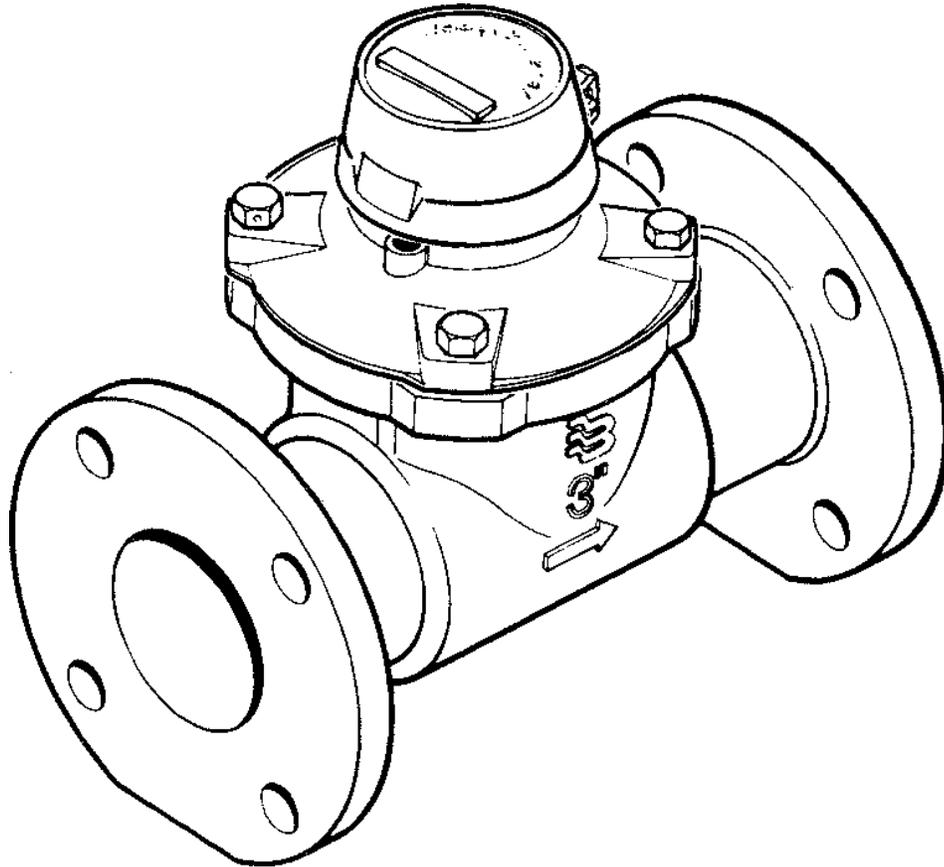


**Recordall® II  
Turbo Meters**

**Sizes 2", 3", 4", 6" and 8"**

**Installation &  
Operation Manual**



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**RT-IOM-3**  
P/N: 62014-003 Rev. 5

12-01

## PREFACE

### SCOPE OF MANUAL

This manual contains information concerning the installation, operation and maintenance of Recordall II® Turbo meters with magnetic drive. To ensure efficient operation of the meters, the instructions in this manual should be thoroughly read and understood. Retain this manual in a location where it is readily available for reference.

### CHANGES IN MANUAL

changes or additions to the original edition of this manual will be covered by a "CHANGE NOTICE" supplied with the manual. The "CHANGE NOTICE" will explain any differences between the turbo meter received and the meters described in this manual.

## Section I

### GENERAL INFORMATION

#### 1-1. DESCRIPTION

Recordall II Turbo meters utilize proven design features such as thrust compensated rotor geometry, direct drive magnetic coupling and dual outboard rotor bearings to achieve high accuracy over a broad flow range. Extended product service life is achieved at higher levels of accuracy, in addition to lower meter maintenance costs. This manual covers Recordall II Turbo meters in 2", 3", 4", 6" and 8" sizes.

Incorporating unitized construction with corrosion-resistant assemblies, the basic components of the Recordall II Turbo are the housing and completely removable measuring element. permanently sealed for greater product reliability, the straight-reading local register and remote-reading Read-o-Matic® generator or RTR® allow on-line servicing. The meter housing and cover plate are bronze (2" - 8"). The measuring element, which is interchangeable among different sized meters, is constructed of high-impact strength thermoplastic. Recordall II Turbo meters are also equipped with an integral calibration vane for in-line accuracy calibration.

In the operation of a turbo meter, water flows through the straightening vanes and a nose cone at the inlet side of the meter so that the swirling effect of upstream piping is minimized. The water then strikes the rotor blades, causing the rotor to turn. In the 4", 6" and 8" sizes, a portion of the water flows through the annular space between the measuring element and the housing. However, because the flow is turbulent and there is minimal pressure drop induced by the measuring element, the flow stream velocity is uniform allowing the flow to be measured accurately and completely.

