

Ryton, 316 SS, Zirconia Bush, Hastalloy C

Aluminium Models

2 to 100 / 0.53 to 26.4

3 to 100 / 0.8 to 26.4

+/- 1%

1000 Centipoise

500kPa/75PSI/5Bar

80°C / 176°F

Hall Effect Sensor/Reed Switch

1000/3785

50x50mm / 1.97"x1.97"

60mm / 2.36"

310g / 11oz

6061 Alum., 316 SS, Ryton

Zirconia Bush

Trouble shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through the meter	A) Foreign matter blocking rotors B) Line strainer blocked C) Damaged rotors D) Meter connections over tightened	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
Reduced flow through the meter	A) Line strainer partially blocked B) Fluid is too viscous	A) Clean strainer B) Maximum viscosity 1000 centipoise
Meter reading inaccurate	A) Fluid flowrate is too low or too high B) Air in fluid C) Excess wear caused by incorrect installation	A) See specifications for min. and max. flowrates B) Bleed air from system C) Check meter body and rotors
Meter not giving a pulse signal	A) Faulty hall effect sensor or reed switch B) Faulty magnet C) Rotors installed in wrong position	A) Replace meter cap B) Replace rotors C) Refer to correct rotor positioning - assembly instructions.

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

a.)The product has been altered or modified outside the warrantor's duly appointed representative;

b.)The product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its address below no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive displacement flowmeters **GM003 series instruction manual**

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM003 meters. For models with displays, an additional manual is supplied. If you need further assistance, contact your local representative or distributor for advice.

This Flowmeter has incorporated the oval rotor principal into its design. This has 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 low pressure drop and high pressure rating means oval rotor flow meters are suitable for both gravity and pump (in-line) applications.

The GPI GM003 Series Flowmeters are available in either PPS (Polyphenylene



Sulfide Resins), Aluminium or 316 Stainless Steel. Standard rotors are made from 316 Stainless Steel. Optional PPS rotors with Hastalloy C Shafts available on PPS models only.

Operation



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

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.

To prevent damage from dirt or foreign

matter it is recommended that a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

Note:

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Failure to do this could damage the meter.

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

Installation

1. Use thread sealant on all pipe threads.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane. Flow is bi-directional.
3. GPI recommends use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or overtightening meter connections can cause meter damage.

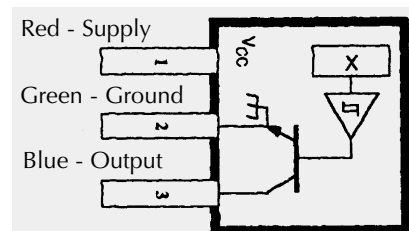
Pulsar details

Hall Effect Sensor Specifications;

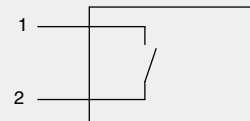
- 1 4.5V to 24V (4.6 ~ 9mA) operation needs only an unregulated supply.
- 1 Open collector 25mA output NPN (Current Sink) compatible with digital logic.
- 1 Reverse battery protection.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .

Reed Relay Specifications;

- 1 Two wire SPST N/O.
- 1 Switching voltage 150VDC maximum current 0.25 AMPS.
- 1 Rating 3 watts.
- 1 Temperature -40°C / -40°F ~ 150°C / 300°F .
- 1 Duty Cycle 20% on 80% off.



Hall Effect Sensor Wiring Details



Reed Switch Wiring Details

Maintenance

Disassembly:

1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove four (4) screws (Item 3) and remove the meter body cover (Item 2).
3. Remove o-ring (Item 5) and inspect (replace o-ring if damaged).
4. Remove rotors (Item 4), clean and inspect (replace rotors if damaged).

Reassembly:

1. Place rotors (Item 4) into the meter body. The rotors should be at 90o to each other.

Note: The rotor with magnets must be placed in the body on the same side as the groove on the body (refer to diagram).
2. Lightly rotate the rotors (Item 4) by hand (they must rotate freely).
3. Install o-ring (Item 5).
4. Replace the meter cap (Item 2).

Note: The groove on the cover must line up with the groove on the meter body (refer to diagram).

5. Replace four screws (Item 3).



CAUTION:

Care must be taken not to overtighten the screws (Item 3) or damage may occur.

Trouble shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through the meter	A) Foreign matter blocking rotors B) Line strainer blocked C) Damaged rotors D) Meter connections over tightened	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
Reduced flow through the meter	A) Line strainer partially blocked B) Fluid is too viscous	A) Clean strainer B) Maximum viscosity 1000 centipoise
Meter reading inaccurate	A) Fluid flowrate is too low or too high B) Air in fluid C) Excess wear caused by incorrect installation	A) See specifications for min. and max. flowrates B) Bleed air from system C) Check meter body and rotors
Meter not giving a pulse signal	A) Faulty hall effect sensor or reed switch B) Faulty magnet C) Rotors installed in wrong position	A) Replace meter cap B) Replace rotors C) Refer to correct rotor positioning - assembly instructions.

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MS345G
0603
0005



GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
— **GMO05 series instruction manual** —



GMO05 Pulse Meter From serial No. CXXXX

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM005 Series meters with Pulse outputs. For models with an Liquid Crystal Display an additional instruction manual is 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 has 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 low pressure drop and high pressure rating oval rotor flow meters are suitable for both gravity and pump (in line) applications.

Flow meters are available in either Aluminium or 316 Stainless Steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 Stainless Steel rotors available for both Stainless steel and Aluminium models.

GM005 Series Meters are available with either;

* Pulse output

* Standard LC Display and Pulse

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

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.

To prevent damage from dirt or foreign matter it is recommended that a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your

local representative for advice.

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

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

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

Maintenance can be carried out to the

liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required, the meter must be isolated and the line pressure reduced.

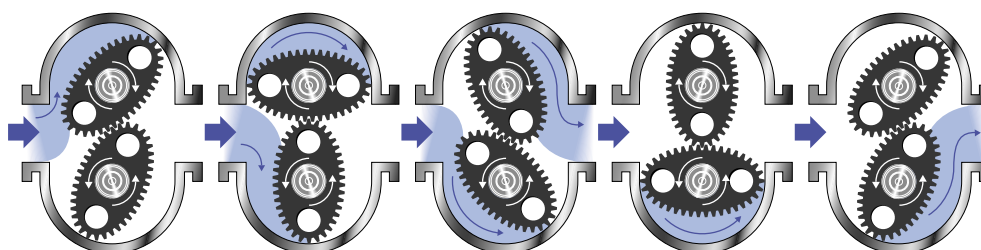
The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used. Contact your meter distributor for further information.

Operating Principle

When fluid passes through the meter the rotors turn, as shown below. The magnets which are located in the rotors will pass across the pulser circuit board

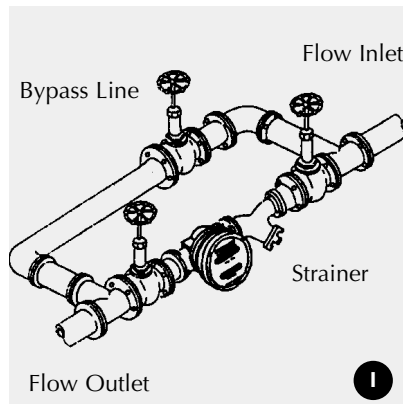
(containing either Reed switches or Hall Effect sensors). A signal is generated which is then sent by the Pulse Circuit Board (PCB) to the

relevant LC display or receiving instrument.



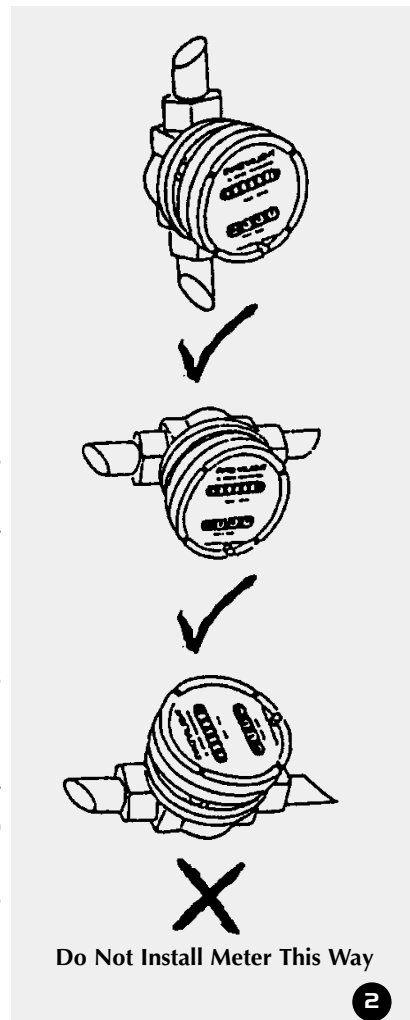
Installation

- 1] it is recommended that when setting up pipework 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 Fig.1)
- 2] Use thread sealant on all pipe threads.
- 3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump. See Meter Specifications section for further details.
- 4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.
- 5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.
- 6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.



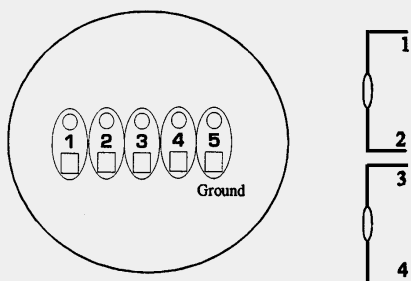
Note: Incorrect installation can cause premature wear of meter components.

- 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 decreases.



Electrical Connections

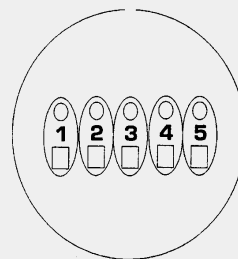
Reed Switch Connections



Contact rating 15VA
Maximum Voltage 150VDC
Note: Double rate pulse output not available

3

Hall Effect or Reed/Hall Sensor Connections



Reed/Hall combination

- 1 - Reed Switch
- 2 - Reed Switch
- 3 - HE Common -
- 4 - HE Signal
- 5 - HE Supply +

Hall/Hall Combination

- 1 - HE1 Supply +
- 2 - HE1 Signal
- 3 - HE Common -
- 4 - HE2 Signal
- 5 - HE Ground

Hall Effect Voltage 4.5 to 24 VDC
Current Draw Minimum 4.6mA
Output NPN Open Collector 25mA

4

Service Instructions

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.

1a) Pulse Caps models: Undo the conduit connector, remove pulse cap (item 9) and remove the wires from the pulse terminal board (item 5).

1b) Standard LC Display: Mark the display orientation with a marking pen, unscrew the four large screws (Item 26) 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 Standard LC Display instruction manual).

2] Remove the mounting adaptor plate and gasket (Item 14).

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 (Item 2) from the o'ring groove in the meter cap (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° to each other (refer Fig. 5) 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° to the other rotor. Re-check the operation of the rotors.

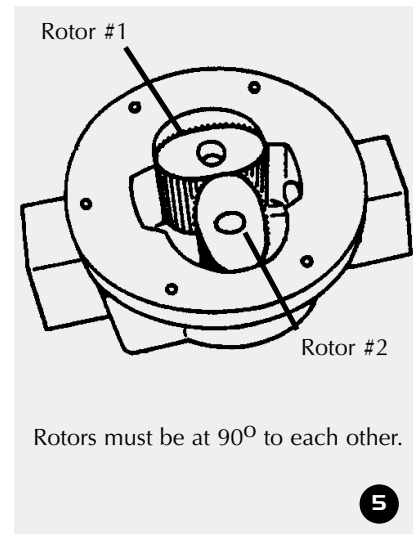
4] Replace the o'ring (Item 2) into groove in the meter cap, if the o'ring has grown or is damaged in any way replace it with a new part.

5] Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in a diagonal sequence 1, 3, 2, 4, etc.

6] 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.

7] 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.

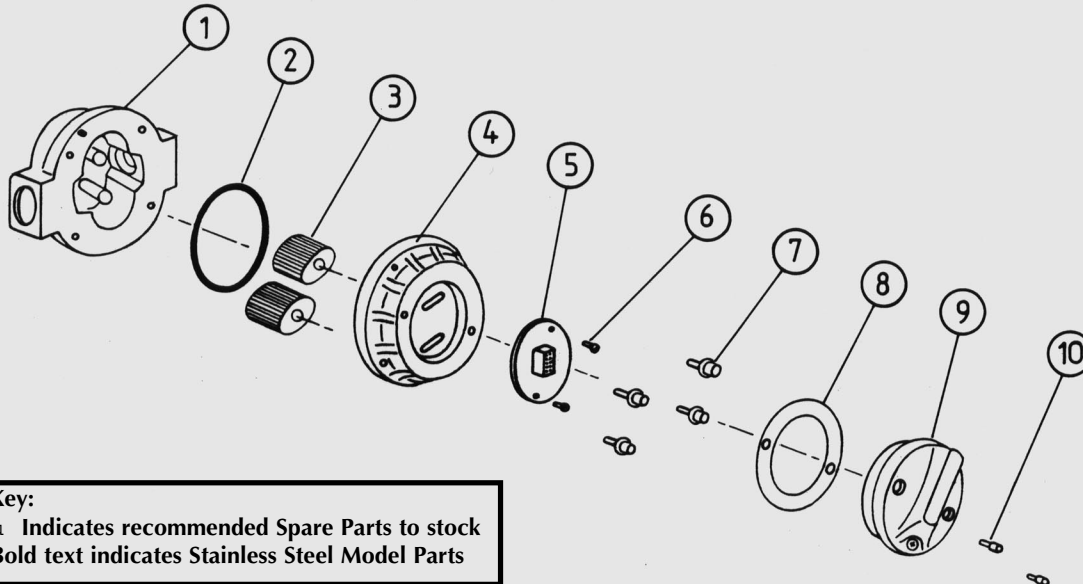
Pulse Circuit Board (PCB) Notes:



The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off's. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Reed switch or hall effect sensors are not available as individual replacement parts and are only available with the complete PCB (Item 5).

Meter Parts Listing



Key:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS298B	Meter Body 1/2" BSP (Aluminium)
1	1		MS298N	Meter Body 1/2" NPT (Aluminium)
1	1		MS337B	Meter Body 1/2" BSP (Stainless Steel)
1	1		MS337N	Meter Body 1/2" NPT (Stainless Steel)
2	1	u	BS145S	"O" Ring (NBR)
2	1	u	BS145TES	"O" Ring (Teflon)
2	1	u	BS145VS	"O" Ring (Viton)
3	2	u	MS342S	Rotors PPS (Polyphenylene Sulfide Resins)
3	2	u	MS342-1S	Rotors (Stainless Steel)
3	2	u	MS342HS	High Viscosity Rotors (PPS)
3	2	u	MS342-1HS	High Viscosity Rotors (Stainless Steel)
4	1		MS297	Meter Cap (Aluminium)
4	1		MS338	Meter Cap (Stainless Steel)
5	1	u	MS344-RS	PCB (Standard Reed Switch)
5	1	u	MS344-HES	PCB (Hall Effect Sensor)
5	1		MS344-R/HES	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	2		MS284S	PCB Board Screws
7	4	u	MS346S	Meter Cap Screws (Standard)
7	4	u	MS350S	Meter Cap Screws (Stainless Steel)
8	1	u	MS340S	Pulser Cap Gasket
9	1		MS296	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS296N	Pulser Cap (Aluminum) 1/2" NPT Thread
9	1		MS339	Pulser Cap (Stainless Steel) 20mm Conduit Thread
9	1		MS339N	Pulser Cap (Stainless Steel) 1/2" NPT Thread
10	2		MS347S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
13	1		Customer to Specify	Legend Plate (Not Shown) inc. Hammer Screws

Meter Specifications

Meter Type	Pulse
Flow Ranges Litres/minute - US Gall/min	
Above 5 Centipoise	1 to 30/ 0.26 to 8
Below 5 Centipoise	3 to 25/ 0.8 to 6.60
Accuracy of Reading	+/- 0.5%
Maximum Viscosity*	1000 Centipoise
Max. Operating Pressure	5500kPa/ 800 PSI/ 55 BAR
Max. Operating Temp.	80°C/ 176°F (S.S. Models 120°C/ 248°F)
Pulse Type	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch**
Pulses Per Litre/US Gallon	112 / 224

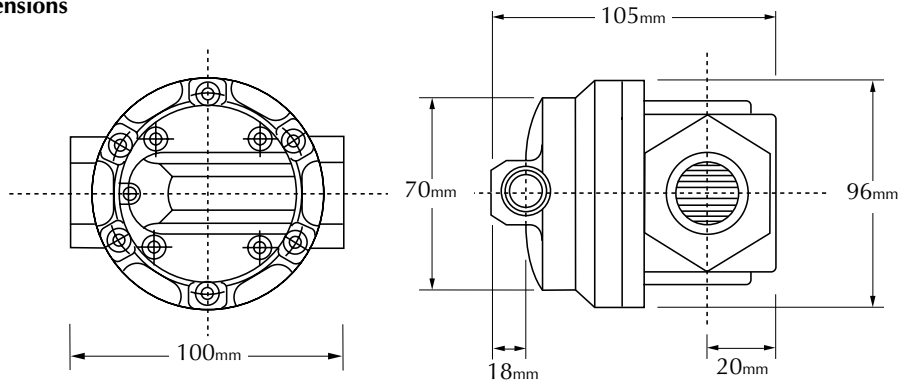
* Unless High Viscosity Rotors are fitted.

Meter Trouble Shooting

TROUBLE	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 the 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] Fluid is too viscous 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

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.)The product has been altered or modified outside the warrantor's duly appointed representative;
- b.)The product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its address below no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).

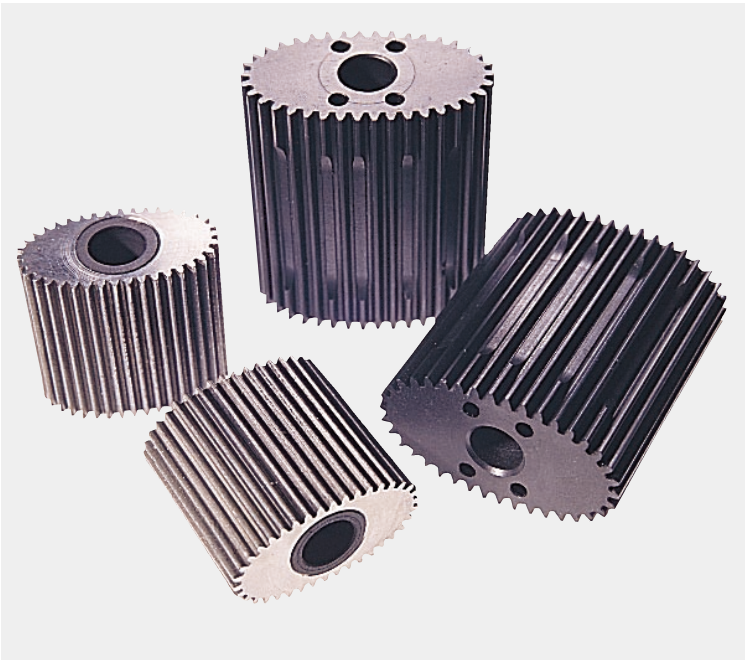


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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
— GM505 series instruction manual —



GM505 Mechanical meter • From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM505 Series meters with mechanical displays. If you need further assistance, contact your local GPI representative

or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow meter is suitable for both

gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium or 316 stainless steel. Standard rotors are made from PPS.

The GM505 Series mechanical displays have a resettable batch totaliser and non-resettable accumulative totaliser.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

2] Use thread sealant on all pipe threads.

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the

individual installation.

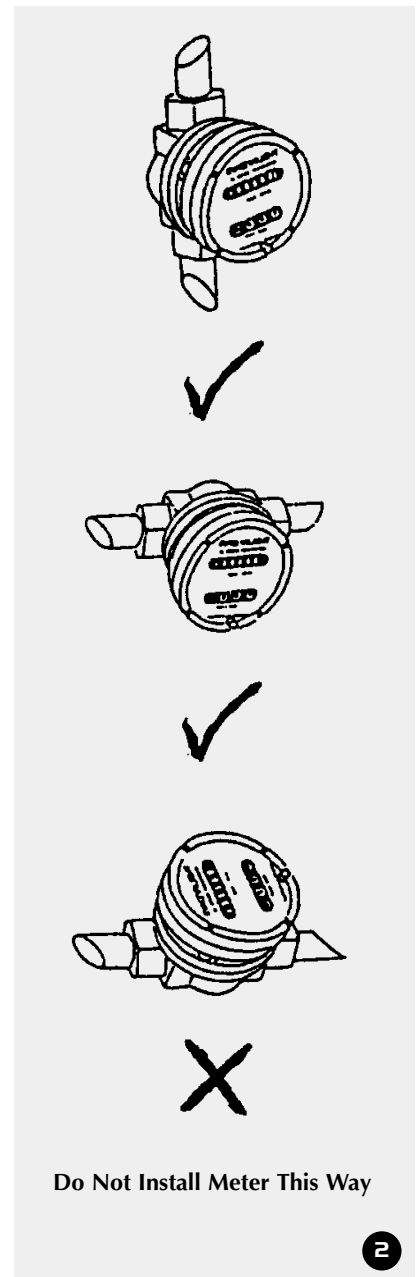
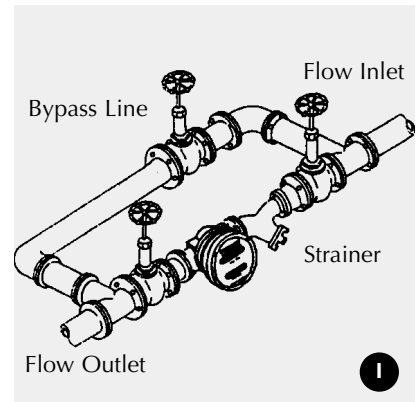
Note: Incorrect installation can cause premature wear of meter components.

