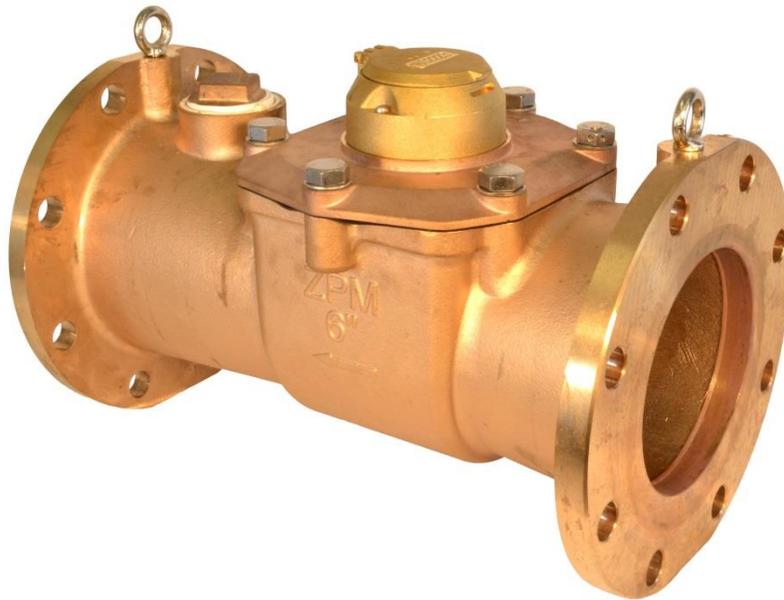


**ZTM AND ZTMB ZENNER TURBINE METERS
INSTALLATION, MAINTENANCE AND SERVICING**



INSTALLATION

1. The meter is intended for measuring potable, cold water in one direction.
2. The meter is to be installed in a horizontal pipeline with the register facing upward.
3. Proper shut-off valves should be installed adjacent to both the inlet and outlet of the meter so service may be shut off without undue inconvenience to the customer whenever the meter must be removed.
4. Because of the need to periodically flow test larger meters, it is also recommended that a bypass system be installed.
5. Clean and flush the service line thoroughly on the inlet side of the meter before installing the meter.
6. Set the meter with the arrow on the meter pointed toward the customer's service line, and install using new bolts and gaskets.
7. Note: It is recommended that a strainer be installed in front of any of our ZENNER Turbine Water Meters.
8. To insure unrestricted flow of water through the meter, use the proper size and type of gaskets. Connections should only be sufficiently tight to seal; do not over-tighten.
9. After the meter is installed, shut off the outlet. Open the inlet shut-off valve slowly until the meter fills with water and then check for leaks.
10. Open the outlet valve slowly, allowing the trapped air to move through the service line and out of the meter. Then open a valve slowly downstream of the meter to allow complete water movement through the meter, checking that no foreign debris has obstructed the water flow.
11. Install an electrical grounding strap around the meter for maintenance while repairing or removing the meter.

To ensure proper registration and performance, the following points should be taken into consideration:

1. When installing turbine meters without a strainer, a minimum of (10) times the pipe diameter should be allowed on the inlet and (5) times the pipe diameter should be allowed on the outlet side of the meter.
2. When installing turbine meters with a strainer, minimum of (5) times the pipe diameter should be allowed on the inlet and five (5) times the pipe diameter should be allowed on the outlet side of the meter.
3. The use of a ZENNER Strainer upstream of the meter offers protection against meter damage caused by debris and assists in reducing turbulence.
4. Do not use elbows bends, check valves, back flow preventers, pressure reducing devices or nonconcentric reducers within ten (10) pipe diameters upstream or five (5) pipe diameters downstream.
5. Gate valves are acceptable immediately upstream of the meter provided they are completely open during operation and are not utilized to restrict or throttle flow rates through the meter.
6. Do not install butterfly valves within five (5) pipe diameters upstream or three (3) pipe diameters downstream of the meter.

Note that the installer should also reference the AWWA M6 Manual for Water Meters – Selection, Installation, Testing, and Maintenance.

MAINTENANCE

This section contains general maintenance instructions for the ZTM and ZTMB ZENNER Turbine Meters. Typically the only components of the ZMT and ZTMB Turbine Meter assemblies that may need adjustment, repair or replacement are the measuring element and the register. Exploded views of these meters with part numbers and descriptions are available on our website at www.zennerusa.com.

Periodic Inspection

- Visually inspect the meter for missing hardware, loose screws or bolts, damaged register, etc. Evaluate and repair or replace as necessary.
- Verify that the meter is operating at the proper flow rate and pressure. If the pressure and flow rate has been reduced, this may indicate that the upstream pipeline, the strainer or the meter itself is clogged and needs cleaning.

Cleaning

- Periodically clean all dirt and debris from the exterior of the meter.
- If it has been determined that system pressure has been reduced, the first step would be to clean out the upstream strainer screen. Shut off the upstream and downstream valves. Remove the strainer cover bolts. Remove the strainer cover. Remove the strainer screen clean off any debris. Reinstall the screen, cover and cover plate bolts. Open up the upstream and downstream valves and verify that the system pressure has been returned to normal.
- If after cleaning the strainer you find that the system pressure is still reduced, then the meter measuring element should also be cleaned out. Shut off the upstream valve. Remove the turbine meter cover plate bolts. Carefully remove the entire unitized measuring element (UME) assembly. Clean out any debris from the measuring element. Reinstall the UME and cover plate bolts. Open up the upstream and downstream valves and verify the system pressure has been returned to normal.