Motion of the rotor is transferred by means of a worm drive to a vertical spindle, which transmits the rotation to the meter's register of Read-o-Matic generator. The direct drive magnetic coupling provides accurate flow registration during line surges, and allows the hermetically-sealed register to be easily removed to facilitate on-line service.

A pictorial description of the meter's components can be found in the illustrated repair parts list RT-P-3. The location and

identification of assemblies comprising the Recordall II Turbo meters are shown on the exploded view illustration of RT-P-3. Each assembly or part carries an item number that is cross referenced to an associated parts list which consists of the service assemblies and parts shown in the exploded illustration. The list provides the following information:

- a. Item number
- b. Name of part
- c. Part number

#### 1-2. CONFIGURATIONS AND SPECIFICATIONS

The descriptive brochure, exploded parts list, pressure loss and accuracy charts included with this manual show the available sizes, flow range, head loss, laying length and weight for Recordall II Turbo meters. The difference between various meter configurations relate primarily to flange connections and options for units of registration, i.e., U.S. gallons, cubic feet, etc. Materials used in the construction of the meters are also described in the accompanying literature.

#### 1-3. ACCESSORIES

Badger's Read-o-Matic remote reading is available as an option for Recordall II Turbo meters. This offers special advantages for installations where access to the meter is difficult. The Read-o-Matic system consists of a register-generator mounted on the meter and a remote register which is connected to the generator with two-conductor wire. Pulses transmitted by the generator operate the counters on the remote register. The RTR Register is also an option, allowing various MRT solutions.

Badger Plate Strainers 2" - 8" are also available. Recommended for use with all turbo meters, Badger Plate Strainers provide exceptional meter protection while improving meter accuracy and reliability.

And for fully-automatic meter reading, ACCESSplus®, TRACE®, etc. can be used in conjunction with the Recordall II Turbo.

## Section II

### INSTALLATION

#### 2-1. UNPACKING AND INSPECTION

To avoid damage in transit, Badger Recordall II Turbo meters are shipped to the customer in special shipping containers. Upon receipt of shipment, be sure to follow these unpacking and inspection procedures:

#### NOTE

If damage to a shipping container is evident upon receipt of a meter, request that a representative of the carrier be present when the meter is unpacked.

A. Carefully open the shipping container, following any instructions that may be marked on the container. Remove all cushioning material surrounding the meter and carefully lift the meter from the container. Keep the container and all packing material for possible use in reshipment or storage.

B. Visually inspect the meter and applicable accessory devices for any signs of damage such as scratches, loose or broken parts or other physical damage that may have occurred during shipment.

## NOTE

If damage is found, request an inspection by carrier's agent within 48 hours of delivery. Then file a claim with the carrier. A claim for equipment damaged in transit is the responsibility of the customer.

## 2-2. INSTALLATION

Procedures for installing Badger Recordall II Turbo meters are essentially the same for all meter sizes. Any special instructions required for the installation or connection of accessory devices such as strainers will be provided as supplements to this manual. Figure 1 outlines a recommended meter installation.

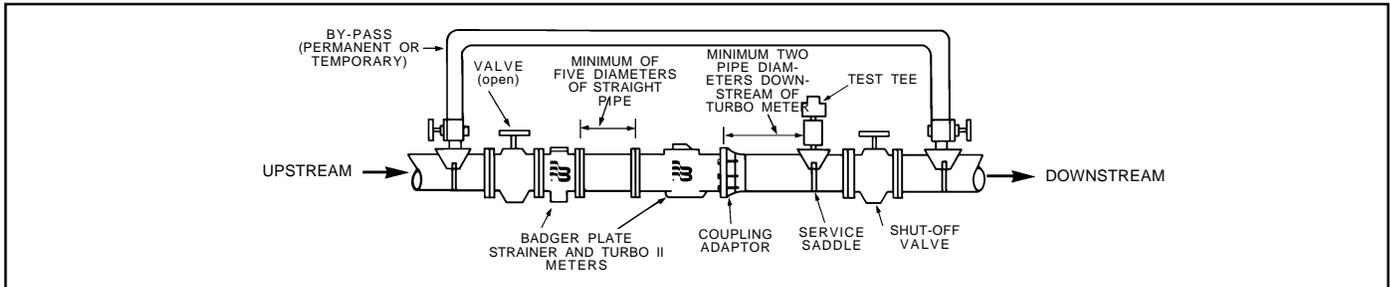


Figure 1. Recommended Meter Installation

## CAUTION

The life of the turbo meter will be curtailed if operated at flow rates higher than specified. (See Bulletin RT-3).

