



RM IMPERIAL METERS RM METRIC METERS



INSTALLATION & MAINTENANCE MANUAL

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INTRODUCTION

The Romet rotary meter is suitable for the measurement of natural gas and most clean, dry gases. The installation of an upstream filter or, at the very least, an 80 mesh strainer (e.g. Romet Tee Screen) will protect the meter from contaminants in the gas stream and permit accurate measurement. The meter is not suitable for the measurement of liquids. Consult the factory if any corrosive gases (i.e. sour or sewer gases) are present, since these gases may have adverse effects on the meter. Meters specifically constructed for these applications are available.

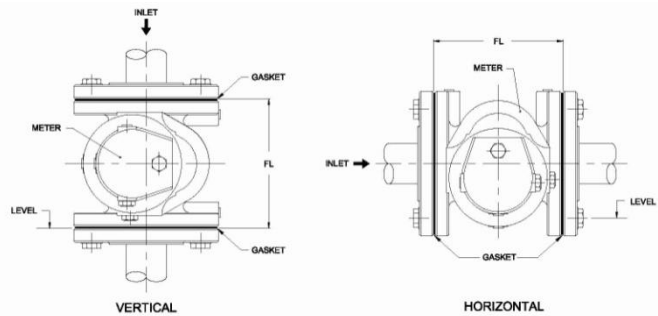
The maximum allowable operating pressure (MAOP) of 175 psig, 1206 kPa or 12 bar and flow rating (Qmax) for each meter is indicated on the serial plate and should not be exceeded. Although ruggedly constructed, the Romet meter is a precision measuring instrument and should be handled accordingly.

PRE-INSTALLATION

Note: *Do not fill the meter with oil until the meter is installed and tested.*

1. Inspect the meter for any damage which may have occurred during transportation and handling. Consult the factory if the meter has been damaged.
2. Remove the sealing plugs or caps from the inlet and outlet port of the meter.
3. Ensure that all foreign material and scale have been removed from the meter station piping and that the mounting flanges are the correct distance (F_L) apart, aligned with each other and level (maximum of 1/16" per foot or 5mm per meter in all directions).

Meter Model	F_L	
RM600-RM5000	7 1/16"	179 mm
RM7000-RM23000	9 13/16"	249 mm
RM25000-RM56000	6 5/16"	414 mm
RM16-RM140	179 mm	7 1/16"
RM200-RM650	249 mm	9 13/16"
RM700-RM1600	414 mm	6 5/16"



4. The meter can be installed in either the horizontal or vertical position. The vertical position is the recommended installation since contaminants are more easily expelled from the meter, reducing the potential for internal wear or damage to the meter.
5. Check that the correct hardware is installed as per Table 1.0.

TABLE 1. HARDWARE SPECIFICATION TABLE

METER MODEL	FLANGE	BOLTS	WASHERS	GASKETS
RM600-RM1500 RM16-RM40	ANSI 125/150 2" Flat Face	5/8"-11 x 1.5" long Hex Head, SAE Grade 5 Steel, Zinc Plated (8 Required)	Flat; Steel; Zinc Plated (8 Required)	ANSI 125/150 2" Full Face x 1/8" thick Compressed Fiber (2 Required)
RM2000-RM3000 RM55-RM85	ANSI 125/150 2" Flat Face	5/8"-11 x 1.75" long Hex Head, SAE Grade 5 Steel, Zinc Plated (8 Required)	Flat; Steel; Zinc Plated (8 Required)	ANSI 125/150 2" Full Face x 1/8" thick Compressed Fiber (2 Required)
RM5000-RM7000 RM140-RM200	ANSI 125/150 3" Flat Face	5/8"-11 x 2" long Hex Head, SAE Grade 5 Steel, Zinc Plated (8 Required)	Flat; Steel; Zinc Plated (8 Required)	ANSI 125/150 3" Full Face x 1/8" thick Compressed Fiber (2 Required)
RM11000- RM23000 RM300-RM650	ANSI 125/150 4" Flat Face	5/8"-11 x 2" long Hex Head, SAE Grade 5 Steel, Zinc Plated (16 Required)	Flat; Steel; Zinc Plated (16 Required)	ANSI 125/150 4" Full Face x 1/8" thick Compressed Fiber (2 Required)
RM25000- RM56000 RM700-RM1600	ANSI 125/150 6" Flat Face	3/4"-10 x 2.5" long Hex Head, SAE Grade 5 Steel, Zinc Plated (16 Required)	Flat; Steel; Zinc Plated (16 Required)	ANSI 125/150 6" Full Face x 1/8" thick Compressed Fiber (2 Required)