Calibration Check and Adjustment

The meter's calibration is preset at the factory. Under normal operating conditions the calibration should not have to be re-adjusted. Periodically the ZMT/ZTMB ZENNER Turbine Meter can be flow tested on a test bench or in the field to insure that the meter is registering flow accurately. If the flow test indicates the meter is not measuring accurately, an adjustment can be made as follows:

1. Cut the tamper wire seal between the cover plate bolt and the slotted screw with tamper wire hole holding down the Brass Register Cover Assembly.
2. Remove the three slotted screws after which you can remove the Register Cover Assembly.
3. Remove the register from the plastic register retaining ring.
4. There is a plastic disk (Calibration Disk) under the register that is attached to the calibration shaft assembly. The meter calibration can be adjusted by turning the shaft Clockwise (CW) or Counter-Clockwise (CCW) within a range of approximately 80 degrees, using a special spanner wrench. If a spanner wrench is not available, a heavy duty pair of needle nose pliers can be used. The total range of the calibration adjustment is about 6%, which will allow for a $\pm 3\%$ adjustment in the field.

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- a. Turning the Calibration Disk clockwise increases the registration. This speeds up the rotor.
- b. Turning the Calibration Disk counterclockwise decreases the registration. This slows down the rotor.



5. The calibration shaft will stay in the new position without the use of a locking device. Re-install the register and register cover assembly.
6. After setting the calibration, perform another flow test to insure that the turbine meter is now registering accurately. If necessary, re-adjust the calibration within the limits of the calibration shaft.
7. For more detailed test and calibration procedures, refer to the AWWA M6 Manual. Calibration can also be performed at a certified calibration center or by ZENNER USA.
8. If you are unable to adjust the meter calibration within test specifications, the register or the measuring element may need to be repaired or replaced.

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SERVICING PARTS AND ASSEMBLIES

When the ZTM or ZTMB ZENNER Turbine Meters no longer perform to AWWA C701 testing requirements and can't be adjusted, this indicates a need for servicing. This section contains instructions for the removal, inspection and installation of repair parts and assemblies. Exploded views of these meters with part numbers and descriptions are available on our website at www.zennerusa.com.

Removing the Meter Unitized Measuring Element (UME)

The ZTM or ZTMB ZENNER Turbine Meters can be serviced without removing them from the line. To service these meters, close the upstream and downstream valves. If there is a drain valve in the system, relieve the pressure prior to removing the UME. If there is no drain valve in the system, please follow the procedure below to relieve the pressure.

Relieving System Pressure (Note that failure to properly relieve system pressure could allow for the UME to eject from the housing causing injury or property damage)

1. Cut the tamper wire seal between the cover plate bolt and the slotted screw with tamper wire hole holding down the Brass Register Cover Assembly.
2. Loosen each of the cover plate bolts two to three turns. Do not completely remove the bolts
3. If after loosening the bolts water is not coming out of the assembly, gently pry up the cover plate by inserting a flat blade screwdriver between the cover plate and the housing.
4. Allow the meter to drain. Please make sure that the water coming from the meter does not spray onto any electrical equipment potentially creating a shock hazard.
5. When the pressure is relieved, remove the cover plate bolts.
6. Lift the UME from the housing. Note that for turbine meter sizes 1-1/2" through 10", there is a front O-ring seal that may come out separate from the measuring element assembly. Please keep for re-installation.

Removing the Register

1. Remove the three slotted screws holding down the Register Cover Assembly.
 2. Remove the register from the plastic register retaining ring.
- To reinstall the register, use the same procedure in reverse order.

Removing the Measuring Element Assembly (MEA) from the Cover Plate

1. Prior to removing the MEA, evaluate the MEA for obvious damage. If the damage is extensive, consider replacing the MEA complete.
2. For turbine meter sizes 1-1/2" through 4", remove the four screws holding the MEA to the Cover Plate. For turbine meter sizes 6" through 12", remove the six screws holding the MEA to the Cover Plate.

Removing the Back Holder (Rotor Holder) and Rotor

1. Note that the straightening vanes, upper bearing (calibration disk), vertical shaft assembly and magnet components are integrated into the measuring element cage and should not be taken apart.
2. For turbine meter sizes 1-1/2" through 4", remove the one flat head screw holding back holder to the cage. For turbine meter sizes 6" through 12", remove the two flat head screws holding the back holder to the cage.
3. Remove the back holder and the rotor assembly from the cage.
4. Evaluate the back holder for damage to the bearing and the vanes. Replace back holder if necessary.
5. Evaluate the rotor for damage to the worm gear threads, bearing sleeves and the vanes. Replace rotor if necessary.
6. Evaluate the cage components for damage. Replace the cage if any of the following show damage.
 - a. Cage rotor bearing.
 - b. Vertical transmission shaft gear and shaft.

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- c. Upper bearing assembly (calibration disk).
 - d. Upper bearing (calibration disk) O-ring. Replace if necessary.
 - e. Cage housing.
7. After replacing any damage components, reinstall the MEA onto the cover plate.
 8. Install the assembled UME into the meter housing using a new measuring element gasket if necessary. Also, make sure to install the front O-ring seal on the UME where required.