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.

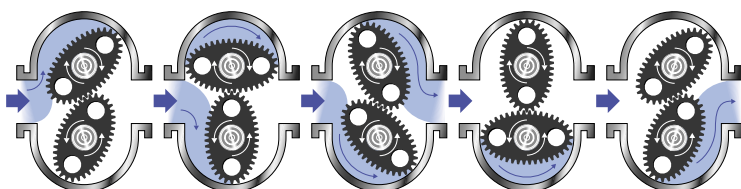
9] Test the system for leaks.

10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.



Operation

When fluid passes through the meter, rotors turn. The gear located on top of one of the rotors drives the mechanical registers gear train which provides an accurate readout.



Service Instructions

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram on page 5 for item numbers.

- 1] Remove the four screws (Item 17) located on the face of the register. Then remove the face plate cover including register assembly.
- 2] Remove the four register mounting screws (Item 15). Then remove the lower half of the register housing.
- 3] Remove the six cover plate screws (Item 12) and remove the cover plate (Item 11).
- 4] Remove the four meter cap screws (Item 5) and remove the meter cap (Item 4).
- 5] Remove rotors (Item 3).

Reassembly

- 1] Clean all components before reassembly.
- 2] Before reassembly check the condition of the rotors (Item 3). Replace if necessary.
- 3] Replace the rotor (with the gear) on the short shaft in the housing then place the 2nd rotor onto the shaft so as the rotors are at 90° to each other. (Refer Fig 3). Check rotor 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 it correctly at 90° to the other rotor. Recheck the operation of the rotors.

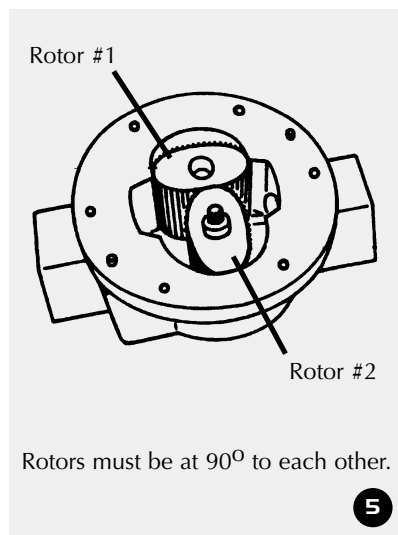
- 4] Inspect the gears (Item 6) in the meter cap (Item 4) for wear. (Replace if required, refer to spare parts on page 5 & 6).
- 5] Replace the o-ring (Item 2) into the groove in the meter cap, if the o-ring has been distorted or is damaged in any way replace it with a new part.
- 6] Replace the meter cap, making sure the meter cap and the gear on the rotor meshes correctly with the gear in the meter cap (Item 4). Insert the allen screws (Item 5) and tighten in the sequence 1, 4, 2, & 3.
- 7] Inspect the bevel gear (Item 13), o-ring (Item 10), and output gear (Item 7) for wear or damage. (Replace faulty components if necessary).
- 8] Replacement of output shaft, bush and seal.

Disassembly of output shaft

- a. Remove the bevel gear.
- b. Remove the circlip and push out the output shaft assembly, including washer.
- c. Remove the seal.
- d. Carefully press out the output shaft bush (If required).

Assembly of output shaft

- a. Carefully press the new output shaft bush into place (Use Loctite Primer 7471, as per instructions, followed by sealant Loctite 262).



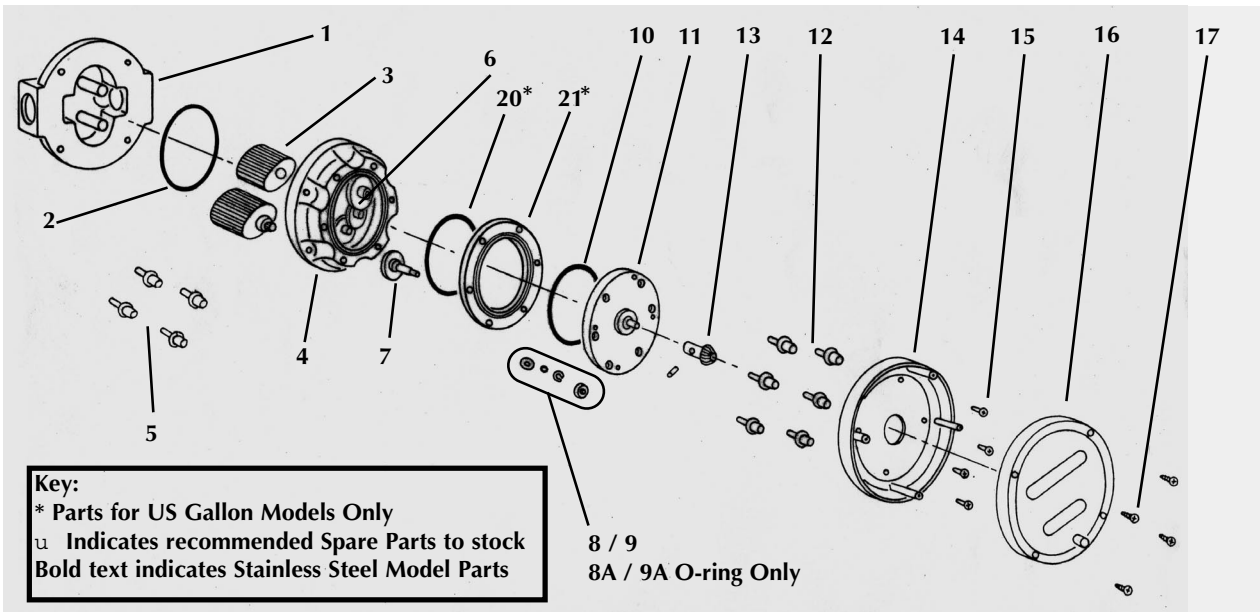
- b. Insert a new seal into the groove of the output shaft bush.
- c. Replace the output gear and washer and replace the circlip to lock the output gear shaft into place.
- d. Replace the bevel gear (Item 13) and tighten the grub screw onto flat face of shaft.

- 9] Place the o-ring (Item 10) into the groove in the meter cap (Replace the o-ring seal if required).
- 10] Place the cover plate onto the meter. Replace the cover plate screws and tighten the six cap head screws (Item 12) firmly.
- 11] Place the lower cover plate of the register into position. Replace the four screws (Item 15) and tighten.
- 12] Position the register correctly on top of the lower register cover. Replace the four screws (Item 17) and tighten.
- 13] Test the meter by turning the rotors with a finger or by applying low air pressure (No more than a good breath) to one end of the meter, before returning meter to the line.

Meter Trouble Shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> 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 the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for maximum viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> 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
Fluid flows but no reading on meter	<ul style="list-style-type: none"> a] Bevel gear is loose on shaft b] Rotor drive gear is damaged c] Transmission gears damaged d] Register gears damaged 	<ul style="list-style-type: none"> a] Tighten grub screws b] Replace rotor c] Replace gears d] Replace register assembly
Fluid leaks into register	<ul style="list-style-type: none"> a] Seal worn or damaged on the cover plate 	<ul style="list-style-type: none"> a] Replace seal (Check seal compatibility with fluid)

Meter Parts Listing



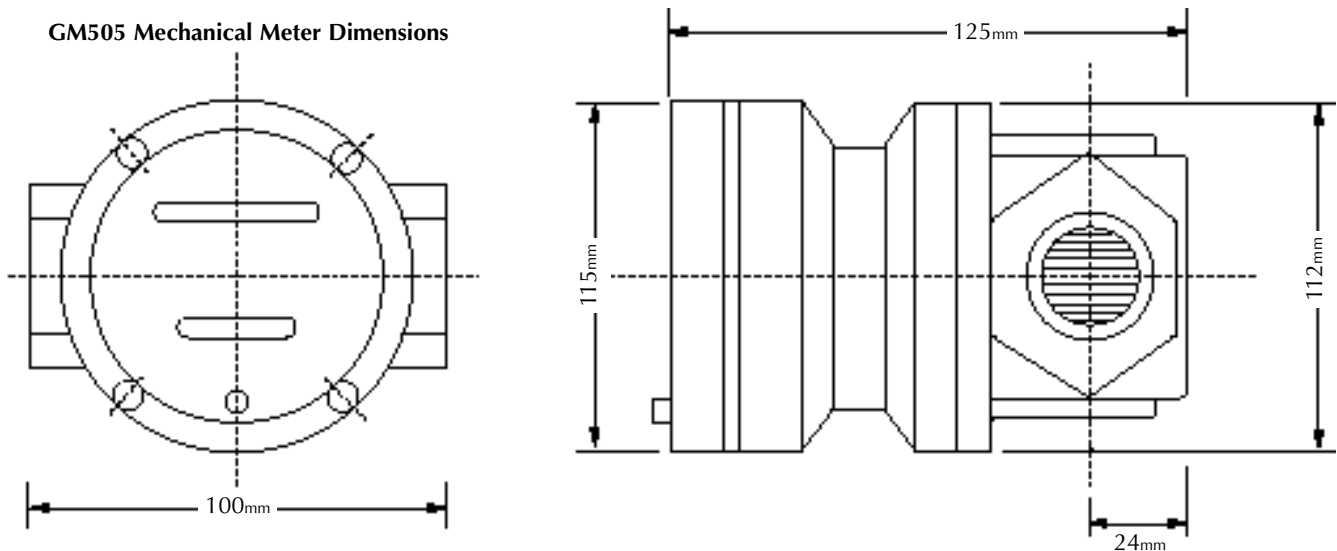
Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS298B	Meter Body 1/2" BSP (Aluminium)
1	1		MS298N	Meter Body 1/2" NPT (Aluminium)
1	1		MS337B	Meter Body 1/2" BSP (Stainless Steel)
1	1		MS337N	Meter Body 1/2" NPT (Stainless Steel)
2	1	u	BS145TES	"O" Ring (Teflon)
2	1	u	BS145VS	"O" Ring (Viton)
3	2	u	MS342MS	Rotors PPS (Polyphenylene Sulfide Resins)
3	2	u	MS342MHS	High Viscosity Rotors (PPS)
4	1		MS544S	Meter Cap Liters (Aluminium)
4	1		MS547S	Meter Cap US Gallons (Aluminium)
4	1		MS545S	Meter Cap Liters (Stainless Steel)
4	1		MS546S	Meter Cap US Gallons (Stainless Steel)
5	4	u	MS346S	Meter Cap Screws (Standard)
5	4	u	MS350S	Meter Cap Screws (Stainless Steel)
6	1	u	MS539S	Complete Gear Set - Liters
6	1	u	MS541S	Complete Gear Set - US Gallons
7	1	u	MS77S	Output Gear & Shaft Assembly
8	1	u	MS78S	Coverplate Seal/Bush Set Standard
8A	1	u	OR42CS	Solvent o-ring (Perfluoro Elastomer)
9	1	u	MS78C	Coverplate Seal/Bush Set Solvent
9A	1	u	V7-007S	O-ring (Viton)
10	1	u	BS145TES	O-ring (Teflon)
10	1	u	BS145VS	O-ring (Viton)

Meter Parts Listing

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
11	1		MS99S	Coverplate (Aluminium) includes bush
11	1		MS99-1S	Coverplate (Stainless Steel) includes bush
12	6	u	MS312S	Coverplate Screws - Litre Model
12	6	u	MS313S	Coverplate Screws (Stainless Steel) Litre Model
12	6	u	MS419S	Coverplate Screws - US Gallon Model
12	6	u	MS420S	Coverplate Screws (Stainless Steel) US Gallon Model
13	1	u	MS83S	Bevel Gear Set
14	1		MS140S	Bottom Register Coverplate
15	4	u	MS111S	Mounting Screws
16	1	u	MS141M4GS	Register Assembly with Coverplate - Liters
16	1	u	MS141UGS	Register Assembly with Coverplate - US Gallons
17	4	u	MS129S	Register Body Screws
20	1	u	BS145TES	O-Ring (Teflon)
20	1	u	BS145VS	O-Ring (Viton)
21	1	u	MS423S	Spacer Ring (Aluminium) US Gallon Model Only
21	1	u	MS423-1S	Spacer Ring (Stainless Steel) US Gallon Model Only

Meter Dimensions

GM505 Mechanical Meter Dimensions



Meter Specifications

Flow Ranges

(Litres per minute/US Gallons per minute)

Above 5 Centipoise 1 to 30/ 0.26 to 8

Below 5 Centipoise 3 to 25/ 0.8 to 6.6

Accuracy of Reading +/- 1%

Maximum Viscosity 1000 Centipoise

Maximum Operating Pressure 3450 kPa / 500 PSI / 34.5 BAR

Operating Temp. Range -10°C / 14°F to 80°C / 176°F

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.)The product has been altered or modified outside the warrantor's duly appointed representative;
- b.)The product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its address below no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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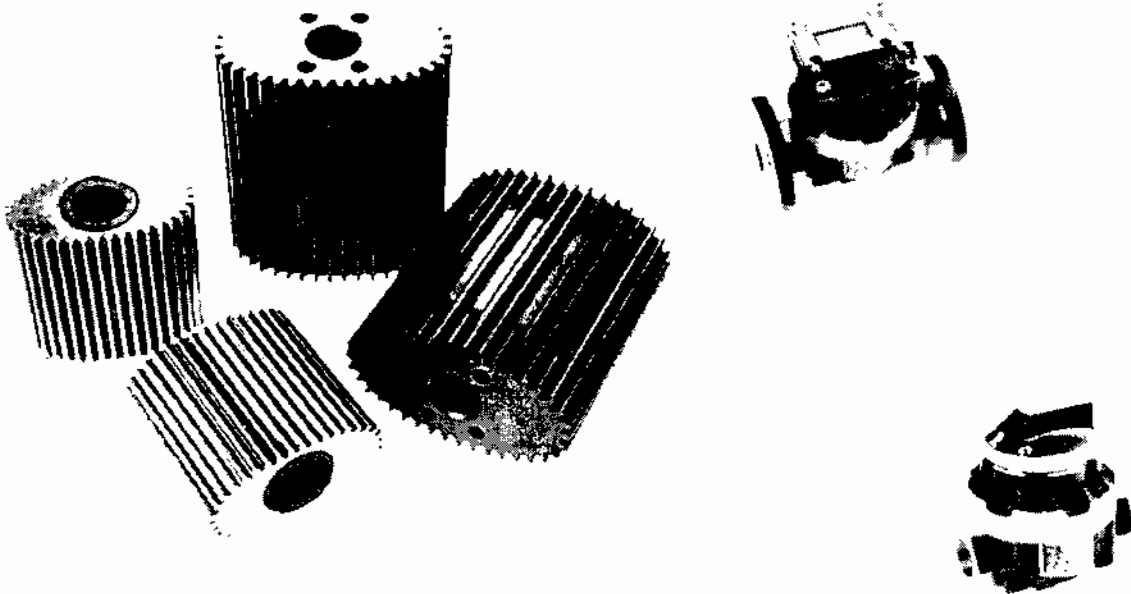
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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters

GM006 series instruction manual



GM006 Pulse • Standard Display • From serial No. CXXXX

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for meters with Pulse outputs and Liquid Crystal

Displays Each model with a Liquid Crystal Display has 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 has 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 low pressure drop and high pressure rating oval rotor flow meters are suitable for both gravity and pump (in line) applications.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

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.

To prevent damage from dirt or foreign matter it is recommended that a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your

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

Note: To prevent damage caused by air purge slowly fill the meter with fluid. To reduce pressure build up turn off the pump at the end of each day.

Maintenance can be carried out to the

liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required, the meter must be isolated and the line pressure reduced.

The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used. Contact your meter distributor for further information.

Operating Principle

When fluid passes through the meter the rotors turn, as shown below. The magnets which are located in the rotors will pass across the pulser circuit board

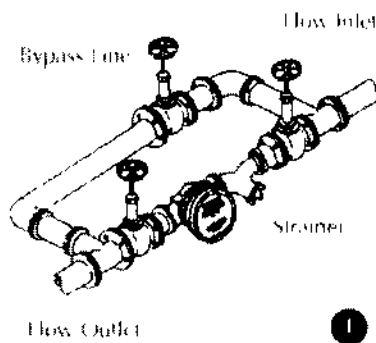
(containing either Reed switches or Hall Effect sensors). A signal is generated which is then sent by the Pulse Circuit Board (PCB) to the

relevant LC display or receiving instrument.



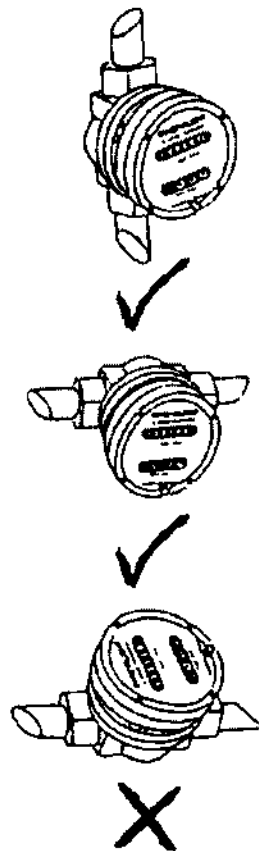
Installation

- 1] it is recommended that when setting up pipework 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 Fig 1)
- 2] Use thread sealant on all pipe threads
- 3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump. See Meter Specifications section for further details.
- 4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.
- 5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.
- 6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation) The register assembly may be orientated



Note: Incorrect installation can cause premature wear of meter components.

- 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 decreases.

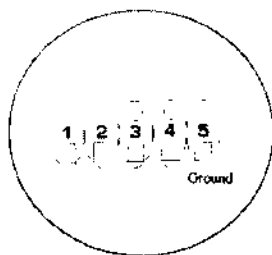


Do Not Install Meter This Way

Electrical Connections

to suit the individual installation.

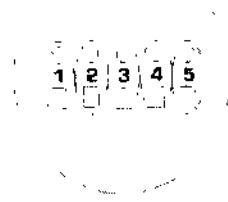
Reed Switch Connections



Contact rating 15VA
Maximum Voltage 150VDC
Note: Double rate pulse output not available



Hall Effect or Reed Hall Sensor Connections



Hall Effect Voltage 4.5 to 24 VDC
Current Draw Minimum 10mA
Output NPN Open Collector 25mA
Note: Std. & Deluxe LCD must be driven by a Reed switch

Reed Hall Combination

- 1 - Reed switch
- 2 - Reed switch
- 3 - HI Common
- 4 - HI Signal
- 5 - HI Supply -

Hall Hall Combination

- 1 - HI Supply +
- 2 - HI Signal
- 3 - HI Common
- 4 - HI 2 Signal
- 5 - Ground

Service Instructions

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.

1a) Pulse Caps models: Undo the conduit connector, remove pulse cap (item 9) and remove the wires from the pulse terminal board (item 5).

1b) 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.

2] Remove the mounting adaptor plate and gasket (Item 14).

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 (Item 2) from the o'ring groove in the meter cap (Item 4).

5] Remove rotors (Item 3) Note the position of the timing marks.

Reassembly

1] Before reassembling check the condition of the rotors (replace if necessary).

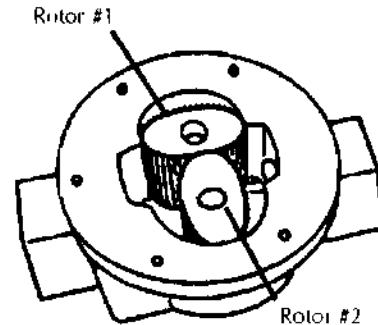
2] Check that the plug side of the rotors is facing you when inserting the rotors, the plug side of the rotor is the magnet side. There is no difference between rotor one or rotor two.

3] Replace the rotors (Item 3) onto the shafts at 90 to each other (refer Fig 5) Check the operation of the rotors by turning either by hand. If the rotors are not in mesh correctly or do not move freely, remove one of the rotors and replace correctly at 90 to the other rotor. Re-check the operation of the rotors.

4] Replace the o'ring (Item 2) in to groove in the meter cap, if the o'ring has grown or is damaged in any way replace it with a new part.

5] Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in a diagonal sequence 1, 3, 2, 4, etc.

6] The replacement of cables and connectors are a reversal of the disassembly procedure, replace conduit fitting if required. When replacing the Standard LC Display,



Rotors must be at 90° to each other



confirm the orientation marks made on disassembly are aligned then screw the register into place.

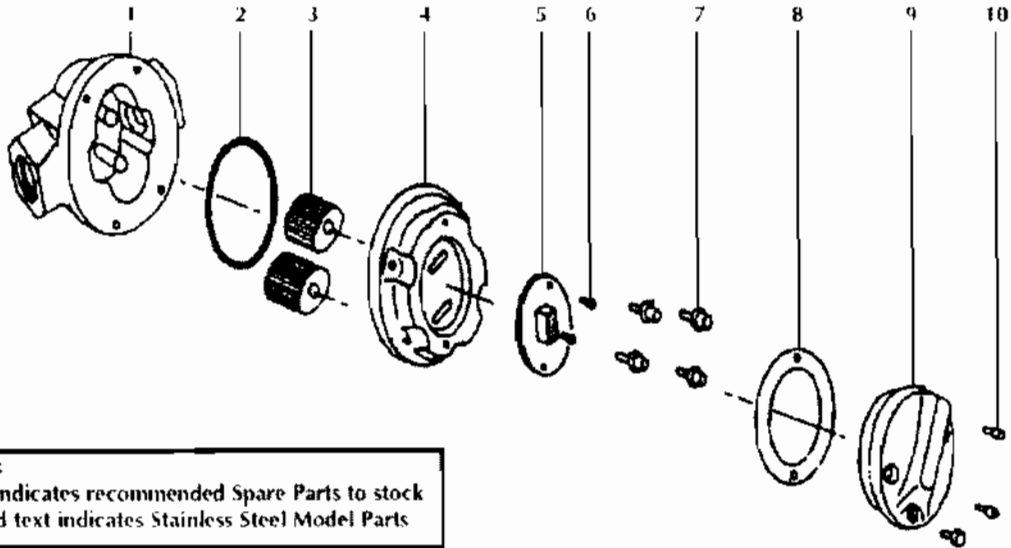
7] Test the meter by turning the rotors with a finger or by applying very low air pressure (no more than a good breath) to one end of the meter, before returning the meter to the line

Pulse Circuit Board (PCB) Notes:

The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off's. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Reed switch or hall effect sensors are not available as individual replacement parts and are only available with the complete PCB (Item 5).

Meter Parts Listing



Key:
 ✓ Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off. Parts	Rec.	Part or Set (Order from this column only)	Part Description
1	1		MS779S	Meter Body 3/4" BSP (Aluminium)
1	1		MS779NS	Meter Body 3/4" NPT (Aluminium)
2	1	✓	BS235TE	"O" Ring (Teflon)
2	1	✓	BS235V	"O" Ring (Viton)
3	2	✓	MS370S	Rotors PPS (Polyphenylene Sulfide Resins)
4	1		MS150	Meter Cap (Aluminium)
5	1	✓	MS28-R	PCB (Standard Reed Switch)
5	1	✓	MS28-HE	PCB (Hall Effect Sensor)
5	1		MS28-R/HE	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	4		MS111S	PCB Board Screws
7	6	✓	MS114S	Meter Cap Screws (Standard)
8	1	✓	MS300	Pulser Cap Gasket
9	1		MS160	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS160N	Pulser Cap (Aluminium) 1/2" NPT Thread
10	4		MS115S	Pulser Cap Screw (Stainless Steel)

Meter Specifications

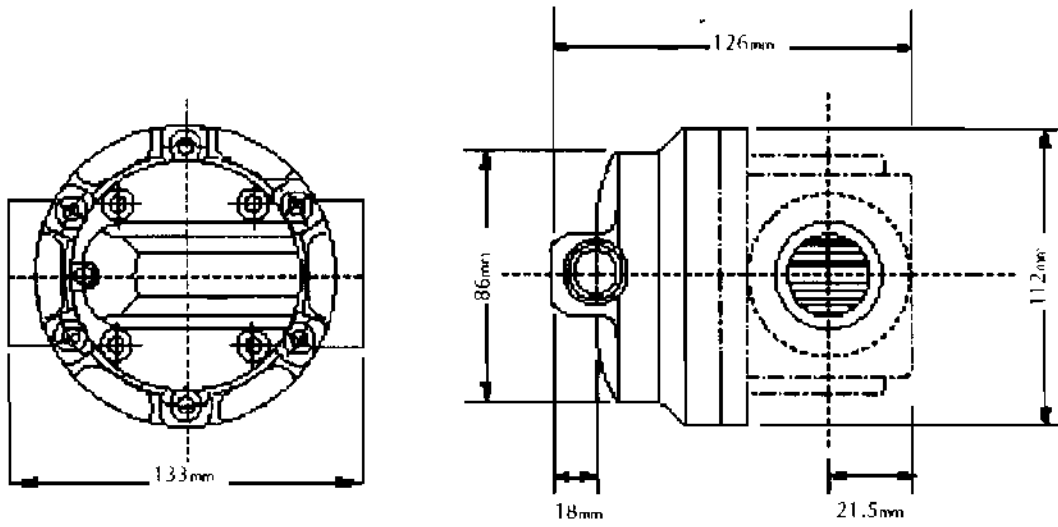
Meter Type	Pulse
Flow Ranges (Litres/min, US Gallons/min)	
Above 5 Centipoise	3 to 60/ 0.8 to 15.85
Below 5 Centipoise	8 to 53/ 2.1 to 14
Accuracy of Reading	+/- 0.5%
Maximum Viscosity*	1000 Centipoise
Maximum Operating Pressure	5500 kPa/ 800 PSI/ 55 BAR
Min. Operating Temperature	-10°C/ 14°F
Max. Operating Temperature	80°C/ 176°F
Pulse Type	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch
Pulses Per Litre/US Gallon	52 / 197

Meter Trouble Shooting

<u>TROUBLE</u>	<u>CAUSE</u>	<u>REMEDY</u>
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> a] Dismantle meter, clean rotors (Strainer must be fitted in line) b] Clean strainer c] Replace rotors (Fit strainer) d] Re-adjust connections e] See specifications for maximum viscosity
Reduced flow through the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for maximum viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> a] Faulty hall effect sensor b] Faulty reed switch c] Magnets failed 	<ul style="list-style-type: none"> a] Replace PCB Board b] Replace PCB Board c] Replace magnets

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters

— **GM007 series instruction manual** —



GM007 Pulse Meter From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM007 Series meters with pulse outputs. For models with displays an additional instruction manual is supplied. [If you need further assistance, contact your local GPI representative or contact

GPI by telephone or fax.]

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow

meter is suitable for both gravity and pump (in line) applications.

The GPI GM Series flow meters are available in aluminum, 316 stainless steel, or PPS. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for either stainless steel or aluminium models.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI distributor for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer

clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the **end of each day**.

Maintenance can be carried out to the liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required,

the meter must be isolated and the line pressure reduced.

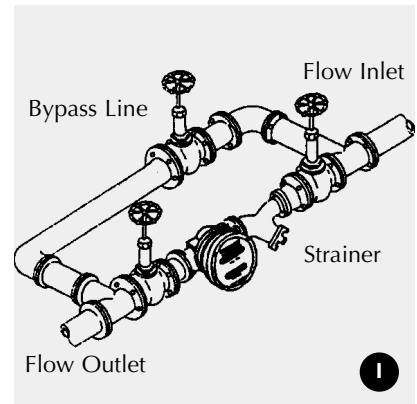
The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used or alternatively use the hall effect sensor option.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.



2] Use thread sealant on all pipe threads.

7] Do not over tighten meter connections.

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

8] **It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.**

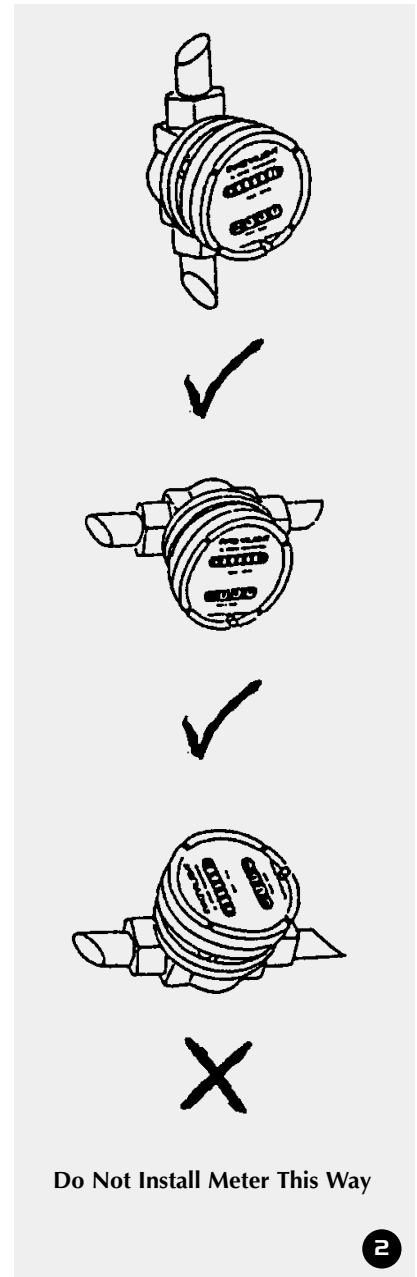
4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.

9] Test the system for leaks.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

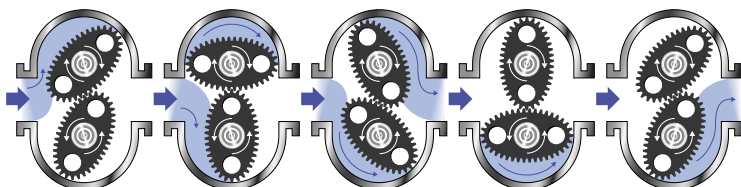
6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct



Operation

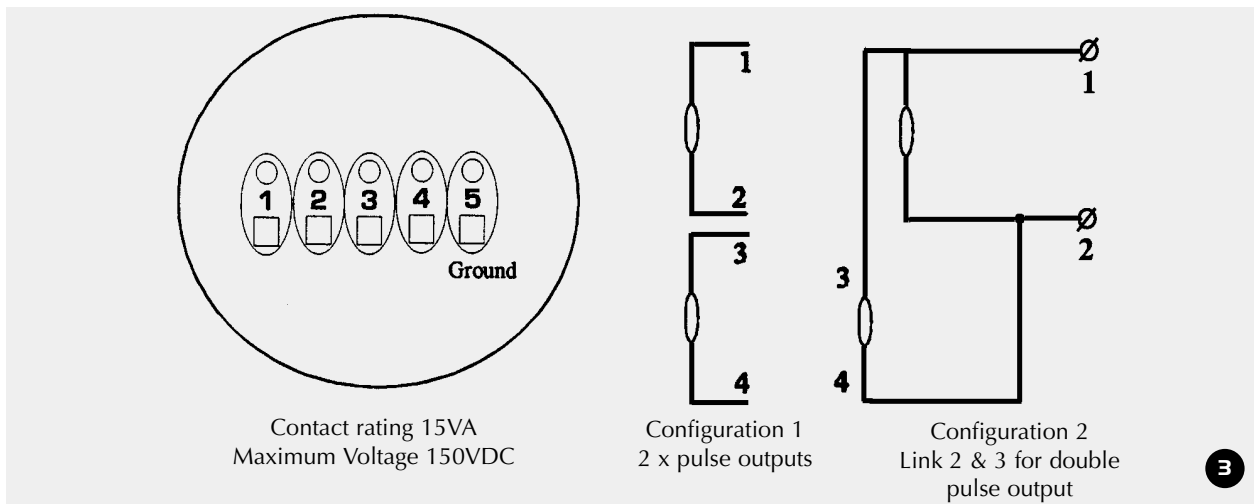
When fluid passes through the meter, the rotors turn. The magnets which are located in the rotors will pass across the pulser circuit board (containing either Reed switches or Hall Effect

sensors). A signal is received which is then sent by the Pulse Circuit Board (PCB) to the relevant LC display or receiving instrument.

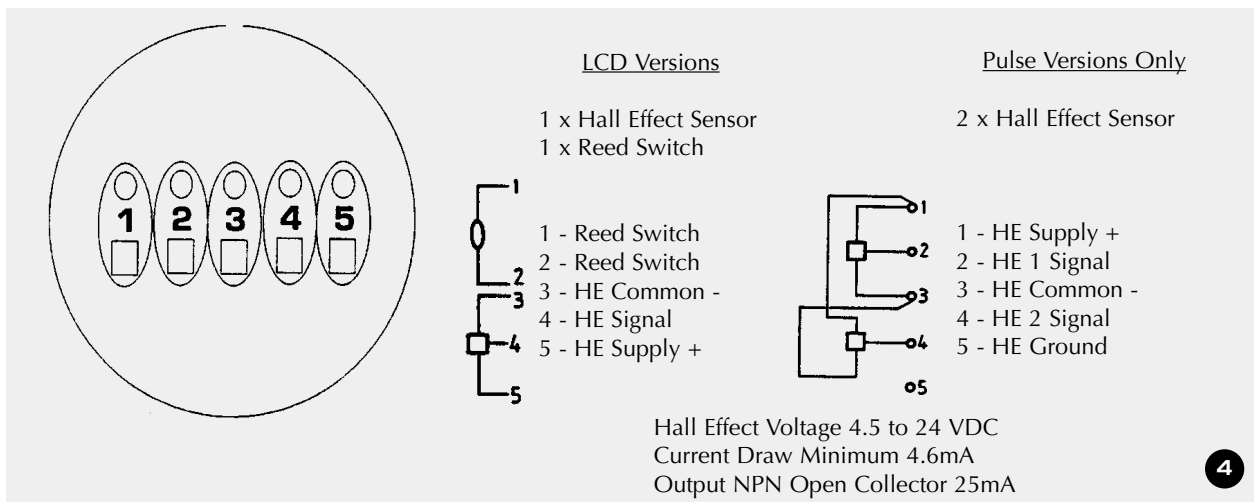


Electrical Connections

Reed Switch Connections for PCB Terminals - refer Fig.3



Hall Effect Sensor Connections - refer Fig.4



Service Instructions

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 the flow. Refer to the exploded parts diagram on pages 5.

1a] Units with Pulse Caps; Undo the conduit connector, remove pulse cap

(item 9) and remove the wires from the pulse terminal board (item 5).

1b] 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.

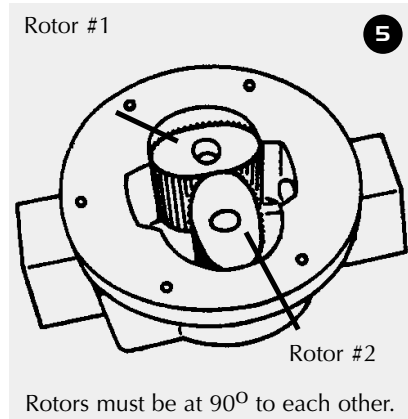
- 2] Remove the mounting adaptor plate and gasket (Item 8).
- 3] Loosen the four cap screws (Item 7) and nuts that hold down the meter cap (Item 4), remove the screws and nuts and lift off the cap.
- 4] Remove the o'ring (Item 2) from the o'ring groove in the meter cap (Item 4).
- 5] Remove rotors (Item 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° to each other (refer Fig. 5) 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° to the other rotor. Re-check the operation of the rotors.

- 4] 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.
- 5] Replace the meter cap. Insert the cap head screws (Item 7) and fix nuts and tighten in the sequence 1, 3, 2, 4
- 6] 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.
- 7] Test the meter by turning the rotors with a finger or by applying very low



air pressure (a good breath) to one end of the meter, before returning the meter to the line.

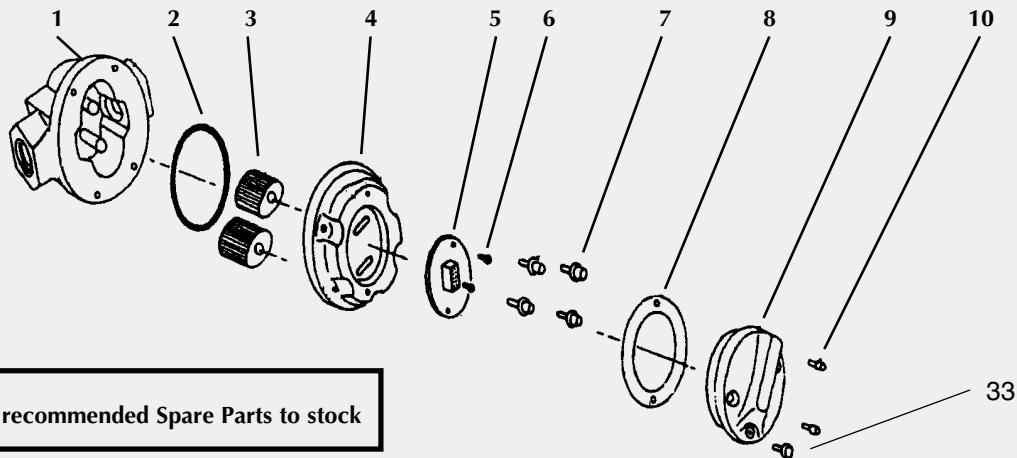
Pulse Circuit Board (PCB) Notes:

The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off's. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile. Individual reed switches or hall effect sensors are not available as replacement parts and are only available with the PCB (Item 5).

Meter Trouble Shooting

TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ol style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ol style="list-style-type: none"> 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 rated viscosity
Reduced flow through the meter	<ol style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ol style="list-style-type: none"> a] Clean strainer b] See specifications for rated viscosity
Meter reading inaccurate	<ol style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ol style="list-style-type: none"> a] See "specifications" for flow range b] Bleed air from system c] Check meter body and rotors. Replace as required.
Meter not giving a pulse signal	<ol style="list-style-type: none"> a] Faulty hall effect sensor b] Faulty reed switch c] Magnets failed 	<ol style="list-style-type: none"> a] Replace PCB Board b] Replace PCB Board c] Replace rotors

Meter Parts Listing



Key:
 u Indicates recommended Spare Parts to stock

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS351B	Meter Body 1" BSP (PPS) & St St Shafts
1	1		MS351N	Meter Body 1" NPT (PPS) & St St Shafts
1	1		MS352B	Meter Body 1" BSP (PPS) & Hastalloy Shafts
1	1		MS352N	Meter Body 1" NPT (PPS) & Hastalloy Shafts
2	1	u	BS235TE	"O" Ring (Teflon) Encapsulated
2	1	u	BS235V	"O" Ring (Viton)
3	2	u	MS370S	Rotors PPS (Polyphenylene Sulfide Resins)
3	2		MS370CPS	Rotors PPS **
4	1		MS405R	Meter Cap (PPS)
5	1	u	MS368-R	PCB (Standard Reed Switch)
5	1	u	MS344-HE	PCB (Hall Effect Sensor)
5	1		MS368-R/HE	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	2		MS284S	PCB Board Screws
7	4	u	MS350S	Meter Cap Screws (Stainless Steel)
8	1	u	MS340	Pulser Cap Gasket
9	1		MS406R	Pulser Cap (PPS) 16mm Conduit Thread
9	1		MS406R-N	Pulser Cap (PPS) 1/2" NPT Thread
10	2		MS347S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
12	1		Specify plate details	Legend Plate (Not Shown) inc. Hammer Screws
33	1		MS111	Earthing Screw
34	4		MS497S	Nut - Stainless Steel - Not Shown, recessed in body

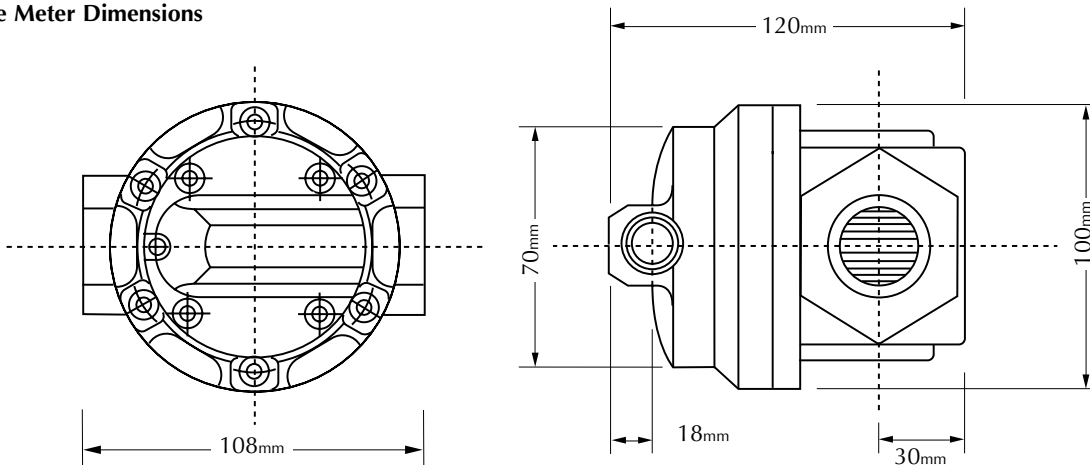
****For PPS Meters fitted with Hastalloy shafts only**