INSTALLATION

1. Install the meter using the hardware as specified in Table 1.
2. Tighten the flange bolts to a torque of 20 ft-lbs (27 Nm). If the meter is fitted with a 3/8" pressure plug (Allen or Hex Head) in the thrust cover, it is recommended to remove plug. Use screw driver engaging to crank cap to rotate impeller. The free moving will ensure that the resisting is not binding the meter which may cause damage. Install pressure plug.
3. Fill the thrust cover, magnetic housing (RM600-RM1500/RM16-RM40, RM2000-RM56000/RM55-RM1600 if applicable) and module with approved meter oil (see point 5) to midway within the sight glass. In the case of a module with a counter (STD CTR, DCID, TC, TCID), fill to the line on the counter dial plate.
4. Depending on the meter model and mounting position (horizontal or vertical), the required volume of oil will be different. Refer to table 2. to obtain the appropriate oil volumes.

TABLE 2. OIL VOLUME REQUIREMENTS
(Imp oz / ml)

METER MODEL	STD CTR, STD ID & DCID		TC & TCID		ECM2® SERIES & AdEM® SERIES	
	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL
RM600/RM16- RM1500/RM40	Module – 6.3oz/180ml Mag.Housing – 1.8oz/50ml Thrust Cov. – 0.9oz/25ml w/BU Ctr – 0.9oz/25ml	Module – 6.3oz/180ml Mag.Housing – 4.4oz/125ml Thrust Cov. – 2.1oz/60ml w/BU Ctr – 3.5oz/100ml	N/A	N/A	Module – N/A Mag.Housing – 1.8oz/50ml Thrust Cov. – 0.9oz/25ml w/BU Ctr – 0.9oz/25ml	Module – N/A Mag.Housing – 4.4oz/125ml Thrust Cov. – 2.1oz/60ml w/BU Ctr – 3.5oz/100ml
RM2000/RM55- RM5000/RM140	Module – 6.3oz/180ml Mag.Housing – 2.3oz/65ml Thrust Cov. – 0.9oz/25ml w/BU Ctr – 0.9oz/25ml	Module – 6.3oz/180ml Mag.Housing – 3.5oz/100ml Thrust Cov. – 2.5oz/70ml w/BU Ctr – 4.4oz/125ml	Module – 5.6oz/160ml Mag.Housing – 2.3oz/65ml Thrust Cov. – 0.9oz/25ml w/BU Ctr – 0.9oz/25ml	Module – 8.8oz/250ml Mag.Housing – 3.5oz/100ml Thrust Cov. – 2.5oz/70ml w/BU Ctr – 4.4oz/125ml	Module – N/A Mag.Housing – 2.3oz/65ml Thrust Cov. – 0.9oz/25ml w/BU Ctr – 0.9oz/25ml	Module – N/A Mag.Housing – 3.5oz/100ml Thrust Cov. – 2.5oz/70ml w/BU Ctr – 4.4oz/125ml
RM7000/RM200- RM23000/RM650	Module – 6.3oz/180ml Mag.Housing – 3.5oz/100ml Thrust Cov. – 1.4oz/40ml w/BU Ctr – 1.8oz/50ml	Module – 6.3oz/180ml Mag.Housing – 11.6oz/330ml Thrust Cov. – 8.8oz/250ml w/BU Ctr – 9.7oz/275ml	Module – 8.4oz/240ml Mag.Housing – 3.5oz/100ml Thrust Cov. – 1.4oz/40ml w/BU Ctr – 1.8oz/50ml	Module – 20.8oz/570ml Mag.Housing – 11.6oz/330ml Thrust Cov. – 8.8oz/250ml w/BU Ctr – 9.7oz/275ml	Module – N/A Mag.Housing – 3.5oz/100ml Thrust Cov. – 1.4oz/40ml w/BU Ctr – 1.8oz/50ml	Module – N/A Mag.Housing – 11.6oz/330ml Thrust Cov. – 8.8oz/250ml w/BU Ctr – 9.7oz/275ml
RM25000/RM700- RM56000/RM1600	Module – 6.3oz/180ml Mag.Housing – 10.5oz/300ml Thrust Cov. – 8.2oz/230ml w/BU Ctr – 8.2oz/230ml	Module – 6.3oz/180ml Mag.Housing – 32.4oz/925ml Thrust Cov. – 30.0oz/850ml w/BU Ctr – 30.0oz/850ml	N/A	N/A	Module – N/A Mag.Housing – 10.5oz/300ml Thrust Cov. – 8.2oz/230ml w/BU Ctr – 8.2oz/230ml	Module – N/A Mag.Housing – 32.4oz/925ml T Thrust Cov. – 30.0oz/850ml w/BU Ctr – 30.0oz/850ml

Note: Side reading STD CTR meters require an oil volume for the module of 4.2 oz/120ml. In the case of ECM2® series and AdEM® series use the oil volumes for the magnetic housing and thrust cover for the applicable meter size.