2. The meters are designed for use in cold water service (up to 120° F or 49° C) within the applicable flow requirements for turbo meters. For use with water at higher temperatures, consult your Badger Meter representative or nearest Badger regional sales office.

3. If solid material is present in the water to be metered, a strainer must be installed in the service piping upstream of the meter. The strainer, in addition to protecting the meter from debris in the line, minimizes the effect of velocity profile distortions or turbulence caused by changes in pipe direction or valving resulting in more accurate registration. Contact your Badger representative for information on Badger® Plate Strainers.

4. Avoid locating the meter in close quarters. Allow sufficient space to permit access for meter reading, testing, and maintenance.

5. Because of the need to test large meters periodically to verify their performance, it is recommended that a bypass system be incorporated into the piping arrangement. This will also provide a means of performing periodic cleanout and routine maintenance without interrupting service to the customer. A test tee can be installed downstream of the meter for field accuracy testing.

6. The Recordall II Turbo is accuracy and pressure tested prior to shipment, therefore no field adjustments are required. As turbine performance is directly related to the flow conditions of the water stream entering the meter, upstream fittings and piping changes can adversely affect flow registration. To insure valid registration and proper performance, the following factors should be considered when installing Recordall II Turbo meters:

A. PRELIMINARY CONSIDERATIONS. Before proceeding any further with the installation, first read the instructions in the paragraphs immediately following to become familiar with the requirements and procedures involved.

## NOTE

Badger Recordall II Turbo meters are designed for operation in HORIZONTAL piping arrangements.

1. Be sure that the meter flow range and size of the meter coincide with the intended service and demand for water.

a. When installing the meter with a Badger Plate Strainer, a minimum of five (5) pipe diameters of straight, unobstructed pipe is required upstream of the meter. (A minimum of ten (10) pipe diameters of straight, unobstructed pipe is required upstream of a meter installed without a plate strainer. The deletion of a strainer, however, is not recommended.) This allows for dampening of velocity profile distortions caused by elbows, pumps, dirt traps, etc., prior to the meter. Where spiral flows are created by three dimensional elbows or rotary pumps, additional distance to dampen the effect is beneficial. If basket or Y-type strainer is utilized, it should be placed five (5) to ten (10) pipe diameters prior to the meter to dampen velocity profile distortions created by this design.

b. Do not install check valves or pressure reducing devices upstream of the meter.

c. Valves immediately upstream of the meter should only be fully-open gate valves. Butterfly valves are acceptable if they are five (5) pipe diameters or more upstream from the meter. Downstream, fully open gate or butterfly valves can be used.

d. The service saddle (or reducing tee) which is used for field accuracy testing should be at least two (2) pipe diameters downstream of the meter's outlet flange.

e. Unweighted check valves should not be located closer than three (3) pipe diameters downstream of the meter.

f. Externally weighted check valves and pressure reducing devices should not be located closer than five (5) pipe diameters of the meter.

g. When installing a turbo meter and plate strainer of a size smaller than the pipe installations, to reduce the effect of jetting caused by the increase in flow velocity, a minimum of five (5) pipe diameters is required upstream of the meter. Additional length is required if a sharp contraction or an eccentric reducer, rather than a concentric, tapered reducer is used.

B. **INSTALLING THE METER.** Overall dimensions and laying lengths of each meter size are shown in bulletin RT-3. After reviewing the applicable dimensional requirements, choose an appropriate installation point in the piping and proceed as follows;

1. Measure precisely the overall length of the meter with gaskets attached to the inlet and outlet flange connections.
2. Provide proper gap length in service piping.
3. Install meter in the pipeline so that the flow arrow on the meter housing points in the same direction as water flow.
4. With meter and gaskets in place, tighten flange connection bolts.
5. To relieve possible strain on the piping, it is recommended that a meter support be used under the meter housing where appropriate.

#### **CAUTION**

Turbine meters must operate in a completely filled line at all times. The downstream piping must always be arranged to provide sufficient back pressure to maintain a full line at the meter. By eliminating air in the line, as well as sudden flow surges, inaccurate registration and damage to the turbine mechanism can be avoided.

#### **2-3. REMOTE REGISTER OPTION**

Badger Meter Read-o-Matic generators and Model 570 remote reading registers are designed for use with the Recordall II Turbo. If the meter has been purchased with a Read-o-Matic remote register, the installation guidelines as outlined in bulletin ROM-I-3 should be followed.

Before proceeding with installation, be sure that the ROM generator and register or RTR Register accessory correspond to the meter size, and unit of measure.

### **Section III MAINTENANCE**

#### **3-1. GENERAL**

This section is limited to information about general preventative maintenance and calibration procedures for Badger Recordall II Turbo meters, whereas instructions for disassembling the meters for servicing can be found in Section IV. A repair parts list, exploded views and other illustrations are provided as a supplement to this manual.