Meter Specifications

Flow Ranges (Litres/min. - US Gall./min.)	3 to 80 / 0.8 to 21
Above 5 Centipoise	8 to 70 / 2 to 18.5
Below 5 Centipoise	+/- 0.5%
Accuracy of Reading	1000 Centipoise
Maximum Viscosity	1000 kPa/ 150 PSI/ 10 BAR
Maximum Operating Pressure	80°C/ 176°F
Maximum Operating Temperature	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch
Pulse Type	52 or 104/197 or 394
Pulses Per Litre/US Gallon	

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3205, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.)The product has been altered or modified outside the warrantor's duly appointed representative;
- b.)The product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its address below no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



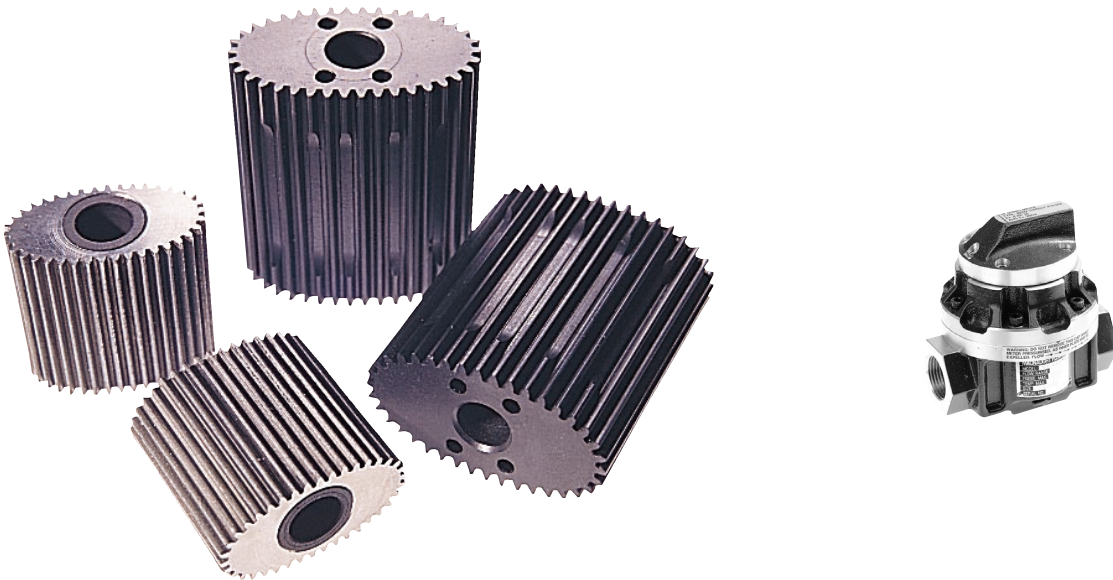
5252 East 36th Street North
Wichita, KS USA 67220-3205
TEL: 316-686-7361
FAX: 316-686-6746

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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
—— **GMOIO series instruction manual** ——



GMOIO Pulse Meter From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM010 Series meters with pulse outputs. For models with display, an additional instruction manual is supplied. If you

need further assistance, contact your local GPI representative or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM

Series flow meter is suitable for both gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM010 Series is available with either;

* Standard Pulse

* Standard LC Display and Pulse

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it should be regularly inspected and

cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

Maintenance can be carried out to the liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required, the meter must be isolated and the line pressure reduced.

The reed switch pulse unit can cause

inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used or alternatively use the hall effect sensor option.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

(Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.

2] Use thread sealant on all pipe threads. For flanged versions 1" ANSI 150lb or DIN16, appropriate companion flanges and gaskets are 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.**

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

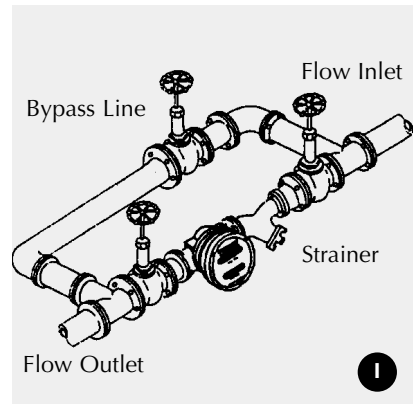
9] Test the system for leaks.

4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.

10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

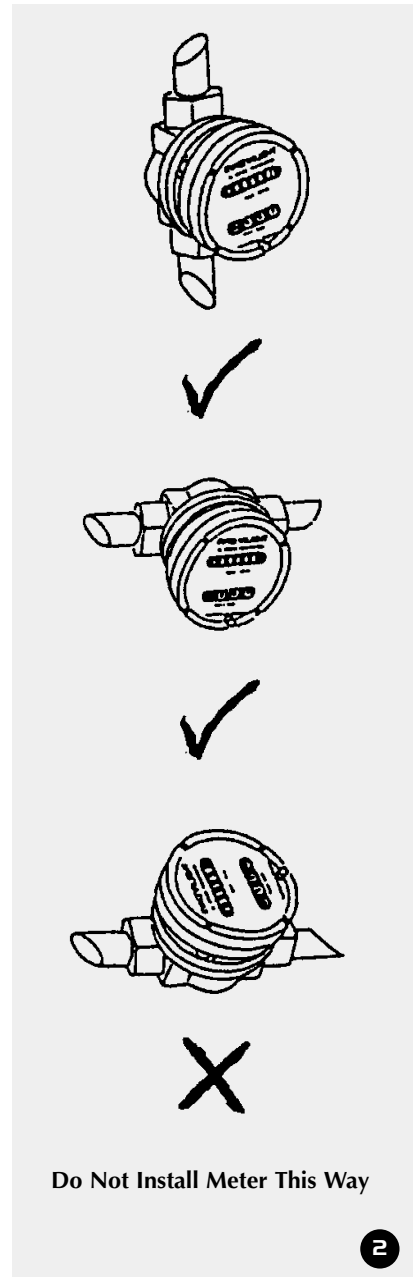
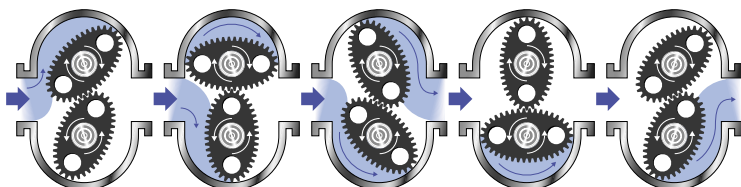
6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane.



Operation

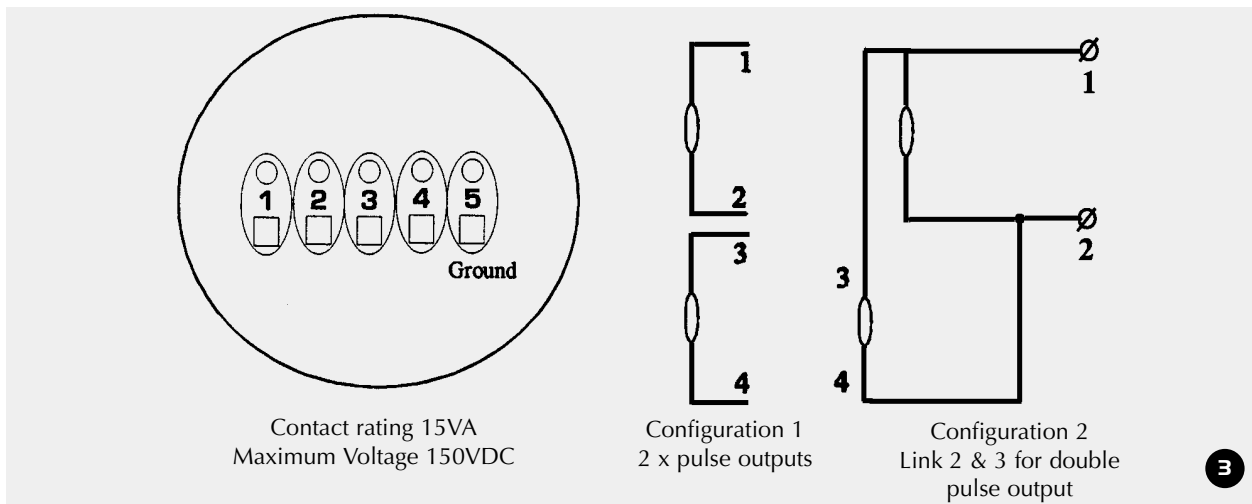
When fluid passes through the meter, rotors turn. The magnets which are located in the rotors will pass across the pulser circuit board (containing either Reed switches or Hall Effect

sensors). A signal is received which is then sent by the Pulse Circuit Board (PCB) to the relevant LC display or receiving instrument.



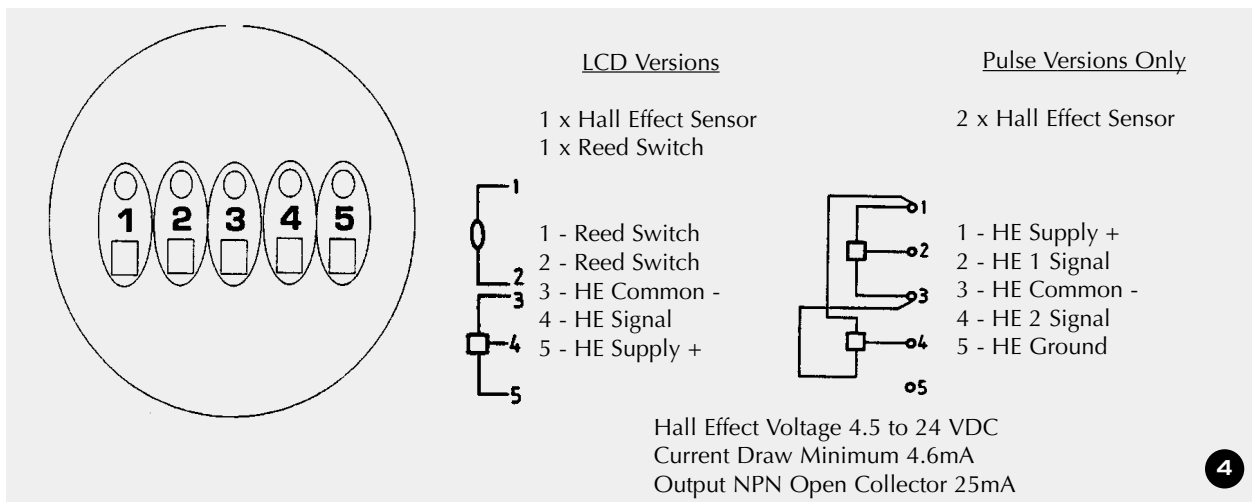
Electrical Connections

Reed Switch Connections for PCB Terminals - refer Fig.3



3

Hall Effect Sensor Connections - refer Fig.4



4

Service Instructions

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 page 5.

1a) Units with Pulse Caps; Undo the conduit connector, remove pulse cap (item 9) and remove the wires from the pulse terminal board (item 5).

1b) 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..

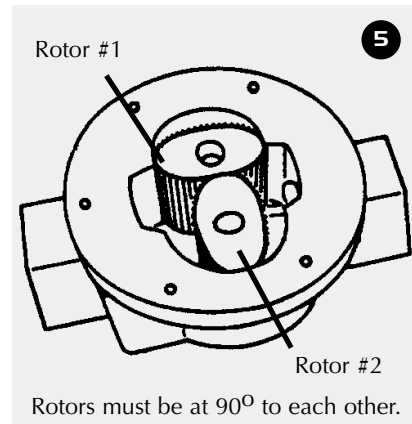
- 2] Remove the mounting adaptor plate and gasket.
- 3] Loosen the six cap head screws (Item 7) that hold down the meter cap (Item 4), remove the screws, washers and lift off the cap.
- 4] Remove the o’ring (Item 2) from the o’ring groove in the meter cap (Item 4).
- 5] Remove rotors (Item 3).

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° to each other (refer Fig. 5) 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° to the other rotor. Re-check the operation of the rotors.

- 4] 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.
- 5] Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in the sequence 1, 4, 2, 5, 3, 6.
- 6] 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.
- 7] 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.

Pulse Circuit Board (PCB) Notes:

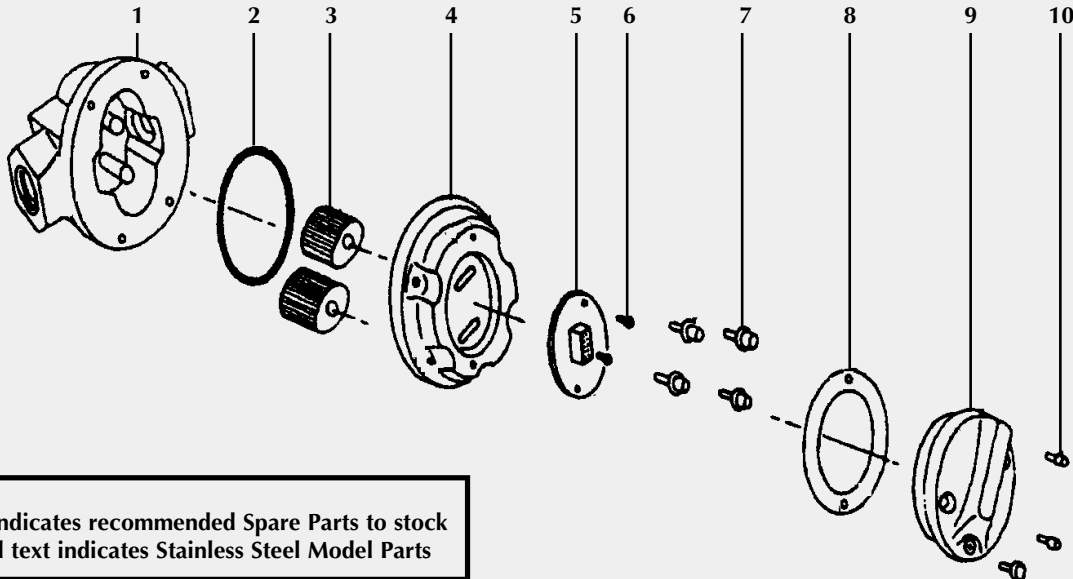
The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off’s. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Individual reed switches or hall effect sensors are not available as individual replacement parts and are only available with the PCB (Item 5).

Meter Trouble Shooting

TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> a] Dismantle meter, clean rotors (Strainer must be fitted in line) b] Clean strainer c] Replace rotors d] Re-adjust connections e] See specifications for rated viscosity
Reduced flow through the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for rated viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> a] See “specifications” for rated flow. b] Bleed air from system c] Check meter body and rotors. Replace as required.
Meter not giving a pulse signal	<ul style="list-style-type: none"> a] Faulty hall effect sensor b] Faulty reed switch c] Magnets failed 	<ul style="list-style-type: none"> a] Replace PCB Board b] Replace PCB Board c] Replace magnets

Meter Parts Listing



Key:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS187B	Meter Body 1" BSP (Aluminium)
1	1		MS187N	Meter Body 1" NPT (Aluminium)
1	1		MS185B	Meter Body 1" BSP (Stainless Steel)
1	1		MS185N	Meter Body 1" NPT (Stainless Steel)
1	1		MS187F	Meter Body 1" ANSI 150lb Flange (Aluminium)
1	1		MS187D	Meter Body 1" DIN16 Flange (Aluminium)
1	1		MS185F	Meter Body 1" ANSI 150lb Flange (S/Steel)
1	1		MS185D	Meter Body 1" DIN16 Flange (S/Steel)
1	1		MS185T	Meter Body 1" Tri-Clover Flange (S/Steel)
2	1	u	BS235TE	"O" Ring (Teflon)
2	1	u	BS235V	"O" Ring (Viton)
3	2	u	MS50S	Rotors PPS (Polyphenylene Sulfide Resins)
3	2	u	MS50-1S	Rotors (Stainless Steel)
3	2	u	MS50HS	High Viscosity Rotors (PPS)
3	2	u	MS50-1HS	High Viscosity Rotors (Stainless Steel)
4	1		MS150	Meter Cap (Aluminium)
4	1		MS250	Meter Cap (Stainless Steel)
5	1	u	MS28-R	PCB (Standard Reed Switch)
5	1	u	MS28-HE	PCB (Hall Effect Sensor)
5	1		MS28-R/HE	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	4		MS111S	PCB Board Screws
7	6	u	MS114S	Meter Cap Screws (Standard)
7	6	u	MS200S	Meter Cap Screws (Stainless Steel)
8	1	u	MS300	Pulser Cap Gasket
9	1		MS160	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS160N	Pulser Cap (Aluminum) 1/2" NPT Thread
9	1		MS170	Pulser Cap (Stainless Steel) 20mm Conduit Thread
9	1		MS170N	Pulser Cap (Stainless Steel) 1/2" NPT Thread
10	4		MS115S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
13	1		Customer to Specify	Legend Plate (Not Shown) inc. Hammer Screws

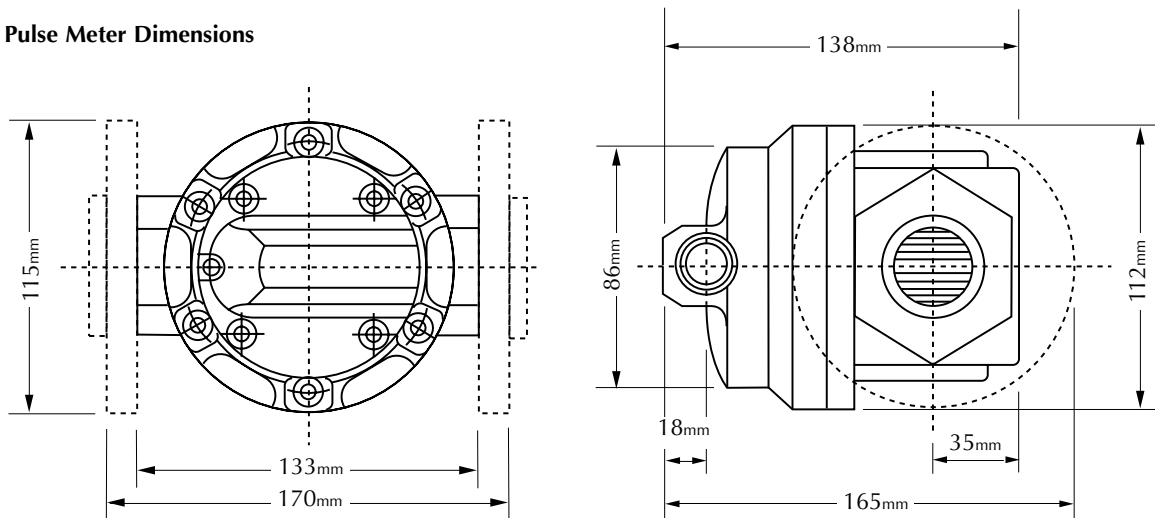
Meter Specifications

Meter Type	Pulse
Flow Ranges (Litres per minute/US Gallons per minute)	
Above 5 Centipoise	6 to 120/ 1.6 to 32
Below 5 Centipoise	10 to 100/ 2.6 to 26
Accuracy of Reading	+/- 0.5%
Maximum Viscosity*	1000 Centipoise
Maximum Operating Pressure	5500 kPa/ 800 PSI/ 55 BAR
Maximum Operating Temperature	80°C/ 176°F (Stainless Steel Models 120°C/ 248°F)
Pulse Type	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch
Pulses Per Litre/US Gallon	36/ 72 or 136.3/ 272.6

* Unless High Viscosity Rotors are fitted

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



5252 East 36th Street North
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TEL: 316-686-7361
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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
— GM510 series instruction manual —



GM510 Mechanical Meter • From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM510 Series meters with mechanical displays. If you need further assistance, contact your local GPI representative

or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow meter is suitable for both

gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium, Bronze or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM510 Series mechanical displays have a resettable batch totaliser and non-resettable accumulative totaliser.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

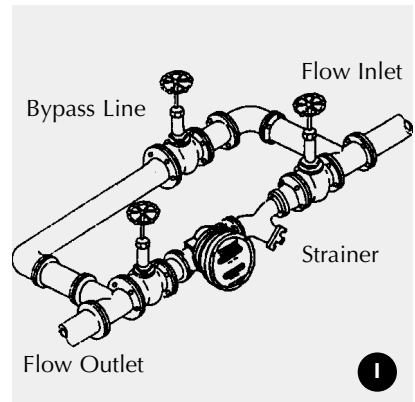
Installation

- 1] GPI recommends that when setting up pipework 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 Fig.1)
- 2] Use thread sealant on all pipe threads. For flanged versions 1" ANSI 150lb or DIN16, appropriate companion flanges and gaskets are required.
- 3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.
- 4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.
- 5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.
- 6] The meter can be installed in any

orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

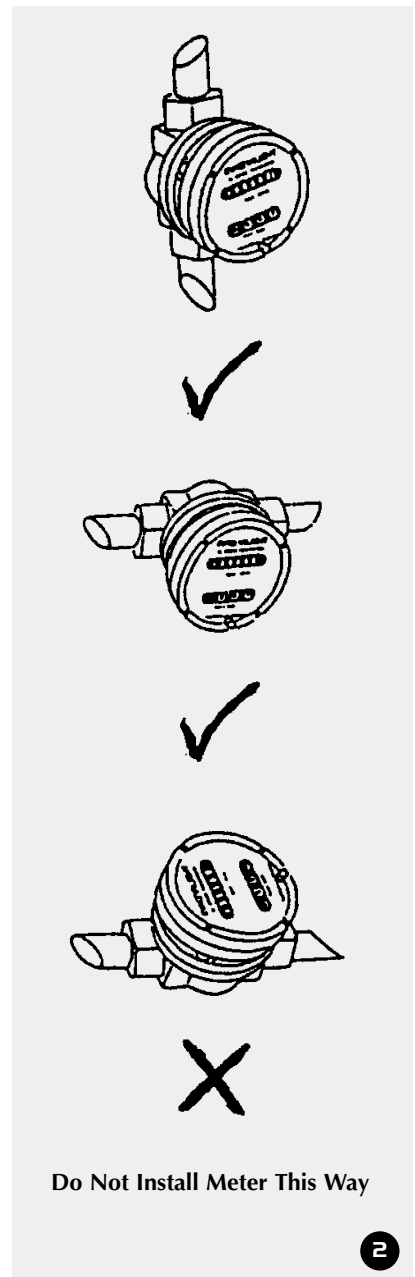
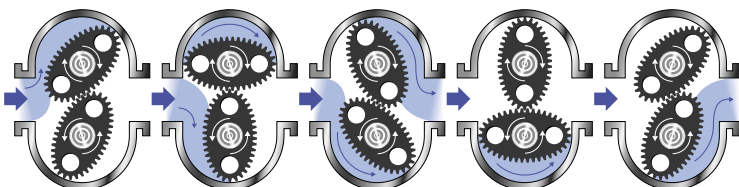
Note: Incorrect installation can cause premature wear of meter components.

