

DUAL BODY (DB) COMPOUND INSTALLATION INSTRUCTIONS



DESIGN AND OPERATION

The Master Meter Dual Body (DB) Compound Meter is designed for services where high accuracy measurement is required over a broad range flow range. This design combines a turbine meter on the high flow line and multi-jet meter on the low flow line.

A built-in, spring loaded differential pressure valve, located downstream of the turbine meter, regulates the flow of water through the appropriate measuring chamber. At low flows, the differential pressure valve remains closed, and water flows through the multi-jet meter only (Figure 1). When flow increases to about one-half the rated capacity of the low flow meter, hydraulic pressure in the differential pressure valve housing drops to a point where the valve begins to open. This allows water to flow through both the turbine and multi-jet meters. At high flows the differential pressure valve will open completely and water will flow primarily through the turbine meter (Figure 2), with minimal flow through the multi-jet meter. Total registration will be the combination of registration on both the turbine and multi-jet meters.

When flow is decreasing, this process is reversed. The hydraulic pressure in the valve's housing will increase gradually, and the differential pressure

valve will automatically begin to close. At the point where the differential pressure valve is completely closed, the water will again flow through the multi-jet meter only.

The range of flows at which the automatic valve is opening or closing is called crossover or change-over. Crossover occurs over a range that varies by meter size (see Meter Operating Characteristics and Head Loss curves in Master Meter's DB Compound brochure).

At crossover meter accuracy will decrease to about 97% of the actual flow. This accuracy decrease results from the operation of the automatic valve. When pressure is stabilized and the valve will be either completely closed or completely open, registration accuracy will return to $\pm 2\%$ of actual flow in the meter's continuous operating range.

In a DB Compound Meter operating in the crossover range it is normal to observe some "pulsation" of the water flow. Flow pulsation results from the temporarily unstable valve condition (opening or closing), and will be eliminated when the flow rate stabilizes.