#### **3-2. MAINTENANCE EQUIPMENT**

The tools and equipment recommended for servicing and maintenance of Recordall II Turbo meters consist of the usual complement of hand tools used by plumbers and mechanics.

#### **3-3. PREVENTATIVE MAINTENANCE**

The purpose of preventative maintenance is to ensure efficient operation and long life by detecting and correcting any condition that may damage the meter or cause it to fail. Maintenance intervals are a function of the water quality and operating flows experienced by the meter. Preventative maintenance includes periodic inspection, accuracy testing and cleaning procedures.

##### **A. PERIODIC INSPECTION**

1. Visually inspect the meter for missing hardware, loose screws, broken or scratched register lens or any other signs of wear or deterioration. Replace worn parts as required.

#### **2-4. PERFORMANCE CHECKS**

Any valves or devices controlling the flow of water through a turbo meter must always be opened and closed SLOWLY to prevent shock loads that may damage the meter's rotor assembly.

Complete the following checks to ensure that a turbo meter is properly installed and operational:

A. Slowly open upstream valve to apply water pressure to the meter and check to see if there are any leaks. Tighten flange bolts as required. Under normal operation this valve must be fully opened.

B. Perform a functional test of the meter. Slowly open valve on downstream (consumer) side of the meter to evacuate any air that may have been trapped in the service line. When air has been eliminated, increase demand flow rate by further opening of downstream valve or valves. Observe register for correct direction of flow. The large test pointer will now move in the proper direction. Now open all applicable service valves.

C. Adjust rate of flow by throttling with the downstream valves so the flow does not exceed the maximum continuous duty specification in Bulletin RT-3. The rate of flow can be quickly checked by timing the quantity registered through the meter in one minute.

#### **2-5. SHUTDOWN INSTRUCTIONS**

If the turbo meter is to be shut down for an extended period of time or if it is being removed from service, Badger recommends that the meter and measuring components be thoroughly flushed to prevent the settling out of undissolved solids or the accumulation of corrosive deposits. If there is an upstream strainer in the line, it also should be flushed at this time.

2. Verify that the meter operates at the proper flow rate and pressure. A loss in pressure coupled with a decrease in flow rate may indicate that the screen in the upstream strainer or the meter itself is clogged and needs cleaning.

##### **B. CLEANING**

1. Clean all dirt, grease, moisture or other foreign material from the exterior of the meter. Use a cleaning solvent or volatile mineral spirits to remove grease or oil. To clean the measuring element, soak for 12 hours in a mild soap-based cleaner or detergent, and then use a stiff bristle brush to remove any deposits. After cleaning, rinse thoroughly with water and dry.

2. In the event that the system pressure has been reduced and the upstream strainer or meter is clogged, the foreign material must be flushed out. To flush the strainer, open the cleanout plug and purge the foreign material with fresh water from the service line. After the strainer has been cleaned, purge the meter with fresh water which can be discharged at the nearest downstream outlet.

#### **3-4. CALIBRATION CHECK AND ADJUSTMENT**

The accuracy of Badger Recordall II Turbo meters is tested at the factory before shipment. However, after a long period of service, it may be necessary to retest and recalibrate a meter.

The meter can be tested for accuracy using appropriate connections with either a test tank of known volume or a test meter. The Recordall II Turbo's integral calibration vane, which can be calibrated under line pressure, simplifies calibration and reduces calibration time. The following instructions are provided to assist in performing a calibration check and adjustment.

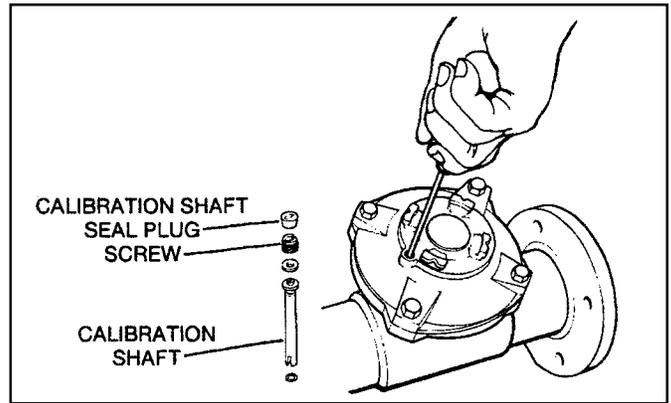
#### A. ACCURACY TEST

1. Place a test tank of known volume at the output of the meter. (An alternative is to connect a calibrated test meter to the output.) Accuracy testing requires test volumes at least as large as the register test circle.
2. As in testing the accuracy of any meter, the Recordall II Turbo must first be purged of air by running water through the meter.
3. Operate the meter until the test tank is filled to the calibrated level or the predetermined quantity has registered on the calibrated test meter. Because accuracy may vary slightly with flow rate, it is recommended that the meter be tested at low, intermediate and high flows.
4. Record the quantity registered on the meter during the test.
5. Perform the following calculations to determine meter accuracy:

$$\frac{\text{Quantity Registered on Meter}}{\text{Test Tank or Test Meter Quantity}} \times 100 = \text{Meter Accuracy}$$