- 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 decreases.



Operation

When fluid passes through the meter, rotors turn. The gear located on top of one of the rotors drives the mechanical registers gear train which provides an accurate readout.



Service Instructions

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram on pages 5 and 6 for item numbers.

- 1] Remove the four screws (Item 17) located on the face of the register. Then remove the face plate cover including register assembly.
- 2] Remove the four register mounting screws (Item 15). Then remove the lower half of the register housing.
- 3] Remove the six cover plate screws (Item 12) and remove the cover plate (Item 11).
- 4] Remove the six meter cap screws (Item 5) and remove the meter cap (Item 4).
- 5] Remove rotors (Item 3).

Reassembly

- 1] Clean all components before reassembly.
- 2] Before reassembly check the condition of the rotors (Item 3). Replace if necessary.
- 3] Replace the rotor (with the gear) on the short shaft in the housing then place the 2nd rotor onto the shaft so as the rotors are at 90° to each other. (Refer Fig 3). Check rotor 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 it correctly at 90° to the other rotor. Recheck the operation of the rotors.

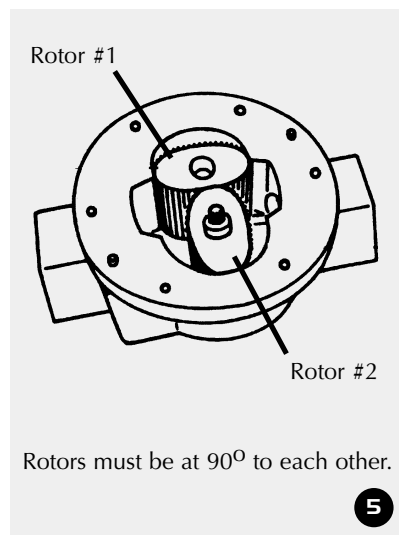
- 4] Inspect the gears (Item 6) in the meter cap (Item 4) for wear. (Replace if required, refer to spare parts on page 10).
- 5] Replace the o-ring (Item 2) into the groove in the meter cap, if the o-ring has been distorted or is damaged in any way replace it with a new part.
- 6] Replace the meter cap, making sure the locating pins line up with the holes in the meter cap and the gear on the rotor meshes correctly with the gear in the meter cap (Item 4). Insert the allen screws (Item 5) and tighten in the sequence 1, 4, 2, 5, 3, 6.
- 7] Inspect the bevel gear (Item 13), o-ring (Item 10), and output gear (Item 7) for wear or damage. (Replace faulty components if necessary).
- 8] Replacement of output shaft, bush and seal.

Disassembly

- a. Remove the bevel gear.
- b. Remove the circlip and push out the output shaft assembly, including washer.
- c. Remove the seal.
- d. Carefully press out the output shaft bush (If required).

Assembly

- a. Carefully press the new output shaft bush into place (Use Loctite Primer 747, as per instructions,



followed by sealant Loctite 262).

b. Insert a new seal into the groove of the output shaft bush.

c. Replace the output gear and washer and replace the circlip to lock the output gear shaft into place.

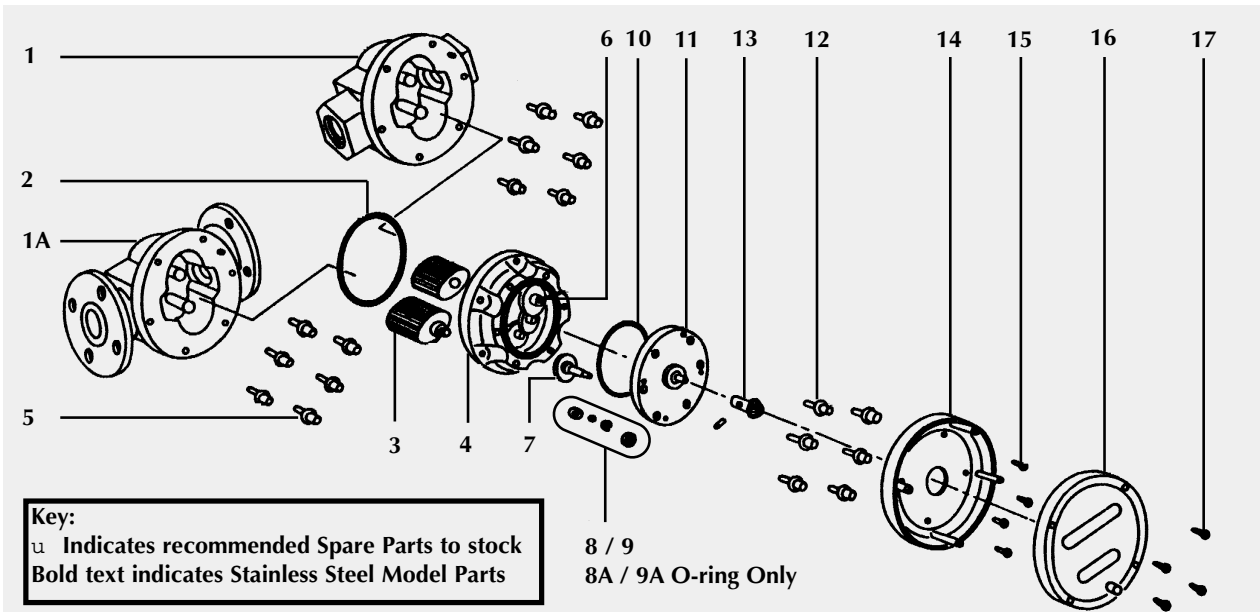
d. Replace the bevel gear (Item 13) and tighten the grub screw onto flat face of shaft.

- 9] Place the o-ring (Item 10) into the groove in the cover plate (Replace the o-ring seal if required).
- 10] Place the cover plate onto the meter. Replace the cover plate screws and tighten the six cap head screws (Item 12) firmly.
- 11] Place the lower cover plate of the register into position. Replace the four screws (Item 15) and tighten.
- 12] Position the register correctly on top of the lower register cover. Replace the four screws (Item 17) and tighten.
- 13] Test the meter by turning the rotors with a finger or by applying low air pressure (No more than a good breath) to one end of the meter, before returning meter to the line.

Meter Trouble Shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> 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 the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for maximum viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> 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
Fluid flows but no reading on meter	<ul style="list-style-type: none"> a] Bevel gear is loose on shaft b] Rotor drive gear is damaged c] Transmission gears damaged d] Register gears damaged 	<ul style="list-style-type: none"> a] Tighten grub screws b] Replace rotor c] Replace gears d] Replace register assembly
Fluid leaks into register	<ul style="list-style-type: none"> a] Seal won or damaged on the cover plate 	<ul style="list-style-type: none"> a] Replace seal (Check seal compatibility with fluid)

Meter Parts Listing



Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS188B	Meter Body 1" BSP (Aluminium)
1	1		MS188N	Meter Body 1" NPT (Aluminium)
1	1		MS186B	Meter Body 1" BSP (Stainless Steel)
1	1		MS186N	Meter Body 1" NPT (Stainless Steel)
1	1		MS188F	Meter Body 1" ANSI 150lb Flange (Aluminium)
1	1		MS188D	Meter Body 1" DIN16 Flange (Aluminium)
1	1		MS186F	Meter Body 1" ANSI 150lb Flange (S/Steel)
1	1		MS186D	Meter Body 1" DIN16 Flange (S/Steel)
2	1	u	BS235TES	"O" Ring (Teflon)
2	1	u	BS235VS	"O" Ring (Viton)
3	2	u	MS72S	Rotors PPS (Polyphenylene Sulfide Resins) brass hub
3	2	u	MS72-1HS	High Viscosity Rotors (SS) with Stainless Steel hub
3	2	u	MS72-1S	Rotors SS (Stainless Steel hub)
3	2	u	MS72-2S	Rotors PPS (with Stainless Steel hub)
3	2	u	MS72HS	High Viscosity Rotors (PPS)
3	2	u	MS72HS-2S	High Viscosity Rotors (PPS) S/Steel hub
4	1		MS75S	Meter Cap Liters (Aluminium)
4	1		MS75US	Meter Cap US Gallons (Aluminium)
4	1		MS251S	Meter Cap Liters (Stainless Steel)
4	1		MS251US	Meter Cap US Gallons (Stainless Steel)
5	6	u	MS114S	Meter Cap Screws (Standard)
5	6	u	MS200S	Meter Cap Screws (Stainless Steel)
6	1	u	MS294S	Complete Gear Set - Liters
6	1	u	MS316S	Complete Gear Set - US Gallons
7	1	u	MS77S	Output Gear & Shaft Assembly
8	1	u	MS78VS	Coverplate Seal/Bush Set Viton
8A	1	u	OR42C	Solvent o-ring (Perfluoro Elastomer)
9	1	u	MS78C	Coverplate Seal/Bush Set Solvent
9A	1	u	V7-007S	O-ring Viton

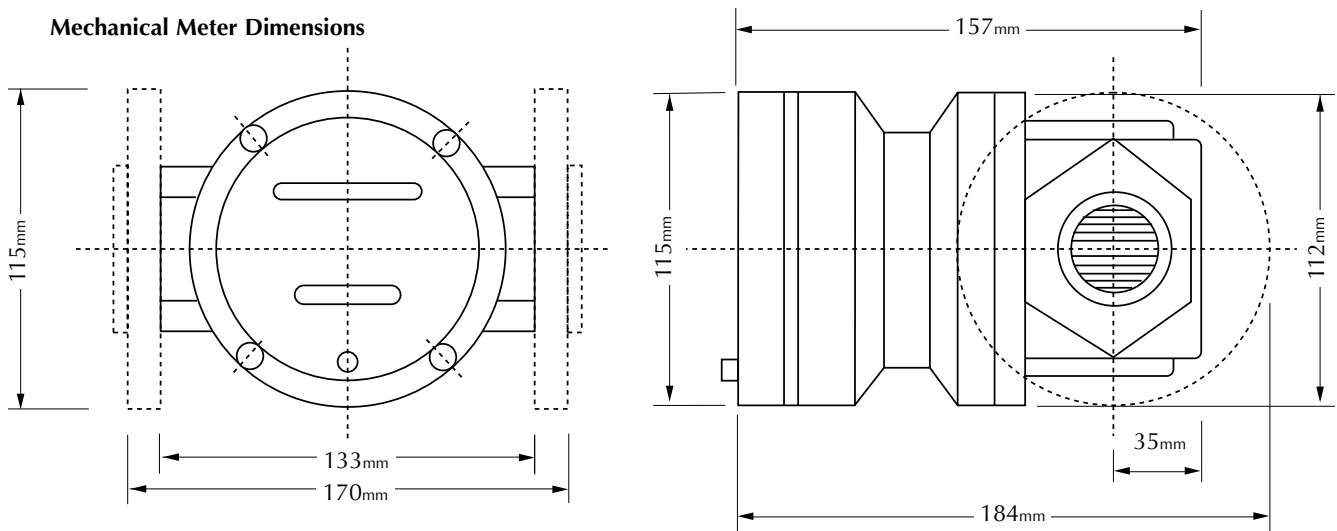
Meter Parts Listing

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
10	1	u	BS145TES	O-ring (Teflon)
10	1	u	BS145VS	O-ring (Viton)
11	1		MS99S	Coverplate (Aluminium) includes bush
11	1		MS99-1S	Coverplate (Stainless Steel) includes bush
12	6	u	MS312S	Coverplate Screws
12	6	u	MS313S	Coverplate Screws (Stainless Steel)
13	1	u	MS83S	Bevel Gear Set
14	1		MS140	Bottom Register Coverplate
15	4	u	MS111S	Mounting Screws
16	1	u	MS141S	Register Assembly with Coverplate - Liters
16	1	u	MS141US	Register Assembly with Coverplate - US Gallons
17	4	u	MS129S	Register Body Screws
18	1		Customer to specify model	Legend Plate (Not Pictured) includes Hammer Screws
19	1		MS37	Warning Label (Not Pictured)

Note: Complete Register Assembly Part Numbers; "Liter" Register - MS84, "US Gallons" Register - MS84U

Meter Dimensions

Mechanical Meter Dimensions



Meter Specifications

Flow Ranges

(Liter per minute/US Gallons per minute)

Above 5 Centipoise 6 to 120/ 1.6 to 32

Below 5 Centipoise 10 to 100/ 2.6 to 26

Accuracy of Reading +/- 1%

Maximum Viscosity* 1000 Centipoise

Maximum Operating Pressure 3450 kPa / 500 PSI / 34.5 BAR

Maximum Operating Temperature 80°C / 176°F (Stainless Steel Models 120°C / 248°F)

* Unless High Viscosity Rotors are fitted

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters

— **GMO15 series instruction manual** —



GMO15 Pulse Meter From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM015 Series meters with pulse outputs. For models with display, an additional instruction manual is supplied. If you need further assistance, contact your

local GPI representative or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow meter is suitable for both gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium, Bronze or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM015 Series is available with either;

* Standard Pulse

* Standard LC Display and Pulse

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact Macnaught for further information).

Note: When a strainer is installed it should be regularly inspected and

cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

Maintenance can be carried out to the liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required,

the meter must be isolated and the line pressure reduced.

The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used or alternatively use the hall effect sensor option.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

(Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.

2] Use thread sealant on all pipe threads. For flanged versions use appropriate companion flanges and gaskets are required.

7] Do not over tighten meter connections.

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

8] **It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.**

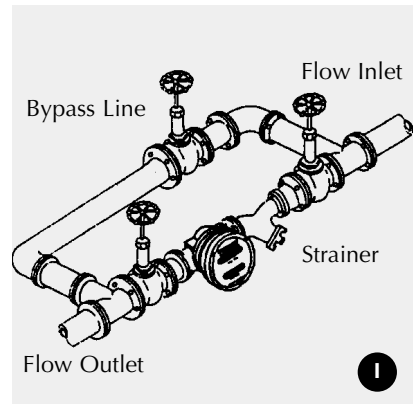
4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.

9] Test the system for leaks.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

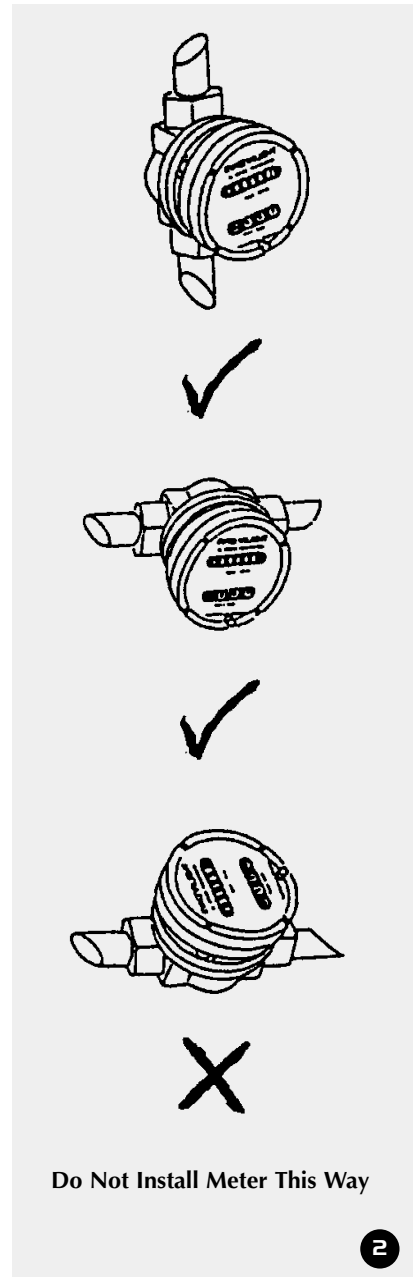
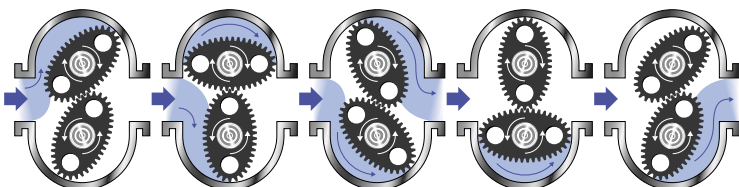
6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane.



Operation

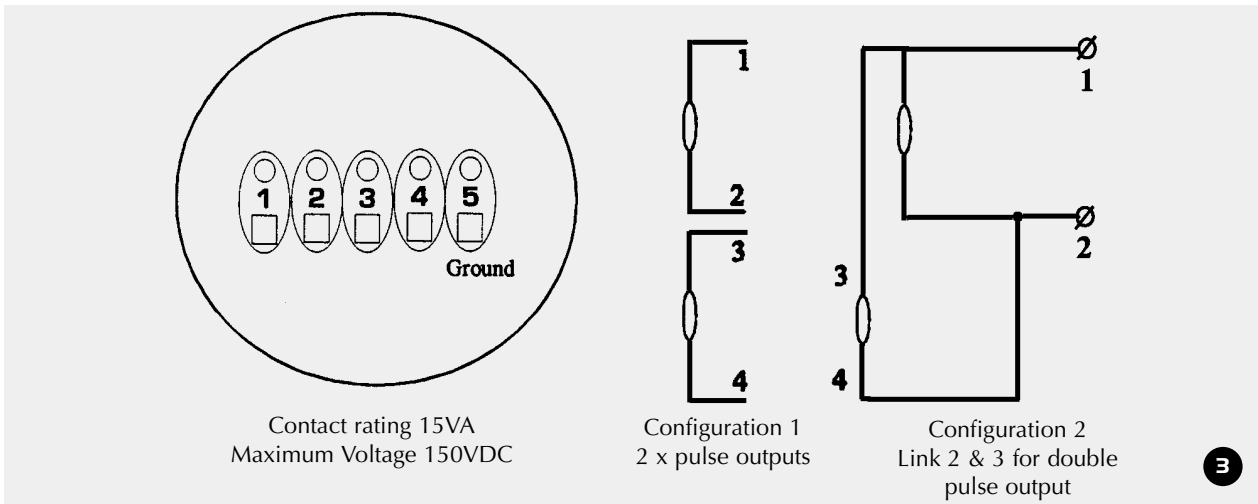
When fluid passes through the meter, rotors turn. The magnets which are located in the rotors will pass across the pulser circuit board (containing either Reed switches or Hall Effect

sensors). A signal is received which is then sent by the Pulse Circuit Board (PCB) to the relevant LC display or receiving instrument.