The ECM2® series module and AdEM® series module being electronic does not require oil in the module.

5. Approved meter oil is available from Romet in one litre (quart) plastic bottles and filled to specific volume according to meter size. Other approved oil: Shell Morlina S2 BL 10. The use of non-approved oil and/or additives, without Romet's prior consent, may void the warranty. Consult the MSDS sheet before use.
6. Ensure all plugs have been installed with a sealant around plug (used to prevent leaks).

POST INSTALLATION

1. Turn the gas supply on slowly (maximum 5 psig or 35 kPa (0.35 bar) per second), checking constantly for leaks. Turning the gas supply on too quickly can over speed and possibly damage the meter.
2. The flow rate of the meter should be checked to insure that the meter is correctly sized for the application and that the rated capacity (Qmax) is not being exceeded. The rated capacity (Qmax) is indicated on the serial plate that is located on the thrust cover. After installing the meter, the customer's total gas load should be turned on to ensure that the meter is sized correctly for the maximum flow rate. By measuring the number of seconds that the instrument drive or right hand uncorrected counter wheel takes to complete one rotation, the meter can be "clocked" to calculate the actual flow rate, using the formula below:

$$\text{ACTUAL VOLUME PER HOUR} = \frac{\text{TEST VOLUME}}{\text{ROTATION TIME}} \times 3600$$

Test volume - Volume of gas (CF or m³) for one complete revolution of the instrument drive or right hand wheel of the uncorrected counter.

METER	VOLUME/REVOLUTION	METER (ECM2®)	VOLUME/REVOLUTION EQUIVALENT
RM600 - RM1500	10 CF	RM600 - RM1500	10,100,1000,10000 CF
RM2000 - RM11000	10 CF/100 CF	RM2000 - RM11000	10,100,1000,10000 CF
RM16000 - RM23000	100 CF	RM16000 - RM23000	100,1000,10000 CF
RM25000 - RM56000	100 CF	RM25000 - RM38000	100,1000,10000 CF
RM16 - RM85	0.1 m ³	RM16 - RM85	0.10,1.00,10.00,100.00 m ³
RM140 - RM650	1.0 m ³	RM140 - RM650	1.00,10.00,100.00 m ³
RM700 - RM1600	1.0 m ³	RM700 - RM11000	1.00,10.00,100.00 m ³

Rotation time - The time in seconds for one complete revolution of the instrument drive or right hand wheel of the uncorrected counter.

MAINTENANCE

The meter oil should be clear and at the correct fill levels (refer to section INSTALLATION, point 4). Under normal operating conditions, it is recommended that the oil should be inspected every 3 - 5 years and changed or "topped up" as required. The oil replacement period will be dependent on the cleanliness of the gas being measured. Pressure access plugs are offered, as an option to permit oil filling and draining while the meter is pressurized and operating. See WARNING below.

If the meter is running abnormally "slow" or has stopped due to contamination from the gas stream, or service the meter as outlined in the Romet Shop Manual. Always drain all of the oil before removing the meter from the installation to prevent the oil from entering the measurement chamber during handling. After completing the servicing of the meter, a differential pressure or proof test should be performed to ensure that the meter is clean and in good operating condition.

WARNING: Meters must be de-pressurized and purged of gases prior to being removed from the line or serviced, and prior to filling the chambers with oil.

Meters equipped with pressure plugs (i.e. Pete's Plugs) may be filled with oil while the meter is pressurized and operating, with the use of proper equipment.

TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
Meter stopped	<ol style="list-style-type: none"> 1. Obstruction of inlet of meter or jamming the impellers (i.e. weld bead, stone, tap shaving, plastic flange cap) 2. Mounting flanges have not been properly aligned or are not at the correct F_L dimension, deforming the meter body and causing the impellers to jam against the cylinder wall. 3. Mechanical instrument has seized on an instrument drive meter 	<ol style="list-style-type: none"> 1. Shut off the gas supply to the meter, depressurize and purge the line of any gas. Remove the access plug from the thrust cover of the meter and insert a clean screwdriver until it engages the slotted crank cap on the end of the impeller shaft. Rotate the impellers back and forth to expel the obstruction. If the obstruction cannot be expelled, remove the meter from service and disassemble the meter per the procedure in the Romet Service Manual. Reinstall the meter per section INSTALLATION of this bulletin. 2. Correctly align the mounting flanges, following the specifications in section PRE-INSTALLATION point 3 of this bulletin. 3. Check if the orientation of the instrument is correct. Repair or replace the instrument. The recommended maximum torque that an instrument should transmit to the drive of the meter is 4 in oz or 0.004 Nm. The instrument drive module should be inspected for any damage per the Romet Shop Manual.
Impellers rubbing, meter noisy	<ol style="list-style-type: none"> 4. Mounting flanges have not been properly aligned or are not at the correct F_L dimension, deforming the meter body and causing the impellers to rub against the cylinder wall. 5. Damaged impellers or timing gears 	<ol style="list-style-type: none"> 4. Correctly align the mounting flanges, following the specifications in section PRE-INSTALLATION point 3 of this bulletin. 5. Return the meter to Romet for inspection.
Meter accuracy low and differential pressure high in comparison to the factory results.	<ol style="list-style-type: none"> 6. Impellers and/or bearings contaminated (dirt, pipe scale, pipe dope, moisture, distillate, etc). 7. Mechanical instrument on an instrument drive meter is producing excessive drag. 8. Meter has been overfilled with oil and the oil has passed through the impeller bearings, contaminating the measurement chamber. 9. Meter was filled with oil prior to installation. Oil may have passed through the impeller bearings during handling and contaminated the measurement chamber. 	<ol style="list-style-type: none"> 6. Shut off the gas supply to the meter, depressurize and purge the gas from the line. Drain the oil from the meter and remove the meter from service. Flush and service the meter as outlined in the Romet Shop Manual. Reinstall the meter and refill the oil per the procedures in section INSTALLATION of this bulletin. Any upstream filters or strainers should be inspected and cleaned or replaced as required. 7. Check the orientation of the instrument and repair or replace the instrument. The recommended maximum torque that an instrument should transmit to the drive of the meter is 4 in oz or 0.004 Nm. 8. Shut off the gas supply to the meter, depressurize and purge the gas from the line. Drain the oil from the meter and remove the meter from service. Flush and service the meter per the Romet Shop Manual. Reinstall the meter and refill the oil as per the procedures in section INSTALLATION of this bulletin. 9. See remedy no. 8.

<p>Meter accuracy low and/or differential pressure high in comparison to the</p>	<p>10. Mounting flanges are not properly aligned or at the correct F_L dimension, deforming the cylinder body of the meter and causing the impellers to rub on the cylinder and/or the impeller bearings to bind.</p> <p>11. Worn or corroded impeller bearings.</p> <p>12. Hoses and/or connections between the prover and the test meter are leaking.</p>	<p>10. Correctly align the mounting flanges, following the specifications in section PRE-INSTALLATION point 3 of this bulletin.</p> <p>11. Install new bearings. Refer to the Romet Shop Manual for the proper procedure.</p> <p>12. Run a leak test on the prover system and fix any leaks.</p>
<p>Meter accuracy substantially higher than the factory test results.</p>	<p>13. The master meter of the transfer prover may have been contaminated during previous tests and running slow.</p> <p>14. Incorrect module is mated to the pressure body (i.e. RM5000 body with an RM7000 module)</p> <p>15. Incorrect module setting in electronic module</p> <p>16. Module is defective</p>	<p>13 Check the master meter accuracy with a reference meter.</p> <p>14 Remove the module from the meter body and verify that the number stamped on the module face plate matches the meter body (e.g. "5" matches with an RM5000 body)</p> <p>15 Verify that the setting of electronic module matches the pressure body.</p> <p>16 Repair or replace module</p>
<p>Meter accuracy substantially lower than the factory test results.</p>	<p>17. Incorrect module is mated to the pressure body (i.e. RM7000 body with an RM5000 module)</p> <p>18. Incorrect module setting in electronic module</p> <p>19. Module is defective</p>	<p>17. Remove the module from the meter body and verify that the number stamped on the module face plate matches the meter body (e.g. "5" matches with an RM5000 body)</p> <p>18. Verify that the setting of electronic module matches the pressure body.</p> <p>19. Repair or replace module</p>
<p>Excessive vibration when the meter is running</p>	<p>20. Contaminates on the impellers.</p> <p>21. Worn or corroded impeller bearings</p>	<p>20. Refer to remedy no. 6</p> <p>21. Install new bearings. Refer to the Romet Shop manual for the proper procedure. Check the mounting flange alignment to ensure that the wear on the bearings is not attributable to misalignment. Refer to section PRE-INSTALLATION point 3 of this bulletin.</p>



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