**B. CALIBRATION.** The meter's calibration vane is preset at the factory and sealed. In normal service, it should not have to be reset. If a retest is required in which a calibrated test stand reveals that the adjustment vane needs recalibration, proceed as follows (see Figure 2):

1. Remove calibration shaft seal plug.
2. Loosen calibration shaft screw.



**Figure 2. Calibrating Recordall II Turbo Meter**

3. Adjust calibration vane with screw driver as follows:  
**TO INCREASE REGISTRATION.** Turn the calibration shaft clockwise. This speeds up the rotor increasing registration.  
**TO DECREASE REGISTRATION.** Turn the calibration shaft counter clockwise. This slows down the rotor decreasing registration.

#### NOTE

The total range of the calibration adjustment is about 6%. Tested and calibrated at the factory, the calibration vane will allow for a  $\pm 3\%$  adjustment in the field.

4. With the calibration shaft turned to the desired setting, tighten the calibration shaft screw while maintaining the calibration shaft position.
5. Retest the meter to confirm the accuracy of the calibration setting. If the meter is still out of calibration, repeat the procedure.
6. Replace the calibration shaft seal plug with a new one.

## Section IV SERVICING

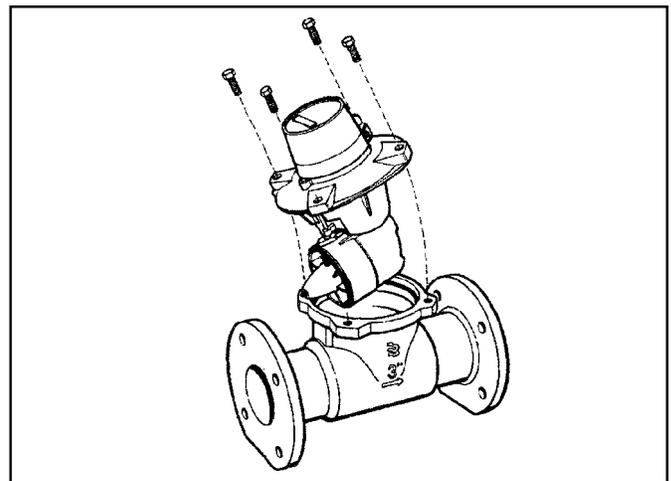
### 4-1. GENERAL

When the performance of the meter indicates a need for servicing, refer to the following instructions pertaining to removal, inspection and installation of service parts and assemblies. With the Recordall II Turbo's unitized construction and measuring elements which are interchangeable among different sized meters, service is simplified with a reduction in required product maintenance training. Also refer to the illustrated repair parts list RT-P-3 included with this manual for part numbers of replaceable components and for ordering information. If satisfactory repair cannot be achieved, contact the Utility Division of Badger Meter, Inc.

### 4-2. REMOVAL OF METER HEAD

Recordall II Turbo meters can be serviced without removing them from the line. A typical installation would be equipped with drain and piping valves. To inspect or replace components of the head assembly (see Figure 4), close the upstream and downstream valves. Wherever an installation is equipped with a drain valve for meter flushing, open the drain valve to relieve pressure within the meter. However, if the installation does not have a drain valve, proceed as follows to relieve pressure:

- A. Loosen each of the head bolts about one and one-half turns. Do not remove the head bolts completely.



**Figure 3. Measuring Element Assembly Removal**

- B. If the O-ring or housing gasket between the meter head and the housing is secure and not leaking, pry the measuring element assembly loose by inserting a screwdriver blade at the outlet side where the head and housing join together. Prying the element loose on the inlet side of the head flange will result in damage to the element.

### CAUTION

Be sure that any water coming out of the meter head does not spray onto electrical equipment to create a shock hazard.

- C. Allow the meter to drain and relieve internal pressure.
- D. When pressure is relieved, remove the head bolts completely. Then lift the measuring element assembly from the housing, at the same time tilting it forward allowing the nose cone to come clear of the housing (see Figure 3.) Remove the O-ring or housing gasket. Attempting to lift the element straight up, or tilting it backwards before it clears the housing may damage the element.

### NOTE

A dummy cover plate is available to close the meter in the line and continue service while the measuring element assembly is being inspected or serviced. (See illustrated parts list RT-P-3.)

