® Badger Meter Europa GmbH

MN 05 series

Oval gear flow meter

INSTRUCTION AND OPERATION MANUAL

January 2009

IND_MN05_BA_02_0901

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1. Basic safety recommendations

The manufacturer is not liable for damages that result from improper or not in accordance with the requirements use.
The meters are constructed according to state-of-the-art technology and tested operationally reliable. They have left the factory in a faultless condition concerning safety regulations.
The mounting, electric installation, taking into operation and maintenance of the meter may only be carried out by suitable technicians. Furthermore the operating personnel has to be trained by the operating authority and the instructions of this manual have to be followed.
Basically, you have to respect the regulations for the opening and repairing of electrical equipment valid in your country.

2. Repairs

Should you send back a flow meter in operation, please take notice of the following points:

- Please enclose a description of the error as well as a precise statement of the measured medium (if necessary a safety specification sheet).
- The meter has to be in a cleaned condition (outside and inside). Especially with harmful measuring mediums you have to pay attention that there are no impurities nor residues in the pipe or at the connections.
- If it is not possible to clean the meter completely, particularly with harmful materials, do not send back the meter.
- Please copy and fill in the harmless declaration at the end of this manual and send it back together with the meter to be repaired.

We reserve the right to repair only cleaned meters. Costs, which result from insufficient cleaning, will be charged to you.

3. To the owner

Thank you for purchasing a MN 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 MN1 series meters. If you need further assistance, contact us or your local representative for advice. The MN series flow meter has incorporated the oval rotor principle 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 MN series flow meter design. The low pressure drop and high pressure rating means the MN series flow meter is suitable for both gravity and pump (in-line) applications. **The meter is preferrably used for the measurement of lubricants. Other fluids on request.**

4. Operation

Please read this information carefully before use!

Before use, confirm the fluid to be used is compatible with the meter, or consult your local representative for advice. This meter will handle particle sizes up to 0.075 mm/0.0003”. To prevent damage from dirt or foreign matter, we recommend a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. 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.

5. For the use in ex-zones

- Reed switch: Connection to intrinsically safe electric circuit (simple electrical equipments must be operated intrinsically safe with a suitable barrier according to EN 50020).
- Equipotential bonding has to be ensured upon the pipe system.
- Meters with plastic housing (PPS): Please do not clean the meters with a dry cloth as this would cause electrostatic charge.
- The fluid conductivity must be better than 1000 pico/Siemens/meter to avoid electrostatic charges.
- Ambient temperature must be between - 20°C and + 40°C (T4).
- If electronical register is mounted on the meter or operated with the meter, the electronical register must have a current ATEX approval and must be operated intrinsically safe with a suitable barrier according to EN 50020.

6. Model MN05

6.1 General information

The MN05 series flow meters are available in either PPS (Polyphenylene Sulfide Resin) or 316 stainless steel. Standard rotors are made from 316 stainless steel with optional PPS rotors with Hastelloy C shafts available.

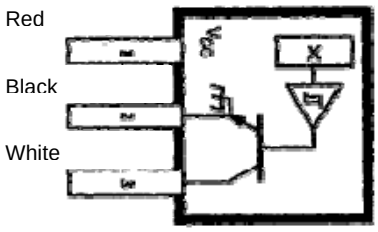
6.2 Installation

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. We recommend use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or over tightening meter connections can cause meter damage.

6.3 Pulser details

Hall effect sensor specifications:

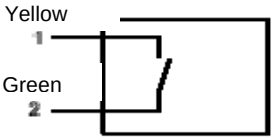
- 4.5V to 24V (4.6 ~ 9mA) operation needs only an unregulated supply.
- Open collector 25mA output NPN compatible with digital logic.
- Reverse battery protection.
- Temperature –40°C / -40°F ~150°C / 300°F.



Hall Effect Sensor Wiring Details

Reed relay specifications:

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



Reed Switch Wiring Details

Red wire	On BC2 = 6	Hall sensor power (+)	Hall voltage range	4,5 – 24V DC
Black wire	On BC2 = 5	Hall sensor negative (-)	Hall max rated current	25mA
White wire	On BC2 = 4	Hall sensor signal	Hall connection	1K ohm pull up resistor fitted
Yellow wire		Reed sensor connection	Reed max voltage	30V
Green wire		Reed sensor connection	Reed max current	0,5A
			Reed life (typical)	500 x 10^6 cycles 10VDC at 10mA

6.4 Maintenance

Disassembly:

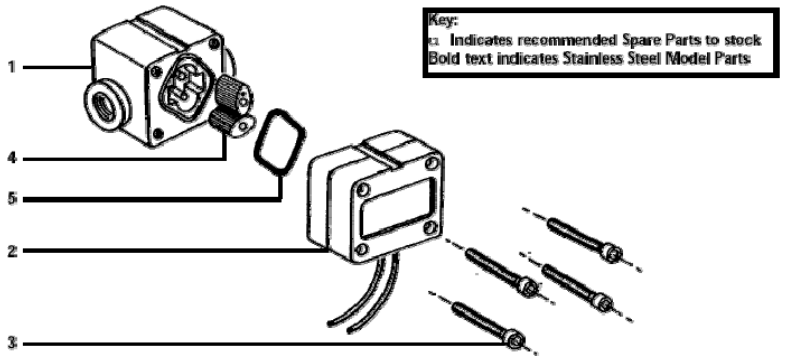
1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove four (4) screws (Item 3) and remove the meter body cover (item 2).
3. Remove o-ring (item 5) and inspect (replace o-ring if damaged).
4. Remove rotors (item 4), clean and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

6.5 Display parts listing



Item No.	No. Off.	Rec. Parts	Part or set (order from this column only)	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**
2	1	u	MS3R-SR	Meter cap reed switch Aluminium
2	**1**	**u**	**MS3S-SR**	Meter cap reed switch
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 (Perfluro Elastomer)
5	1	u	BS127Es	O-Ring (EPDM)

6.6 Meter specifications

Meter type	Pulse
Flow ranges (litres per hour/US gallons per hour)	
Above 1 mPas	0.5 to 50 l/h
Below 1 mPas	1 to 50 l/h
Accuracy of reading	+/- 1%
Maximum viscosity	1000 mPas
Maximum operating pressure	500/1000 kPa
Maximum operating temperature	80°C / 120°C
Pulse type	Hall effect sensor / reed switch
Pulses per litre/US gallons	1552
Meter dimensions	50 x 50mm / 1.97” x 1.97” (meter body) 60mm / 2.58” (port face to face)
Weight	240g / 8.5oz

6.7 Trouble shooting

Trouble shooting guide		
Trouble	Cause	Remedy
Fluid will not flow through the meter	A) Foreign matter blocking rotors	A) Dismantle meter, clean rotors (strainer must be fitted in line).
	B) Line strainer blocked	B) Clean strainer
	C) Damaged rotors	C) Replace rotors (strainer must be fitted in line)
	D) Meter connections over-tightened	D) Re-adjust connections
Reduced flow through the meter	A) Line strainer partially blocked	A) Clean strainer
	B) Fluid is too viscous	B) Maximum viscosity 1000 mPas
Meter reading inaccurate	A) Fluid flow rate is too low or too high	A) See specifications for min.and max. flow rates
	B) Air in fluid	B) Bleed air from system
	C) Excess wear caused by incorrect installation	C) Check meter body and rotors
Meter not giving a pulse signal	A) Faulty hall effect sensor or reed switch	A) Replace meter cap
	B) Faulty magnet	B) Replace rotors
	C) Rotors installed in wrong position	C) Refer to correct rotor positioning – assembly instructions

7. Warranty

Badger Meter warrants meters and parts manufactured and supplied by it hereunder to be free from defects in materials and workmanship for a period of 18 months from date of shipment or 12 months from date of installation, whichever period shall be shorter. If within such period any meters or parts shall be proved to seller´s satisfaction to be defective, such meters or parts shall be repaired or replaced at seller´s option. seller´s obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon seller´s receiving written notice of any alleged defect within 10 days after its discovery and, at seller´s option, return of such meters or parts to seller, f.o.b. its factory. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES (EXCEPT OF TITLE) OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Badger Meter shall not be liable for any defects attributable to acts or omissions of others after shipment, nor any consequential, incidental or contingent damage whatsoever.

Note:
This warranty does not form part of, nor does it constitute, a contract between Badger Meter and the end user. It is additional to any warranty given by the seller of the products and does not exclude, limit, restrict or modify the rights and remedies conferred upon the end user, or the liabilities imposed on the seller, by any statute or other laws in respect of the sale of the product.

8. Return of goods for repair / harmlessness declaration

Please copy, fill in and sign hereafter harmlessness declaration and enclose it for any return of goods you may send back for repair.

No repair will be performed prior to receiving the harmlessness declaration duly filled and signed.

Harmless declaration

To : _____

Attn. : _____

From : _____

Dept. : _____

Please note that no repair will be performed prior to receiving of this declaration duly singed by you!

Please send all parts clean from medium and inform us about possible medium wastes remaining in the part. For this purpose, please use this form. A security specification sheet of the medium must accompany this declaration in the following cases: Toxical, dangerous or objectionable media, or media belonging to any dangerous materials class. We inform you that uncleaned parts lead to additional costs. Extra clean costs will be charged to you. Furthermore, we reserve us the right to send the parts back to you for cleaning!

Declaration

We herewith confirm that the part(s) sent for repair has/have been cleaned and is/are free of any liquid and/or solid wastes of the medium and/or cleaning medium: Any eventually remaining wastes are:

❍ harmless

❍ dangerous, toxic, etc. – Security specifications are attached

Signature of person in charge: _____

Name of the person in charge in capital letters: _____

Date: _____

Company stamp: _____

Hotline

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