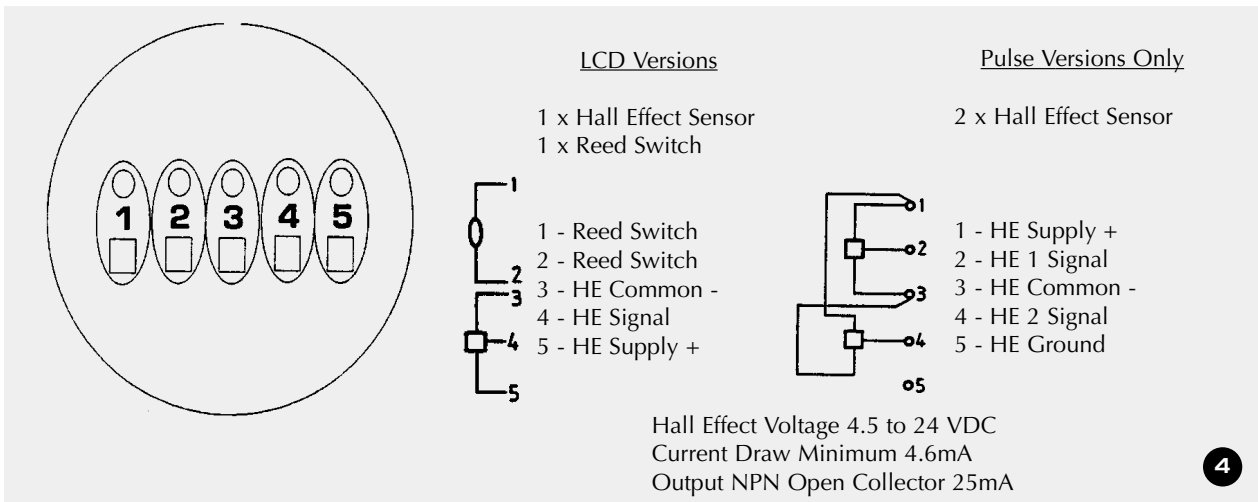


Electrical Connections

Reed Switch Connections for PCB Terminals - refer Fig.3



Hall Effect Sensor Connections - refer Fig.4



Service Instructions

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 page 5.

1a] Units with Pulse Caps; Undo the conduit connector, remove pulse cap (item 9) and remove the wires

from the pulse terminal board (item 5).

1b] 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.

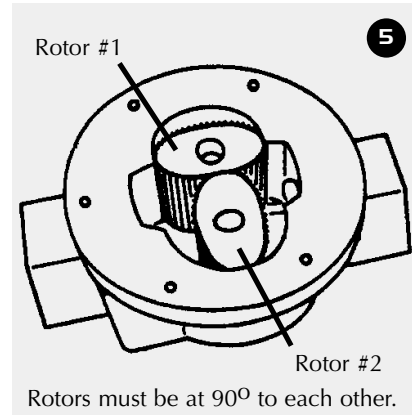
- 2] Remove the mounting adaptor plate and gasket.
- 3] Loosen the eight cap head screws (Item 7) that hold down the meter cap (Item 4), remove the screws, washers and lift off the cap.
- 4] Remove the o’ring (Item 2) from the o’ring groove in the meter cap (Item 4).
- 5] Remove rotors (Item 3).

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° to each other (refer Fig. 5) 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° to the other rotor. Re-check the operation of the rotors.

- 4] 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.
- 5] Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in the sequence 1, 6, 2, 5, 3, 7, 4, 8.
- 6] 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.
- 7] 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.

Pulse Circuit Board (PCB) Notes:

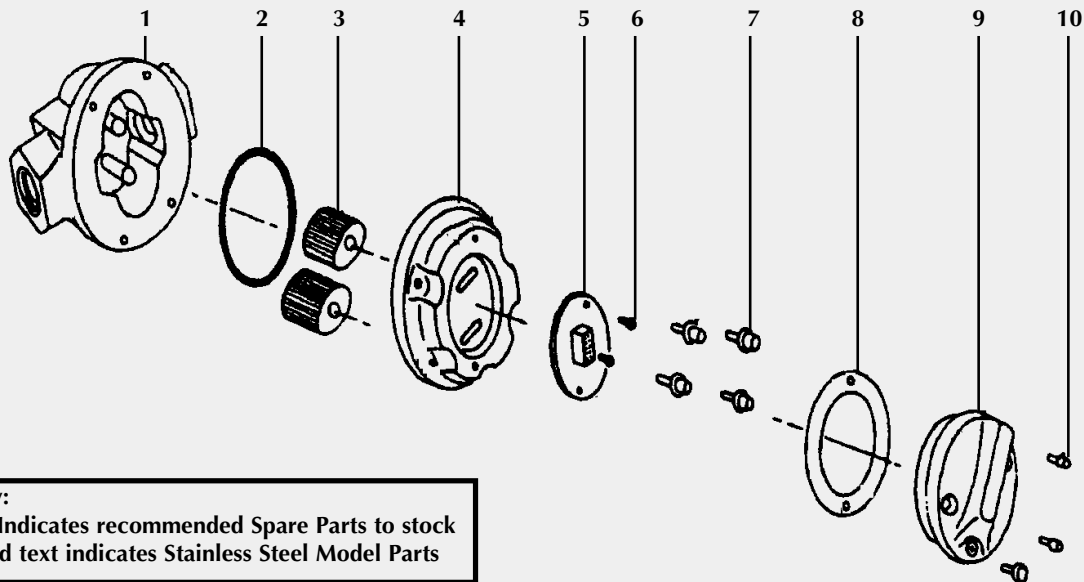
The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off’s. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Individual reed switches or hall effect sensors are not available as individual replacement parts and are only available with the PCB (Item 5).

Meter Trouble Shooting

TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ol style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ol style="list-style-type: none"> a] Dismantle meter, clean rotors (Strainer must be fitted in line) b] Clean strainer c] Replace rotors d] Re-adjust connections e] See specifications for rated viscosity
Reduced flow through the meter	<ol style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ol style="list-style-type: none"> a] Clean strainer b] See specifications for rated viscosity
Meter reading inaccurate	<ol style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ol style="list-style-type: none"> a] See “specifications” for rated flow b] Bleed air from system c] Check meter body and rotors. Replace as required.
Meter not giving a pulse signal	<ol style="list-style-type: none"> a] Faulty hall effect sensor b] Faulty reed switch c] Magnets failed 	<ol style="list-style-type: none"> a] Replace PCB Board b] Replace PCB Board c] Replace magnets

Meter Parts Listing



Key:
u Indicates recommended Spare Parts to stock
Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS191B	Meter Body 1 1/2" BSP (Aluminium)
1	1		MS191N	Meter Body 1 1/2" NPT (Aluminium)
1	1		MS189B	Meter Body 1 1/2" BSP (Stainless Steel)
1	1		MS189N	Meter Body 1 1/2" NPT (Stainless Steel)
1	1		MS191F	Meter Body 1 1/2" ANSI 150lb Flange (Aluminium)
1	1		MS191D	Meter Body 1 1/2" DIN16 Flange (Aluminium)
1	1		MS189F	Meter Body 1 1/2" ANSI 150lb Flange (S/Steel)
1	1		MS189D	Meter Body 1 1/2" DIN16 Flange (S/Steel)
2	1	u	BS243TE	"O" Ring (Teflon)
2	1	u	BS243V	"O" Ring (Viton)
3	2	u	MS58S	Rotors PPS (Polyphenylene Sulfide Resins)
3	2	u	MS58-1S	Rotors (Stainless Steel)
3	2	u	MS58HS	High Viscosity Rotors (PPS)
3	2	u	MS58-1HS	High Viscosity Rotors (Stainless Steel)
4	1		MS220	Meter Cap (Aluminium)
4	1		MS221	Meter Cap (Stainless Steel)
5	1	u	MS201-R	PCB (Standard Reed Switch)
5	1	u	MS201-HE	PCB (Hall Effect Sensor)
5	1		MS201-R/HE	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	4		MS284S	PCB Board Screws
7	6	u	MS116S	Meter Cap Screws (Standard)
7	6	u	MS180S	Meter Cap Screws (Stainless Steel)
8	1	u	MS300	Pulser Cap Gasket
9	1		MS160	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS160N	Pulser Cap (Aluminum) 1/2" NPT Thread
9	1		MS170	Pulser Cap (Stainless Steel) 20mm Conduit Thread
9	1		MS170N	Pulser Cap (Stainless Steel) 1/2" NPT Thread
10	4		MS115S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
13	1		Customer to Specify	Legend Plate (Not Shown) inc. Hammer Screws

Meter Specifications

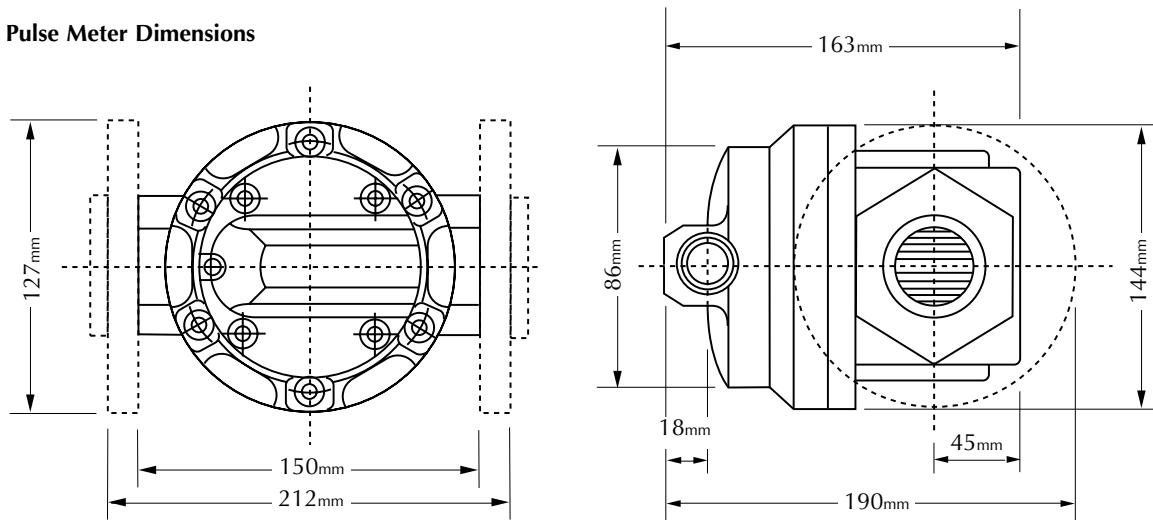
Meter Type	Pulse
Flow Ranges (Litres per minute/US Gallons per minute)	
Above 5 Centipoise	10 to 250/ 2.6 to 66
Below 5 Centipoise	15 to 235/ 4 to 62
Accuracy of Reading	+/- 0.5%
Maximum Viscosity*	1000 Centipoise
Maximum Operating Pressure**	1800 kPa/ 260 PSI/ 18 BAR
Operating Temp. Range	Alum. -10°C/ 14°F to 80°C/ 176°F S.S. -10°C/ 14°F to 120°C/ 248°F
Pulse Type	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch
Pulses Per Litre/US Gallon	14.5/ 29 or 54.9/ 109.7

* Unless High Viscosity Rotors are fitted

** Meter conforms to PED 97/23/EC CAT 1.

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
— GM515 series instruction manual —



GM515 Mechanical meter • From serial No. CXXXX

To the owner

Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for GM515 meters with mechanical displays. If you need further assistance, contact your local representative or distributor.

This Flow Meter has incorporated the Oval rotor principal into its design. This has 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. The low pressure drop and high pressure rating means Oval rotor flow meters are suitable for both gravity and pump (in line) applications.

Flow meters are available in either aluminium, Bronze or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM515 series Mechanical displays have a resettable batch totaliser and non-resettable accumulative totaliser.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

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

advice.

To prevent damage from dirt or foreign matter it is recommended that a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter.

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow

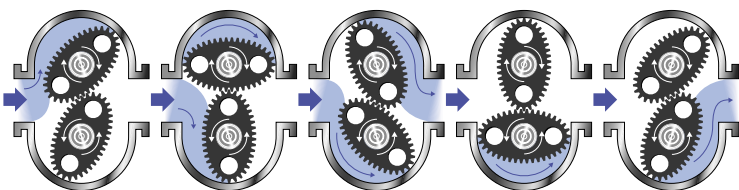
meter performance.

Note: To prevent damage caused by air purge slowly fill the system with fluid.

To prevent pressure build up turn off the pump at the end of each day.

Operation

When fluid passes through the meter, rotors turn. The gear located on top of one of the rotors drives the mechanical registers gear train which provides an accurate readout.



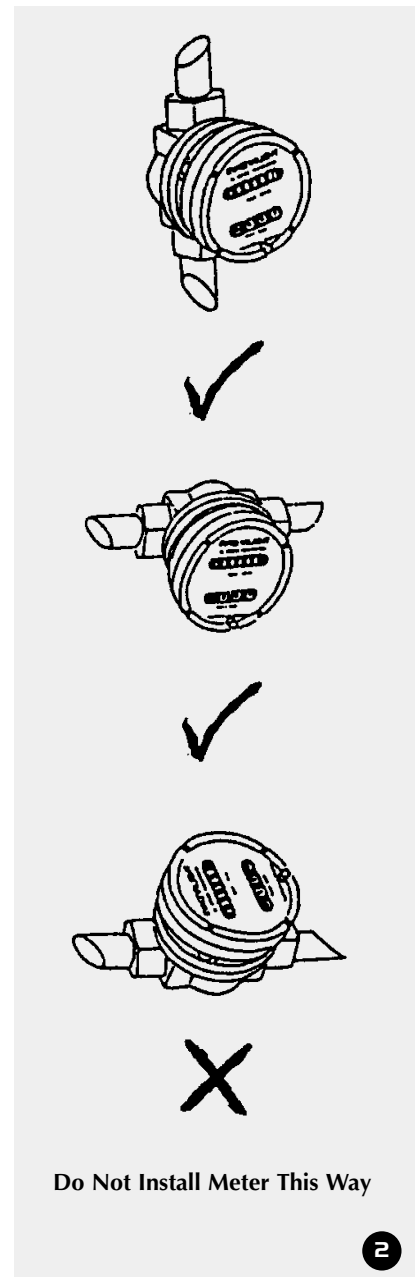
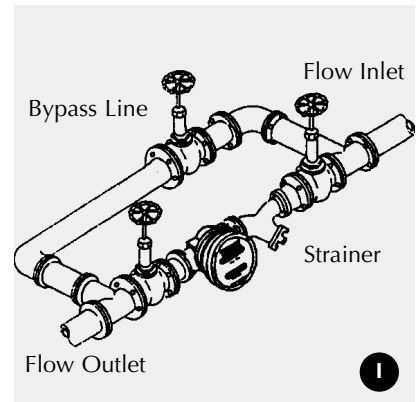
Installation

- 1] It is recommended that when setting up pipework 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 Fig.1)
- 2] Use thread sealant on all pipe threads. For flanged versions appropriate companion flanges and gaskets are required.
- 3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.
- 4] Install a wire mesh strainer (Y or basket type) as close as possible to the inlet side of the meter.
- 5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.
- 6] The meter can be installed in any

orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.

- 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 decreases.



Service Instructions

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram on pages 5 and 6 for item numbers.

- 1] Remove the four screws (Item 17) located on the face of the register. Then remove the face plate cover including register assembly.
- 2] Remove the four register mounting screws (Item 15). Then remove the lower half of the register housing.
- 3] Remove the six cover plate screws (Item 12) and remove the cover plate (Item 11).
- 4] Remove the eight meter cap screws (Item 5) and remove the meter cap (Item 4).
- 5] Remove rotors (Item 3).

Reassembly

- 1] Clean all components before reassembly.
- 2] Before reassembly check the condition of the rotors (Item 3). Replace if necessary.
- 3] Replace the rotor (with the gear) on the short shaft in the housing then place the 2nd rotor onto the shaft so as the rotors are at 90° to each other. (Refer Fig 3). Check rotor 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 it correctly at 90° to the other rotor. Recheck the operation of the rotors.

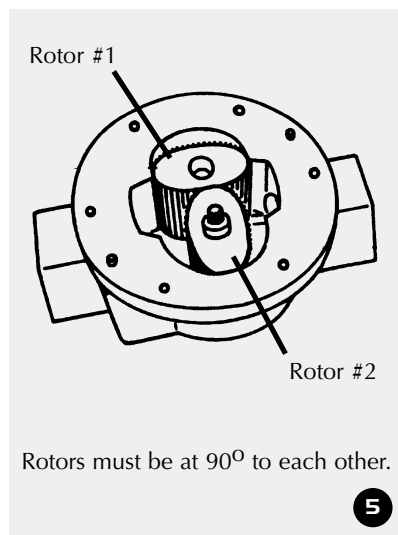
- 4] Inspect the gears (Item 6) in the meter cap (Item 4) for wear. (Replace if required, refer to spare parts on page 10).
- 5] Replace the o-ring (Item 2) into the groove in the meter cap, if the o-ring has been distorted or is damaged in any way replace it with a new part.
- 6] Replace the meter cap, making sure the locating pins line up with the holes in the meter cap and the gear on the rotor meshes correctly with the gear in the meter cap (Item 4). Insert the allen screws (Item 5) and tighten in the sequence 1, 4, 2, 5, 3, 6.
- 7] Inspect the bevel gear (Item 13), o-ring (Item 10), and output gear (Item 7) for wear or damage. (Replace faulty components if necessary).
- 8] Replacement of output shaft, bush and seal.

Disassembly

- a. Remove the bevel gear.
- b. Remove the circlip and push out the output shaft assembly, including washer.
- c. Remove the seal.
- d. Carefully press out the output shaft bush (If required).

Assembly

- a. Carefully press the new output shaft bush into place (Use Loctite Primer 747, as per instructions,



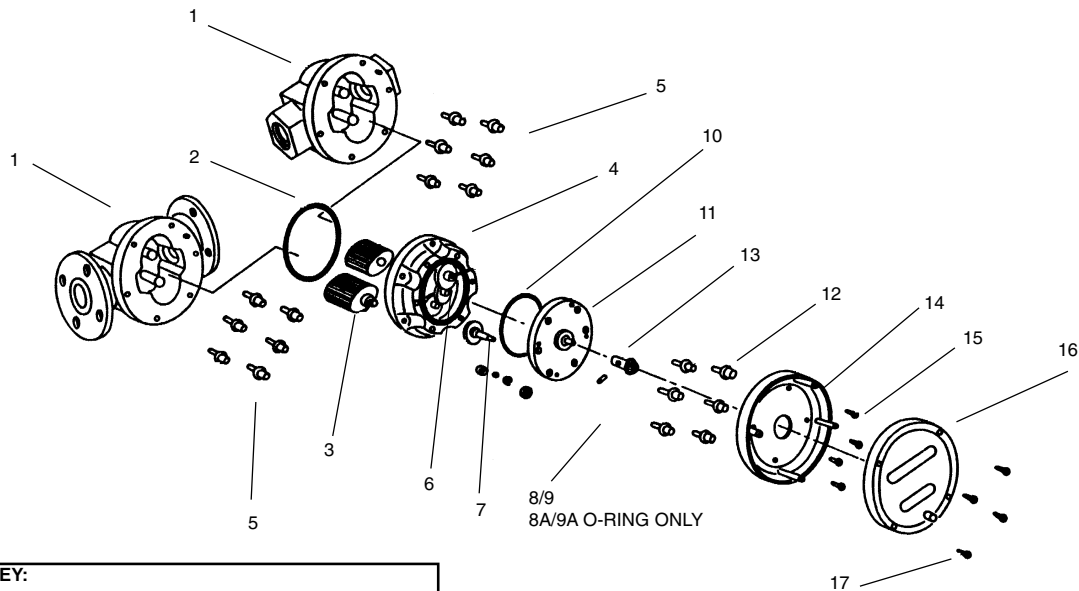
followed by sealant Loctite 262).

- b. Insert a new seal into the groove of the output shaft bush.
- c. Replace the output gear and washer and replace the circlip to lock the output gear shaft into place.
- d. Replace the bevel gear (Item 13) and tighten the grub screw onto flat face of shaft.
- 9] Place the o-ring (Item 10) into the groove in the cover plate (Replace the o-ring seal if required).
- 10] Place the cover plate onto the meter. Replace the cover plate screws and tighten the six cap head screws (Item 12) firmly.
- 11] Place the lower cover plate of the register into position. Replace the four screws (Item 15) and tighten.
- 12] Position the register correctly on top of the lower register cover. Replace the four screws (Item 17) and tighten.
- 13] Test the meter by turning the rotors with a finger or by applying low air pressure (No more than a good breath) to one end of the meter, before returning meter to the line.

Meter Trouble Shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> 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 the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for maximum viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> 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
Fluid flows but no reading on meter	<ul style="list-style-type: none"> a] Bevel gear is loose on shaft b] Rotor drive gear is damaged c] Transmission gears damaged d] Register gears damaged 	<ul style="list-style-type: none"> a] Tighten grub screws b] Replace rotor c] Replace gears d] Replace register assembly
Fluid leaks into register	<ul style="list-style-type: none"> a] Seal won or damaged on the cover plate 	<ul style="list-style-type: none"> a] Replace seal (Check seal compatibility with fluid)

Meter Parts Listing



KEY:
u Indicates recommended Spare Parts to stock
Bold text indicates Stainless Steel Model parts.