### 4-3. LOCAL REGISTER REMOVAL

The Recordall II Turbo meter register or RTR Register are easily removable to facilitate on-line service. Remove the register cover and clamp ring by removing the seal screw which acts as a hinge pin. The clamp ring is removed by spreading it slightly apart at the open side to provide clearance so it can be lifted off the measuring element assembly (see Figure 4.) The register can now be removed. To reinstall the register, follow the above procedure in reverse order. On meters after circa 1992, see flat lid and shroud instructions.

### 4-4. READ-O-MATIC GENERATOR REMOVAL

Remove wire well cover plate on register-generator by unscrewing the cover plate seal screw. Then disconnect the wire leads from the terminals in the well of the register-generator.

Unscrew the second seal screw which secures the generator on the bayonet lock detent. Rotate the generator 45 degrees to release it from the bayonet lock.

To install the generator, follow the above procedure in reverse order.

### 4-5. MEASURING ELEMENT ASSEMBLY

The measuring element insert can be removed from the cover plate for service or replacement by unscrewing the four screws (see Figure 4.) Remove the O-ring or housing gasket. Check for damage and clean or replace prior to reassembling.

The upper transmission bearing components can be removed from the cover plate if worn or damaged. Unscrew the bearing bushing and replace both it and the teflon disc with new parts.

### 4-6. STRAIGHTENING VANES

The straightening vanes are an independent component assembled to the interior of the measuring element insert (see Figure 4.) Remove the straightening vane O-ring.

### NOTE

This O-ring is installed in the 2" and 3" Recordall II Turbo so that the entire water volume flows through the measuring element. For sizes 4", 6", and 8", the O-ring is not necessary as a portion of the water flows through the annular space between the measuring element and the housing.

Unscrew the straightening vane setscrew or depress the detent ball. Take hold of the straightening vanes and turn counter-clockwise thereby releasing the calibration vane lever in the bayonet-like slot. Pull the straightening vanes out from the measuring element insert. If stuck, loosen with slight tapping with a rubber mallet on the measuring element insert.

Pull calibration vane lever upward to remove. Lift calibration vane slightly to remove from straightening vanes.

Refer to Section 4-9 of this manual to correctly reassemble components.

### 4-7. CALIBRATION VANE

To disassemble the calibration vane assembly, the following procedures are required (see Figure 4.) Pull down the calibration shaft driver from the calibration shaft. Remove the calibration shaft seal plug and unscrew the calibration shaft screw from the cover plate. Remove the calibration shaft O-ring and calibration shaft. The calibration shaft can be pressed out of the cover plate from below. The calibration shaft slide ring may be removed if a leak exists at this point in the disassembly of the meter. If replaced, the calibration shaft O-ring should be coated slightly with a silicon grease before insertion. Clean all parts as required.

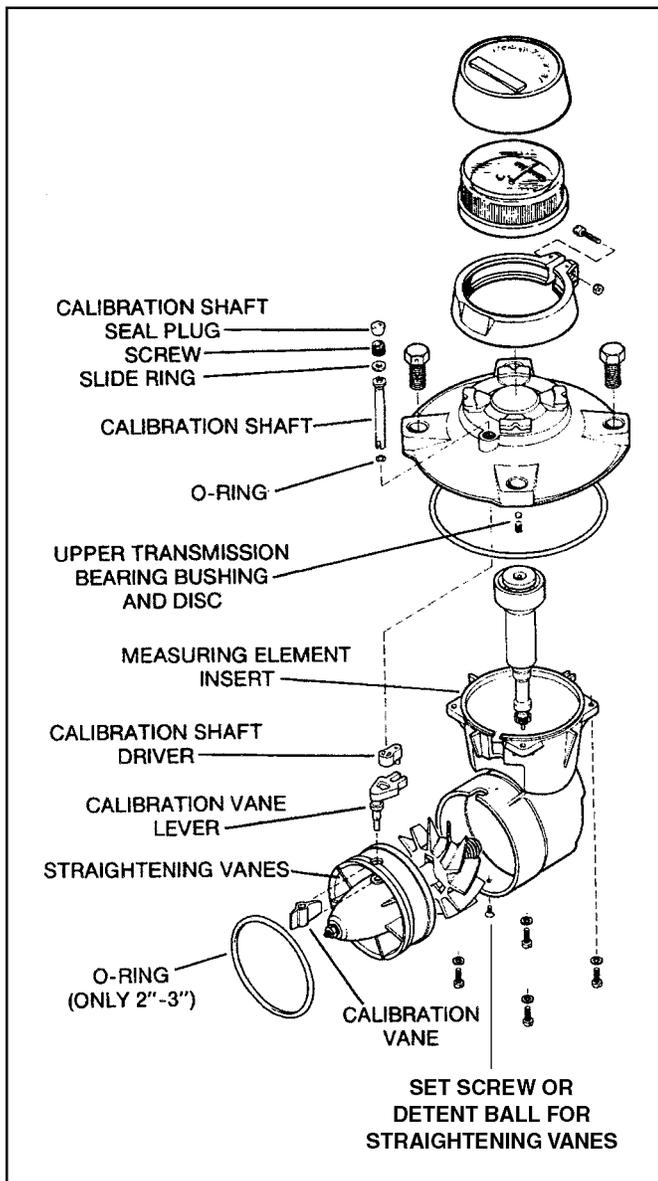


Figure 4. Register and Measuring Element Assembly

## NOTE

When assembling, the calibration shaft driver has to be pressed tightly onto the calibration shaft, engaging it fully, so that the calibration vane cannot vibrate during operation. The calibration shaft screw should also be tightened securely to hold the calibration vane in its desired position.

After the calibration vane assembly is serviced or replaced, be sure to check the accuracy and calibration in accordance with the instructions in section 3-4 of this manual.

### 4-8. TRANSMISSION COUPLING AND BEARINGS

Remove the transmission coupling from the measuring element insert by pulling it upward to disengage the coupling worm gear from the rotor worm (see Figure 4.) Check the condition of the magnet and worm gear on the transmission coupling for damage or wear. If significant wear or damage is present, replace the transmission coupling.

Check the condition of the upper and lower transmission coupling bearing pivot surfaces for size and roundness (see Figure 5.) The diameter of the upper bearing pivot should be .078" - .079" and the lower bearing pivot .117" - .118". The bearing pivot surfaces should be highly polished without any drag lines, with the lower bearing pivot surface showing no signs of wear. Replace transmission coupling if required.

If the transmission bearing bushings exhibit an out-of-round condition, they should be replaced. The upper transmission bearing bushing can be changed by unscrewing it from the cover plate. Both the bushing and teflon disc should be replaced.

The lower transmission bearing bushing can be removed by pulling it out of the measuring element insert with a corkscrew-like tool (see Figure 5.) Press new bushing into the insert over the transmission bearing pin with the larger diameter hole in the bushing pointing toward the bearing pin. The bushing can be secured additionally with a very small drop of adhesive (such as loctite) at the outer edge of the bushing where it meets the insert.

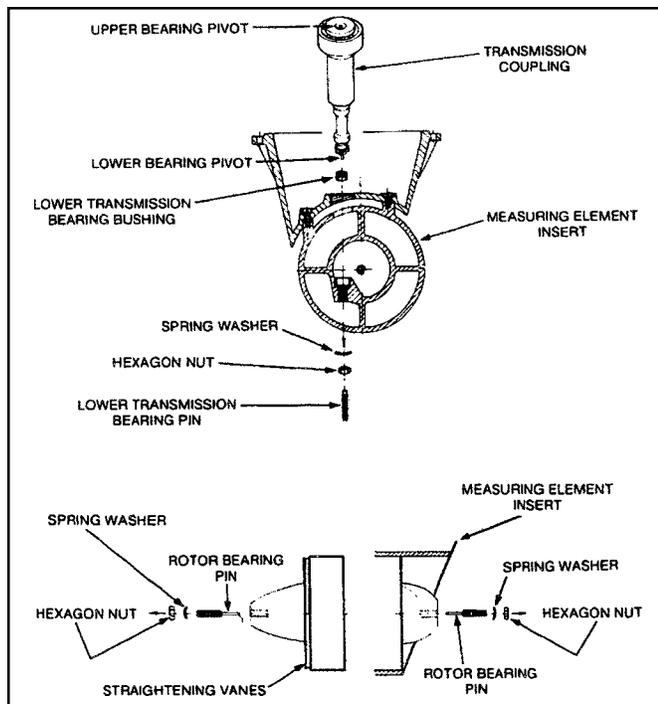


Figure 5. Rotor and Lower Transmission Bearing Replacement

Unscrew the transmission bearing pin by first loosening the hexagon nut (see Figure 5.) Remove the nut and washer and remove the bearing pin from the measuring element insert. Check the bearing surface to insure it is in good condition, with a smooth, even surface.

## NOTE

The lower bearing pivot of the transmission coupling needs to reset upon the lower transmission bearing pin surfaces for correct operation. To achieve this during reassembly, **with light pressure**, screw in the bearing pin until it forces the transmission coupling fast against the upper transmission bearing bushing. **Then back off three-quarters of a turn.** Lock in place with hexagon nut and spring washer.