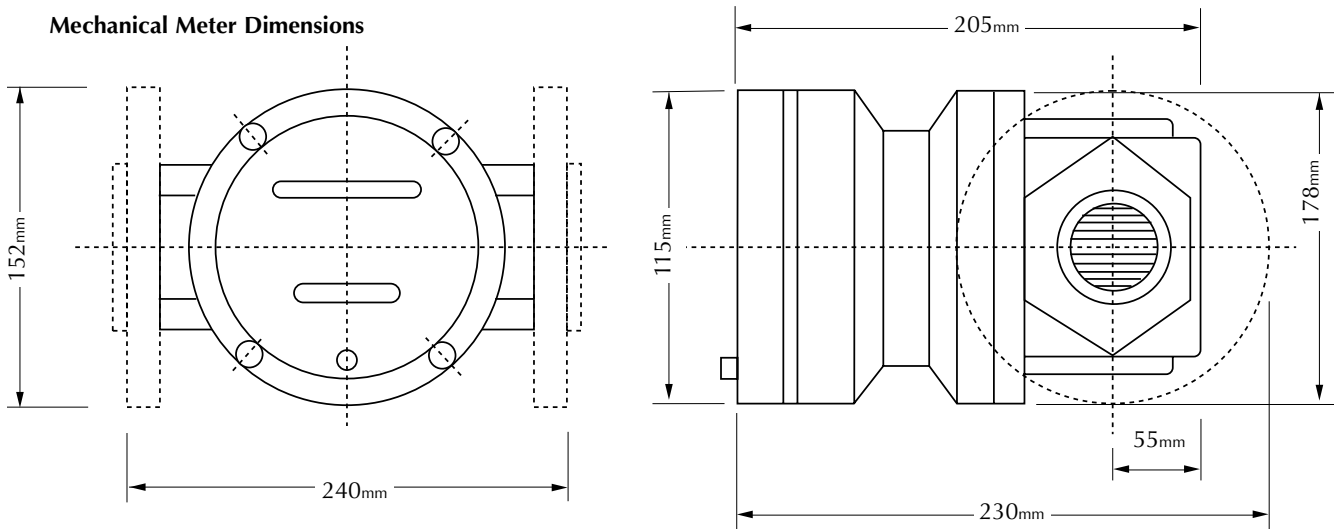
Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS192B	Meter Body 1 1/2" BSP (Aluminium)
1	1		MS192N	Meter Body 1 1/2" NPT (Aluminium)
1	1		MS190B	Meter Body 1 1/2" BSP (Stainless Steel)
1	1		MS190N	Meter Body 1 1/2" NPT (Stainless Steel)
1	1		MS192F	Meter Body 1 1/2" ANSI 150lb Flange (Aluminium)
1	1		MS192D	Meter Body 1 1/2" DIN16 Flange (Aluminium)
1	1		MS190F	Meter Body 1 1/2" ANSI 150lb Flange (S/Steel)
1	1		MS190D	Meter Body 1 1/2" DIN16 Flange (S/Steel)
2	1	u	BS243TES	"O" Ring (Teflon)
2	1	u	BS243VS	"O" Ring (Viton)
3	2	u	MS92S	Rotors PPS (Polyphenylene Sulfide Resins) Brass hub
3	2	u	MS92-1S	Rotors (316 Stainless Steel)
3	2	u	MS92-2S	Rotors PPS with Stainless Steel hub
3	2	u	MS92HS	High Viscosity Rotors (PPS)
3	2	u	MS92HS-2S	High Viscosity Rotors (PPS) S/Steel hub
4	1		MS222S	Meter Cap Liters (Aluminium)
4	1		MS222US	Meter Cap US Gallons (Aluminium)
4	1		MS223S	Meter Cap Liters (Stainless Steel)
4	1		MS223US	Meter Cap US Gallons (Stainless Steel)
5	6	u	MS116S	Meter Cap Screws (Standard)
5	6	u	MS180S	Meter Cap Screws (Stainless Steel)
6	1	u	MS295S	Complete Gear Set - Liters
6	1	u	MS317S	Complete Gear Set - US Gallons
7	1	u	MS77S	Output Gear & Shaft Assembly
8	1	u	MS78VS	Coverplate Seal/Bush Set Viton
8A	1	u	OR42CS	Solvent o-ring (Chemraz)
9	1	u	MS78C	Coverplate Seal/Bush Set Solvent
9A	1	u	V7-007S	O-ring (Viton)

Meter Parts Listing

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
10	2	u	BS145TES	O-ring (Teflon)
10	2	u	BS145VS	O-ring (Viton)
11	1		MS99S	Coverplate (Aluminium) includes bush
11	1		MS99-1S	Coverplate (Stainless Steel) includes bush
12	6	u	MS312S	Coverplate Screws - Litre Model
12	6	u	MS313S	Coverplate Screws (Stainless Steel)- Litre Model
13	1	u	MS83S	Bevel Gear Set
14	1		MS140RS	Bottom Register Coverplate
15	4	u	MS111S	Mounting Screws
16	1	u	MS141RS incl 15 & 17	Register Assembly complete - Litres
16	1	u	MS141RUS incl 15 & 17	Register Assembly with complete - US Gallons
17	4	u	MS129S	Register Body Screws
18	1		Customer to specify model	Legend Plate (Not Pictured) includes Hammer Screws
19	1		MS37	Warning Label (Not Pictured)

Meter Dimensions

Mechanical Meter Dimensions



Meter Specifications

Flow Ranges

(Liter per minute/US Gallons per minute)

Above 5 Centipoise 10 to 250/ 2.6 to 66

Below 5 Centipoise 15 to 235/ 4 to 62

Accuracy of Reading +/- 1%

Maximum Viscosity* 1000 Centipoise

Maximum Operating Pressure** 1800kPa / 260 PSI / 18 BAR

Operating Temp. Range Alum. -10°C / 14°F to 80°C / 176°F

Stainless Steel -10°C / 14°F to 120°C / 248°F

* Unless High Viscosity Rotors are fitted

** Meter conforms to PED 97/23/EC CAT 1.

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters

— **GMO20 series instruction manual** —



GMO20 Pulse Meter From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM020 Series meters with pulse outputs. For models with display, an additional instruction manual is supplied. If you need further assistance, contact your

local GPI representative or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow meter is suitable for both gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM020 Series is available with either;

* Standard Pulse

* Standard LC Display and Pulse

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it

should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

Maintenance can be carried out to the liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required,

the meter must be isolated and the line pressure reduced.

The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used or alternatively use the hall effect sensor option.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

(Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.

2] Use thread sealant on all pipe threads. For flanged versions appropriate companion flanges and gaskets are required.

7] Do not over tighten meter connections.

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

8] **It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.**

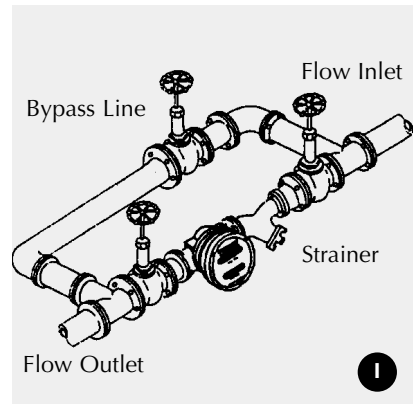
4] Install a wire mesh strainer (Y or basket type 40 mesh as close as possible to the inlet side of the meter.

9] Test the system for leaks.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

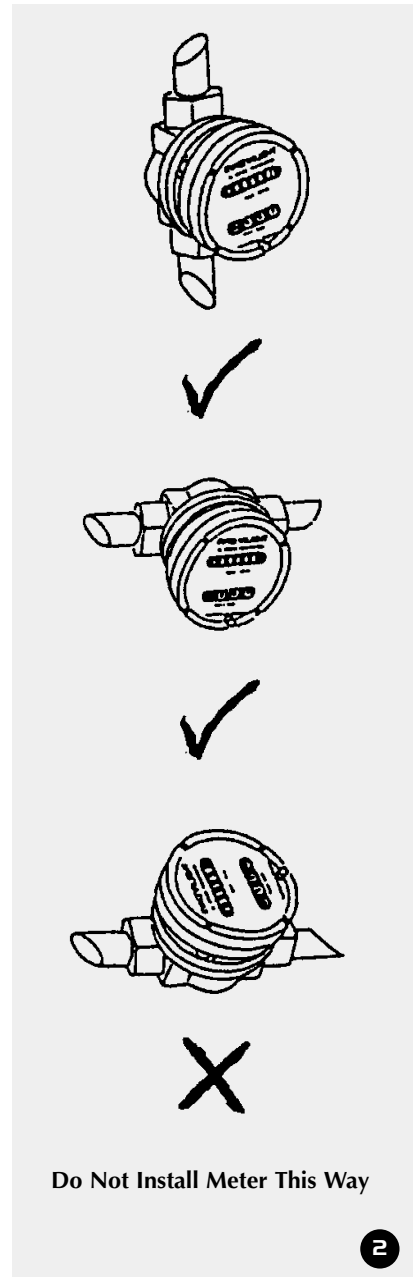
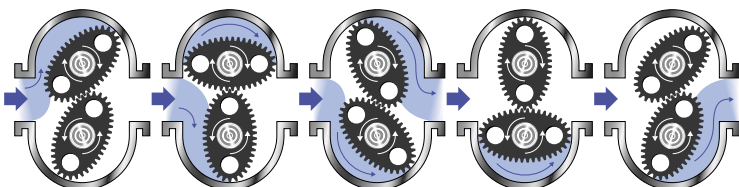
6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane.



Operation

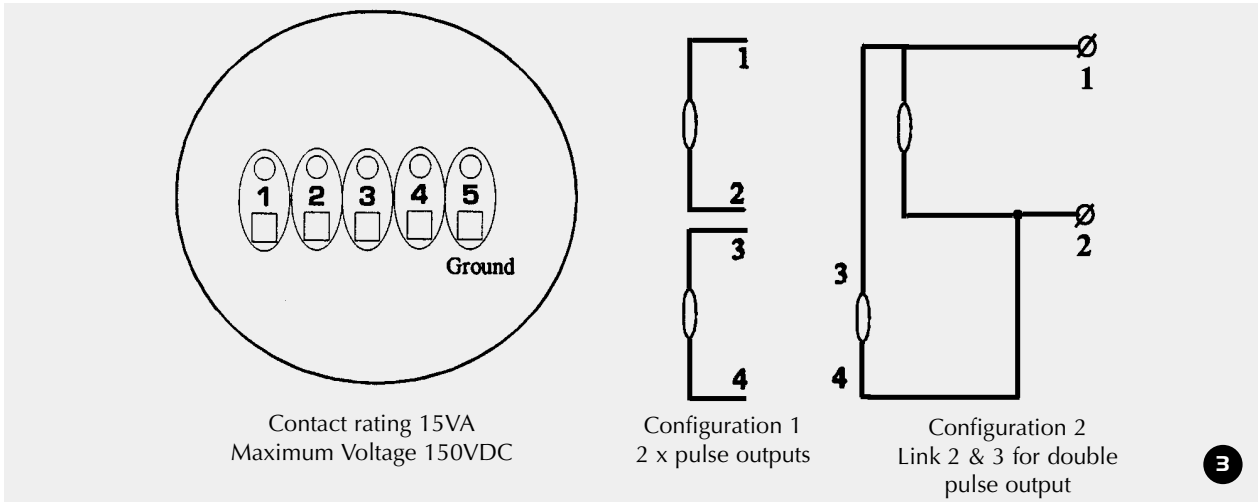
When fluid passes through the meter, rotors turn. The magnets which are located in the rotors will pass across the pulser circuit board (containing either Reed switches or Hall Effect

sensors). A signal is received which is then sent by the Pulse Circuit Board (PCB) to the relevant LC display or receiving instrument.



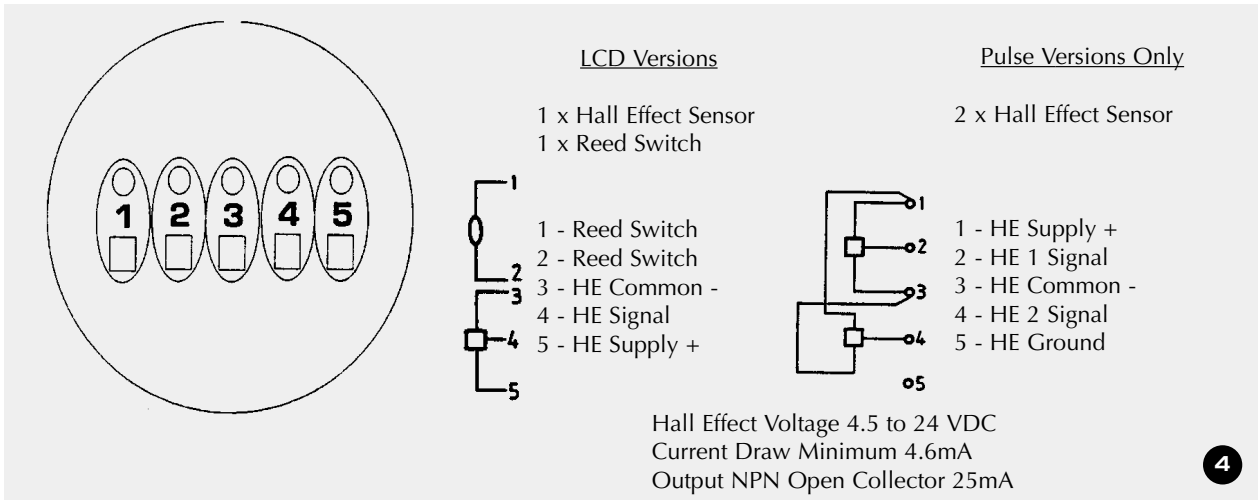
Electrical Connections

Reed Switch Connections for PCB Terminals - refer Fig.3



3

Hall Effect Sensor Connections - refer Fig.4



4

Service Instructions

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 page 5.

1a] Units with Pulse Caps; Undo the conduit connector, remove pulse

cap (item 9) and remove the wires from the pulse terminal board (item 5).

1b] 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..

2] Remove the mounting adaptor plate and gasket.

3] Loosen the eight 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 (Item 2) from the o’ring groove in the meter cap (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° to each other (refer Fig.

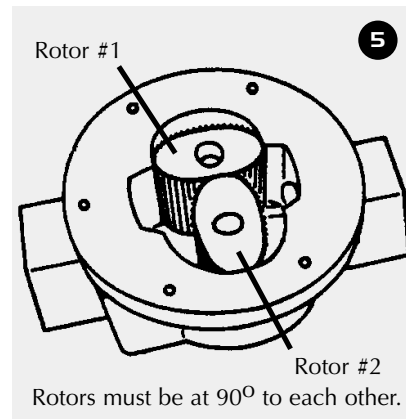
5) and check their operation by turning either of the rotors. If the rotors are not in mesh correctly or do not move freely, remove one of the rotors and replace correctly at 90° to the other rotor. Re-check the operation of the rotors.

4] 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.

5] Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in the sequence 1, 6, 2, 5, 3, 7, 4, 8.

6] 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.

7] 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.

Pulse Circuit Board (PCB) Notes:

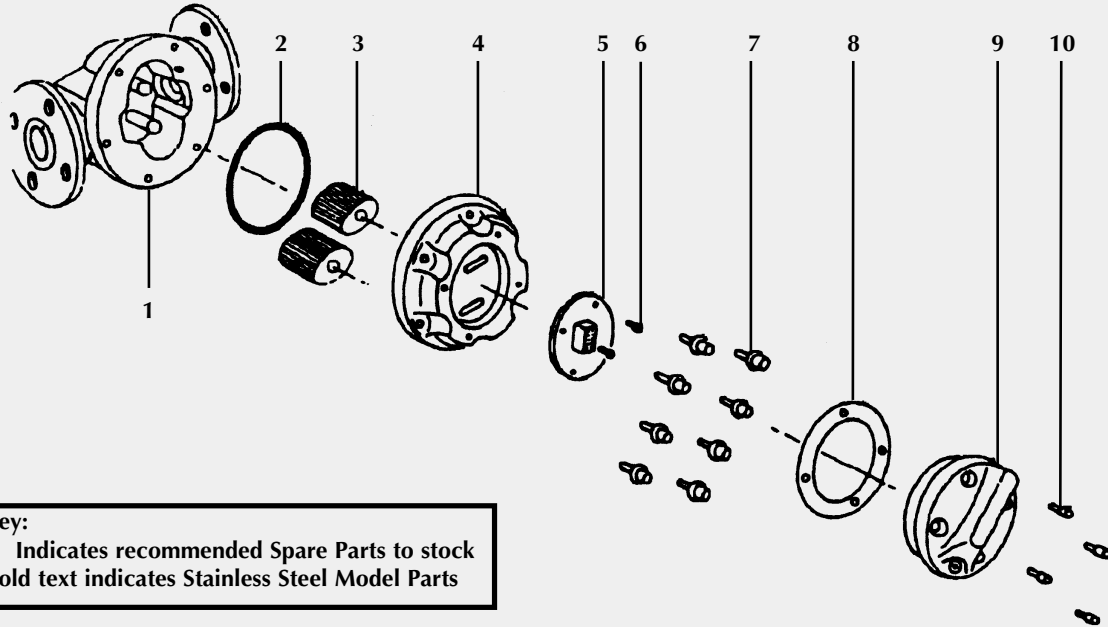
The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor. The PCB board is fastened to the meter cap (Item 4) by two screws and stand off’s. All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Individual reed switches or hall effect sensors are not available as individual replacement parts and are only available with the PCB (Item 5).

Meter Trouble Shooting

TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<p>a] Foreign matter blocking rotors</p> <p>b] Line strainer blocked</p> <p>c] Damaged rotors</p> <p>d] Meter connections over tightened</p> <p>e] Fluid is too viscous</p>	<p>a] Dismantle meter, clean rotors (Strainer must be fitted in line)</p> <p>b] Clean strainer</p> <p>c] Replace rotors</p> <p>d] Re-adjust connections</p> <p>e] See specifications for rated viscosity</p>
Reduced flow through the meter	<p>a] Strainer is partially blocked</p> <p>b] Fluid is too viscous</p>	<p>a] Clean strainer</p> <p>b] See specifications for rated viscosity</p>
Meter reading inaccurate	<p>a] Fluid flow rate is too high or too low</p> <p>b] Fluid is too viscous</p> <p>c] Excess wear caused by incorrect installation</p>	<p>a] See “specifications” for rated flow</p> <p>b] Bleed air from system</p> <p>c] Check meter body and rotors. Replace as required.</p>
Meter not giving a pulse signal	<p>a] Faulty hall effect sensor</p> <p>b] Faulty reed switch</p> <p>c] Magnets failed</p>	<p>a] Replace PCB Board</p> <p>b] Replace PCB Board</p> <p>c] Replace magnets</p>

Meter Parts Listing



Key:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS283F	Meter Body 2" ANSI 150lb Flange (Aluminium)
1	1		MS281D	Meter Body 2" DIN16 Flange (Aluminium)
1	1		MS281F	Meter Body 2" ANSI 150lb Flange (S/Steel)
1	1		MS283D	Meter Body 2" DIN16 Flange (S/Steel)
2	1	u	BS252TE	"O" Ring (Teflon)
2	1	u	BS252V	"O" Ring (Viton)
3	2	u	MS147S	Rotors PPS (Polyphenylene Sulfide Resins)
3	2	u	MS147-1S	Rotor (Stainless Steel)
3	2	u	MS147HS	High Viscosity Rotors (PPS)
3	2	u	MS147-1HS	HighViscosity Rotor (Stainless Steel)
4	1		MS230	Meter Cap (Aluminium)
4	1		MS231	Meter Cap (Stainless Steel)
5	1	u	MS201-R	PCB (Standard Reed Switch)
5	1	u	MS201-HE	PCB (Hall Effect Sensor)
5	1		MS201-R/HE	PCB (1 Reed Switch & 1 Hall Effect Sensor)
6	4		MS284S	PCB Board Screws
7	6	u	MS243S	Meter Cap Screws (Standard)
7	6	u	MS282S	Meter Cap Screws (Stainless Steel)
8	1	u	MS300	Pulser Cap Gasket
9	1		MS160	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS160N	Pulser Cap (Aluminum) 1/2" NPT Thread
9	1		MS170	Pulser Cap (Stainless Steel) 20mm Conduit Thread
9	1		MS170N	Pulser Cap (Stainless Steel) 1/2" NPT Thread
10	4		MS115S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
13	1		Customer to Specify	Legend Plate (Not Shown) inc. Hammer Screws

Meter Specifications

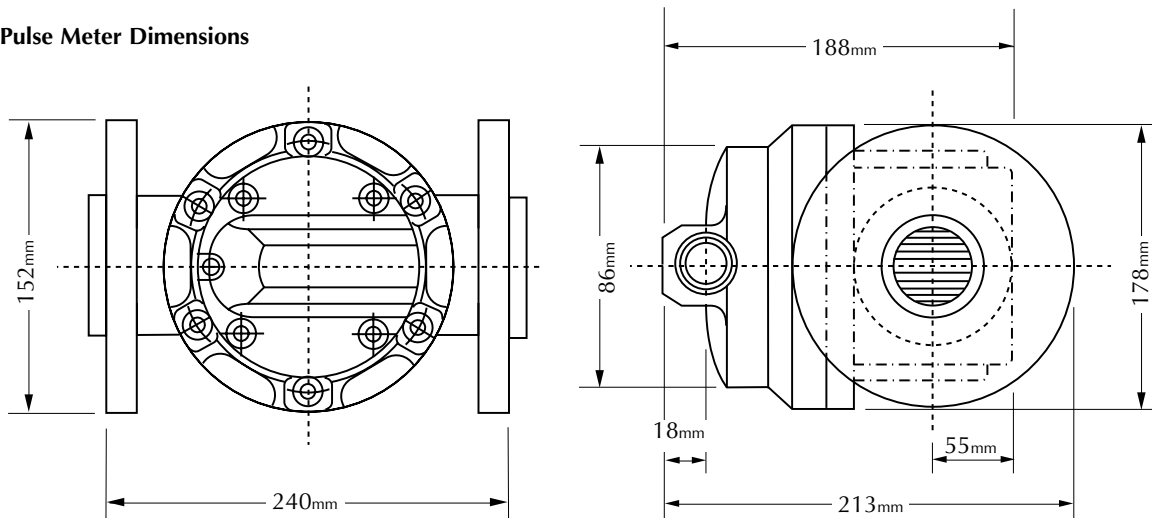
Meter Type	Pulse
Flow Ranges (Litres per minute/US Gallons per minute)	
Above 5 Centipoise	15 to 350/ 4 to 92
Below 5 Centipoise	33 to 300/ 9 to 79
Accuracy of Reading	+/- 0.5%
Maximum Viscosity*	1000 Centipoise
Max. Operating Pressure**	18 BAR / 260 PSI / 1800 kPa
Operating Temp. Range	Alum. -10°C/ 14°F to 80°C/ 176°F S.S -10°C/ 14°F to 120°C/ 248°F
Pulse Type	Dual Reed Switches or Hall Effect Sensor or combination HE Sensor/Reed Switch
Pulses Per Litre/US Gallon	6.68/ 13.3 or 25.28/ 50.57

* Unless High Viscosity Rotors are fitted

** Meter conforms to PED 97/23/EC CAT 1.

Meter Dimensions

Pulse Meter Dimensions



Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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GREAT PLAINS INDUSTRIES, INC.