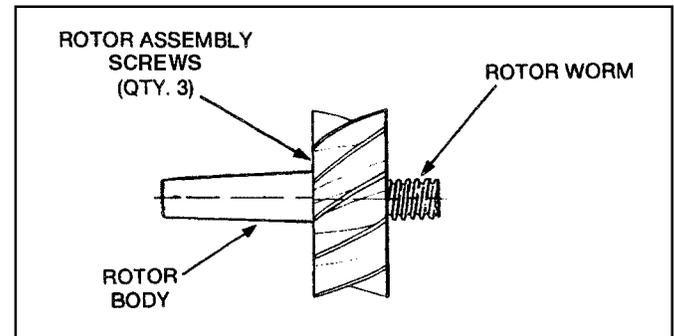


Figure 6. Rotor Assembly (6" - 8" Turbo Meters)

### 4-9. ROTOR AND BEARINGS

The rotor can be inspected by removing the straightening vanes from the measuring element insert as outlined in section 4-6 of this manual.

Check the rotor worm and blades for signs of damage and wear. Also inspect the bearing bushings on the rotor body and worm gear. If replacement is required due to damage or wear, the rotor assembly can be disassembled by removal of the three (3) screws and nuts on sizes 6" - 8" (see Figure 6.) Reinsert these after replacement of needed parts. For the 2" - 4" meters, the entire meter can be replaced.

The rotor bearing pins in the straightening vane and measuring element insert are then inspected for signs of damage and wear (see Figure 5.) The bearing pin diameters should be .127" - .130" and highly polished without any drag lines. The cone of the bearing pin must now show any drag lines and/or wear.

## NOTE

Only highly-polished bearing pin cones guarantee a minimum of friction and optional meter performance.

## CAUTION

When rotor or rotor bearing pins are removed for inspection or replacement, care must be taken during reassembly to achieve the needed clearance between the bearing pin and the rotor so that the rotor spins freely.

Insert and partially screw in the bearing pins into the straightening vane or measuring element insert. Attach the spring washers and hexagon nuts, leaving them loose. Place the rotor assembly in the straightening vane, on the rotor bearing pin. Turn the screw in until the front edge of the rotor blade is at a height of .10" above the rear edge of the straightening vane. Tighten down on the hexagon nut.

Now place the rotor assembly in the measuring element insert on the rotor bearing pin, tipping the insert backwards so that the opening is pointing up. Insert the straightening vane partially into the measuring element insert, engaging the calibration vane lever with the calibration shaft driver. Tilt the measuring element insert assembly forward so that the rotor now engages the rotor bearing pin on the straightening vane also.

#### CAUTION

Be careful not to force the straightening vane into the measuring element insert. Be sure that rotor engages both front and rear rotor bearing pins prior to pressing the straightening vane fully into the measuring element insert.

Press the straightening vane fully into the measuring element insert and turn it clockwise catching the calibration vane lever in the bayonet-like slot. Check to see that the rotor spins freely. If not, remove the straightening vane and repeat the procedure. Insert and tighten straightening vane setscrew.

Tilt the measuring element insert assembly forward. Spin the rotor and tighten down on insert rotor bearing pin until the rotor stops. **Then back off screw one full turn.** Tighten down on the hexagon nut. Check to insure that the rotor spins freely. If not, repeat the procedure.

#### 4-10. REINSTALLING METER HEAD ASSEMBLY

Badger recommends that a new housing O-ring or gasket be used after each teardown and reassembly of the Recordall II Turbo. To provide a tight seal, make sure the surfaces of the housing and meter head are clean and free of any old gasket material. Be careful not to force the measuring element insert into the meter housing. If you experience any binding, **do not force** the element into the housing. Remove the element from the housing and reinsert the unit.

#### NOTE

Head bolts should be tightened similar to that on car tire. First insert the bolts and snug-fit each. Then using a criss-cross pattern, tighten the bolts down. Following this pattern, the meter head will not turn allowing the rotor to remain perpendicular to the flow and eliminating any potential flow distortion. Head bolts should be tightened with between 18 and 23-foot pounds of torque for the 2", 3" and 4" sizes and with between 35 and 40-foot pounds of torque for the 6" and 8" sizes.

To place the meter back in service, close the flushing system drain valve. Open the upstream valve partially, then open the downstream valve slightly to purge air from the service line. Then open both valves completely.

#### ORDERING INFORMATION

Order replacement service parts for your Recordall II Turbo through your local Badger Meter sales representative or directly through Badger Meter, Inc. When placing an order, please provide the following information:

- A. Size of meter.
- B. Registration units, i.e., U.S. gallons, cubic feet, etc.
- C. Complete description of assembly or parts required.
- D. Part number of item as shown in the repair parts list (RT-P-3).
- E. Quantity required.
- F. Purchase order number, plus exact return and billing address.



Please see our website at  
[www.badgermeter.com](http://www.badgermeter.com)  
for specific contacts.

Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding bid obligation exists.



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