Positive Displacement Flowmeters
GM520 series instruction manual



GM520 Mechanical Meter • From serial No. CXXXX

To the owner

Thank you for purchasing a GPI GM Series Flow Meter. Please take a few minutes to read through this manual before installing and operating your meter. If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the GM520 Series meters with mechanical displays. If you need further assistance, contact your local GPI representative

or contact GPI by telephone or fax for advice.

The GPI GM Series Flow Meter has incorporated the oval rotor principal into its design. This has 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 GM Series flow meter design. The low pressure drop and high pressure rating means the GM Series flow meter is suitable for both

gravity and pump (in line) applications.

The GPI GM Series flow meters are available in either aluminium or 316 stainless steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 stainless steel rotors available for both stainless steel and aluminium models.

The GM520 Series mechanical displays have a resettable batch totaliser and non-resettable accumulative totaliser.

Important Information



PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the GPI fluid compatibility chart), or consult your local GPI representative for advice.

To prevent damage from dirt or foreign matter, GPI recommends a Y or Basket type 60 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact GPI for further information).

Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

Installation

1] GPI recommends that when setting up pipework 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 Fig.1)

(Refer to Fig.2 for correct installation) The register assembly may be orientated to suit the individual installation.

Note: Incorrect installation can cause premature wear of meter components.

2] Use thread sealant on all pipe threads. For flanged versions use appropriate companion flanges and gaskets are required.

7] Do not over tighten meter connections.

3] For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

8] **It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.**

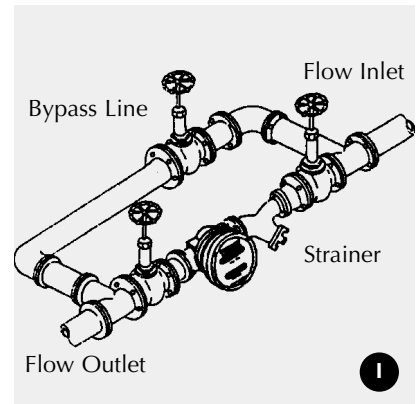
4] Install a wire mesh strainer (Y or basket type 60 mesh as close as possible to the inlet side of the meter.

9] Test the system for leaks.

5] Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

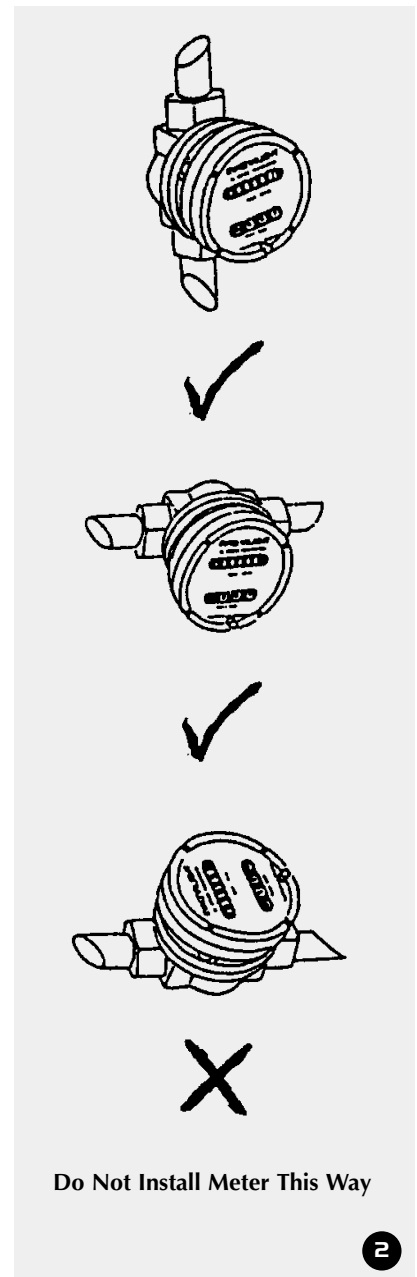
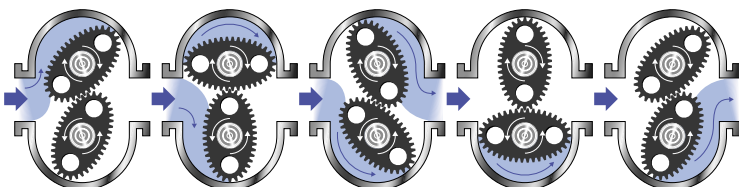
10] Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

6] The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane.



Operation

When fluid passes through the meter, rotors turn. The gear located on top of one of the rotors drives the mechanical registers gear train which provides an accurate readout.



Service Instructions

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram on pages 5 and 6 for item numbers.

- 1] Remove the four screws (Item 17) located on the face of the register. Then remove the face plate cover including register assembly.
- 2] Remove the four register mounting screws (Item 15). Then remove the lower half of the register housing.
- 3] Remove the six cover plate screws (Item 12) and remove the cover plate (Item 11).
- 4] Remove the eight meter cap screws (Item 5) and remove the meter cap (Item 4).
- 5] Remove rotors (Item 3).

Reassembly

- 1] Clean all components before reassembly.
- 2] Before reassembly check the condition of the rotors (Item 3). Replace if necessary.
- 3] Replace the rotor (with the gear) on the short shaft in the housing then place the 2nd rotor onto the shaft so as the rotors are at 90° to each other. (Refer Fig 3). Check rotor 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 it correctly at 90° to the other rotor. Recheck the operation of the rotors.

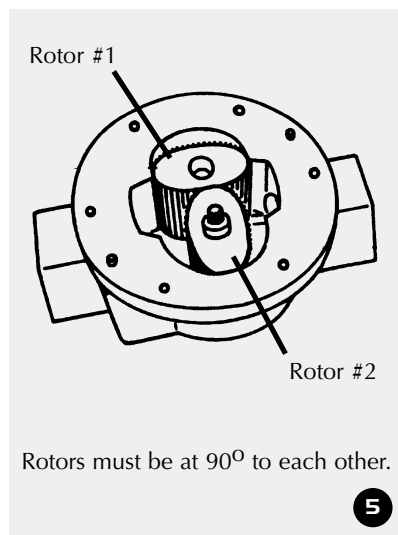
- 4] Inspect the gears (Item 6) in the meter cap (Item 4) for wear. (Replace if required, refer to spare parts on page 10).
- 5] Replace the o-ring (Item 2) into the groove in the meter cap, if the o-ring has been distorted or is damaged in any way replace it with a new part.
- 6] Replace the meter cap, making sure the locating pins line up with the holes in the meter cap and the gear on the rotor meshes correctly with the gear in the meter cap (Item 4). Insert the allen screws (Item 5) and tighten in the sequence 1, 6, 2, 5, 3, 7, 4, 8.
- 7] Inspect the bevel gear (Item 13), o-ring (Item 10), and output gear (Item 7) for wear or damage. (Replace faulty components if necessary).
- 8] Replacement of output shaft, bush and seal.

Disassembly

- a. Remove the bevel gear.
- b. Remove the circlip and push out the output shaft assembly, including washer (Items 7, 8, 9).
- c. Remove the seal.
- d. Carefully press out the output shaft bush (If required).

Assembly

- a. Carefully press the new output shaft bush into place (Use Loctite Primer 747, as per instructions,



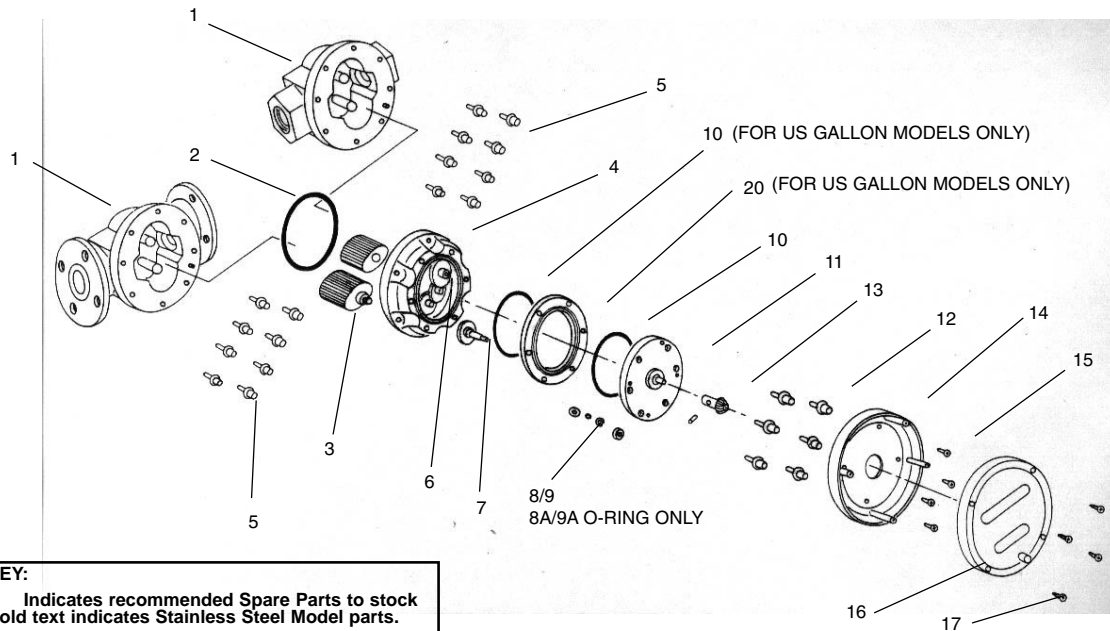
followed by sealant Loctite 262).

- b. Insert a new seal into the groove of the output shaft bush.
- c. Replace the output gear and washer and replace the circlip to lock the output gear shaft into place.
- d. Replace the bevel gear (Item 13) and tighten the grub screw onto flat face of shaft.
- 9] Place the o-ring (Item 10) into the groove in the cover plate (Replace the o-ring seal if required).
- 10] Place the cover plate onto the meter. Replace the cover plate screws and tighten the six cap head screws (Item 12) firmly.
- 11] Place the lower cover plate of the register into position. Replace the four screws (Item 15) and tighten.
- 12] Position the register correctly on top of the lower register cover. Replace the four screws (Item 17) and tighten.
- 13] Test the meter by turning the rotors with a finger or by applying low air pressure (No more than a good breath) to one end of the meter, before returning meter to the line.

Meter Trouble Shooting

TROUBLE SHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	<ul style="list-style-type: none"> a] Foreign matter blocking rotors b] Line strainer blocked c] Damaged rotors d] Meter connections over tightened e] Fluid is too viscous 	<ul style="list-style-type: none"> 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 the meter	<ul style="list-style-type: none"> a] Strainer is partially blocked b] Fluid is too viscous 	<ul style="list-style-type: none"> a] Clean strainer b] See specifications for maximum viscosity
Meter reading inaccurate	<ul style="list-style-type: none"> a] Fluid flow rate is too high or too low b] Fluid is too viscous c] Excess wear caused by incorrect installation 	<ul style="list-style-type: none"> 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
Fluid flows but no reading on meter	<ul style="list-style-type: none"> a] Bevel gear is loose on shaft b] Rotor drive gear is damaged c] Transmission gears damaged d] Register gears damaged 	<ul style="list-style-type: none"> a] Tighten grub screws b] Replace rotor c] Replace gears d] Replace register assembly
Fluid leaks into register	<ul style="list-style-type: none"> a] Seal won or damaged on the cover plate 	<ul style="list-style-type: none"> a] Replace seal (Check seal compatibility with fluid)

Meter Parts Listing



KEY:
 u Indicates recommended Spare Parts to stock
 Bold text indicates Stainless Steel Model parts.

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	1		MS520B	Meter Body 2" BSP (Aluminium)
1	1		MS520N	Meter Body 2" NPT (Aluminium)
1	1		MS520-1B	Meter Body 2" BSP (Stainless Steel)
1	1		MS520-1N	Meter Body 2" NPT (Stainless Steel)
1	1		MS483F	Meter Body 2" ANSI 150lb Flange (Aluminium)
1	1		MS483D	Meter Body 2" DIN16 Flange (Aluminium)
1	1		MS481F	Meter Body 2" ANSI 150lb Flange (S/Steel)
1	1		MS481D	Meter Body 2" DIN16 Flange (S/Steel)
2	1	u	BS252TES	"O" Ring (Teflon)
2	1	u	BS252VS	"O" Ring (Viton)
3	2	u	MS105-1S	Rotors 316 Stainless Steel with S/Steel Pinion
3	2	u	MS105-2S	Rotors PPS with Stainless Steel Pinion
3	2	u	MS105HS-2S	HighViscosity Rotors (PPS) with S/Steel Pinion
3	1	u	MS105-1HS	High Viscosity Rotors (Stainless Steel) with S/Steel Pinion
4	1		MS232S	Meter Cap Liters (Aluminium)
4	1		MS335US	Meter Cap US Gallons (Aluminium)
4	1		MS233S	Meter Cap Liters (Stainless Steel)
4	1		MS425US	Meter Cap US Gallons (Stainless Steel)
5	6	u	MS243S	Meter Cap Screws (Standard)
5	6	u	MS282S	Meter Cap Screws (Stainless Steel)
6	1	u	MS363S	Complete Gear Set - Liters
6	1	u	MS470S	Complete Gear Set - US Gallons
7	1	u	MS77S	Output Gear & Shaft Assembly
8	1		MS78VS	Coverplate Seal/Bush Set Viton
8A	1	u	OR42CS	Solvent o-ring (Chemraz)
9	1	u	MS78C	Coverplate Seal/Bush Set Solvent
9A	1	u	V7-007S	O-ring (Viton)

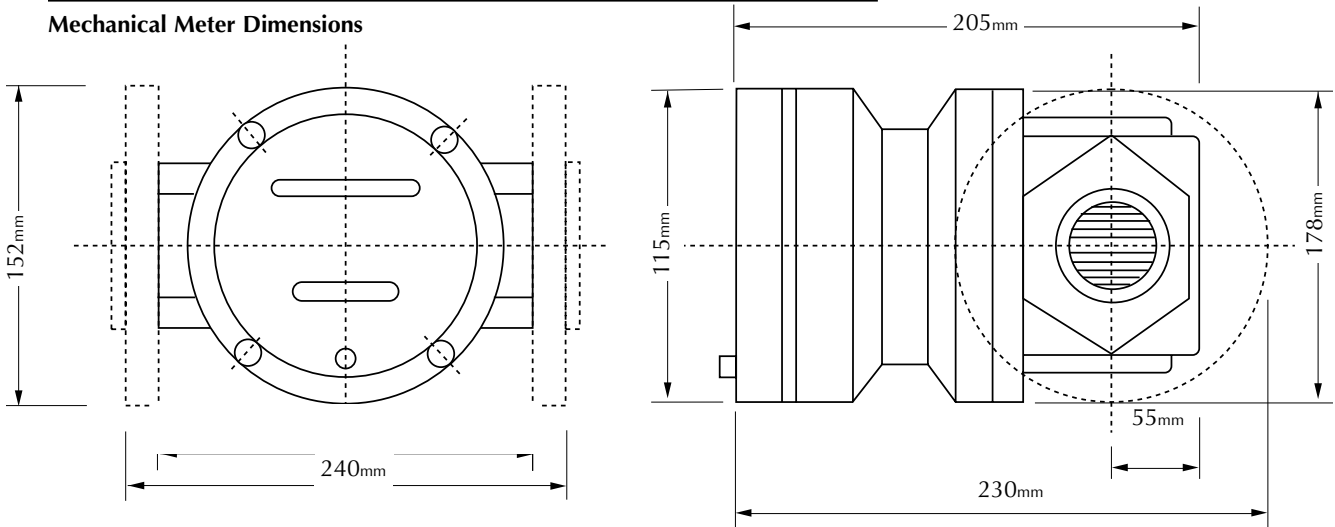
Meter Parts Listing

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
10	2	u	BS145TES	O-ring (Teflon)
10	2	u	BS145VS	O-ring (Viton)
11	1		MS99S	Coverplate (Aluminium) includes bush
11	1		MS99-1S	Coverplate (Stainless Steel) includes bush
12	6	u	MS312S	Coverplate Screws - Litre Model
12	6	u	MS313S	Coverplate Screws (Stainless Steel)- Litre Model
12	6	u	MS419S	Coverplate Screws - U.S Gallon Model
12	6	u	MS420S	Coverplate Screws (Stainless Steel)- U.S Gallon Model
13	1	u	MS83S	Bevel Gear Set
14	1		MS140	Bottom Register Coverplate
15	4	u	MS111S	Mounting Screws
16	1	u	MS141S	Register Assembly with Coverplate - Liters
16	1	u	MS141US	Register Assembly with Coverplate - US Gallons
17	4	u	MS129S	Register Body Screws
18	1		Customer to specify model	Legend Plate (Not Pictured) includes Hammer Screws
19	1		MS37	Warning Label (Not Pictured)
20	1	u	MS423S	Spacer Ring (Aluminium) U.S Gallons Model only
20	1	u	MS423-1S	Spacer Ring (Stainless Steel) U.S Gallon Model only

Note: Complete Register Assembly Part Numbers; "Litre" Register - MS84, "US Gallons" Register - MS84U

Meter Dimensions

Mechanical Meter Dimensions



Meter Specifications

Flow Ranges

(Liter per minute/US Gallons per minute)

Above 5 Centipoise 15 to 350/ 3.96 to 92.46

Below 5 Centipoise 30 to 300/ 7.93 to 79.25

Accuracy of Reading +/- 1%

Maximum Viscosity* 1000 Centipoise

Maximum Operating Pressure** 1800 kPa / 260 PSI / 18 BAR

Operating Temp Range Alum -10°C / 14°F to 80°C / 176°F

S.S -10°C / 14°F to 120°C / 248°F

* Unless High Viscosity Rotors are fitted

**Meter conforms to PED 97/23/EC CAT 1.

Warranty

Great Plains Industries, Inc. Limited Warranty Policy

Great Plains Industries, Inc., 5252 East 36th Street North, Wichita, Kansas USA 67220-3202, hereby provides a limited one year warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective part or parts. This warranty shall not apply if:

- a.) the product has been altered or modified outside the warrantor's duly appointed representative;
- b.) the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, notice of claim must be given in writing to the company at its above address no later than 30 days after the expiration of the warranty period. Such notice shall identify the defect in the product. The company shall, within 14 days of receipt of such notice, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.

GREAT PLAINS INDUSTRIES, INC. EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE IF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT - Part 702 (governs the resale availability of the warranty terms).



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