4" DBC WATER METER
DIFFERENTIAL VALVE CLOSED POSITION

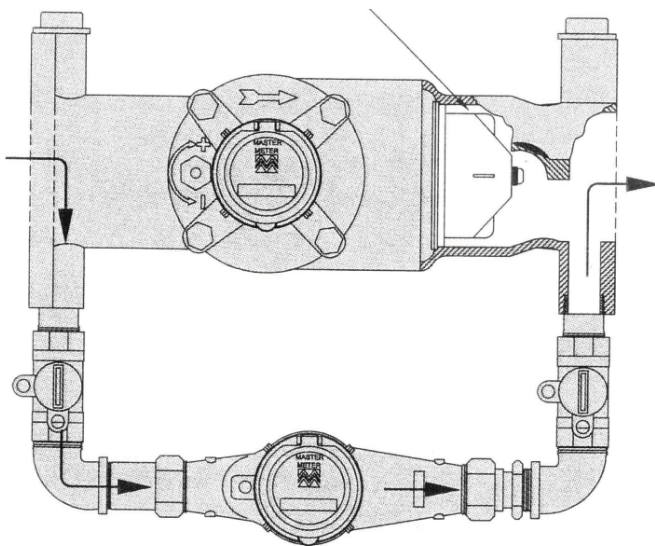


FIGURE 1: DB COMPOUND METER
OPERATION AT LOW FLOWS

4" DBC WATER METER
DIFFERENTIAL VALVE OPEN POSITION

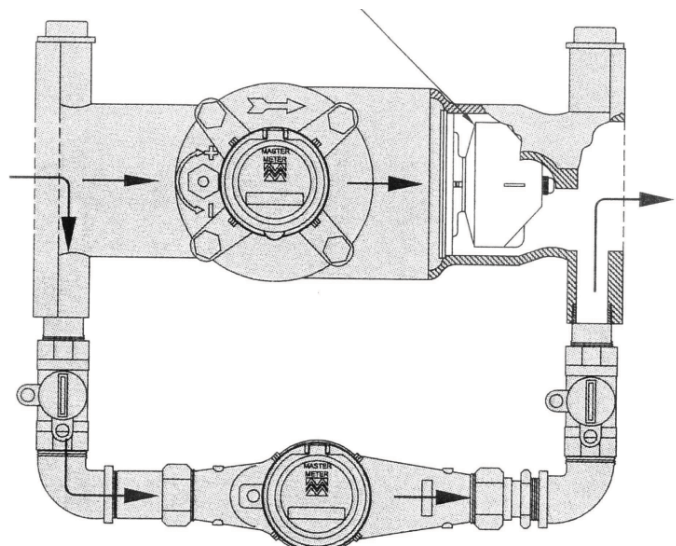
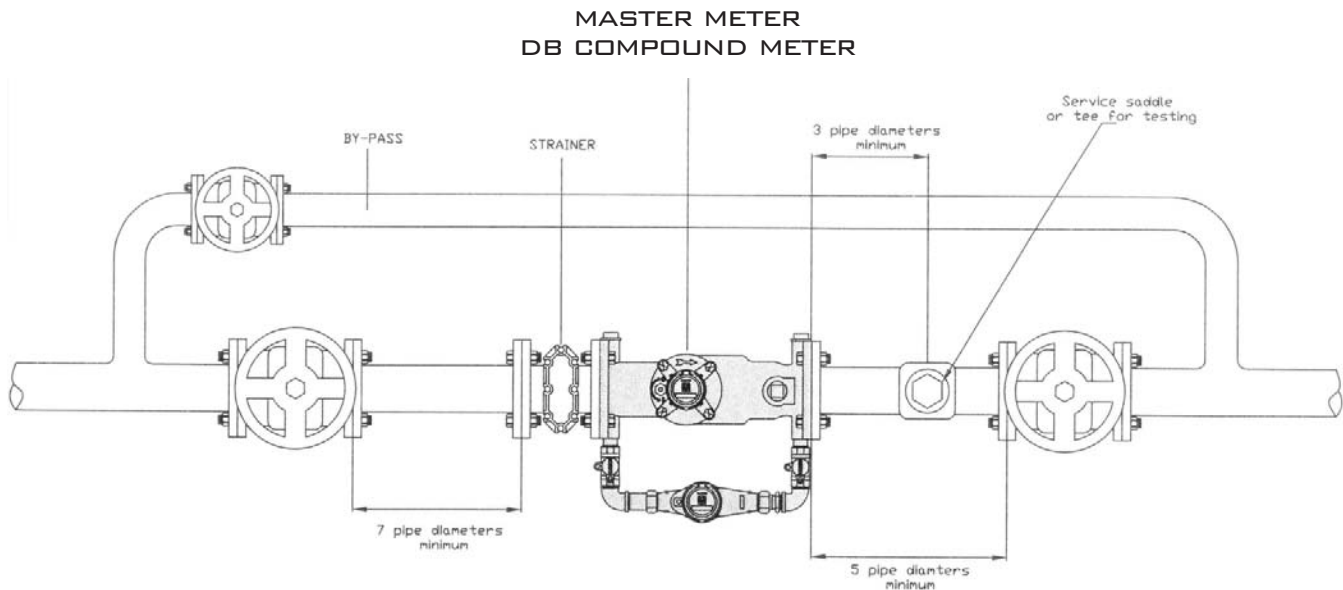


FIGURE 2: DB COMPOUND METER
OPERATION AT HIGH FLOWS

INSTALLATION

Proper installation is essential for the DB Compound Meter to operate accurately and according to the operation described above. The performance of the turbine meter and the differential pressure valve can be seriously affected by flow turbulence created by improper installation. The following installation practices are recommended:

1. Install the DB Compound Meter to insure that the meter will always operate full of water. Do not install the meter in the upper part of a piping system, or in a location where the downstream line will eventually be empty.
2. The installation should include a strainer on the inlet side of the DB Compound Meter. The strainer will both protect your meter investment from damage from line debris and improve the pattern of the incoming flow, maximizing the meter's accuracy.
3. Install the DB Compound Meter horizontally and with the dial face of both registers facing upwards.
4. Do not install pressure reducing or check valves in the inlet side of the DB Compound Meter.
5. Install a minimum of seven (7) pipe diameters of straight, unobstructed pipe upstream of the DB Compound Meter. Install a minimum of five (5) pipe diameters of straight, unobstructed pipe downstream of the meter (Figure 3). Straight runs of pipe should be free of valves or flow-restricting fittings such as bell reducers or bushings.
6. Install a by-pass line to insure continuous service capability when meter maintenance is performed.
7. Do not open or connect any service pipe to the plugs located on the side of the DB Compound Meter. These plugs are designed for the multi-jet meter low flow line only, allowing factory installation of the low-flow meter on the left or right side of the turbine meter. Any connection to these ports will adversely affect meter performance.
8. A testing port can be installed at a distance of at least 3 pipe diameters from the outlet flange of the DB Compound Meter (Figure 3).



**FIGURE 3: TYPICAL DB COMPOUND METER INSTALLATION
TOP VIEW**

PLACING THE DB COMPOUND METER INTO SERVICE

After completing installation, you will put the DB Compound Meter into service. It is imperative that you follow the step-by-step sequence outlined below. Severe and permanent damage to the differential pressure valve will result from careless or sudden start-up is not covered by Master Meter's product warranty.

Installation With By-pass Line:

1. Start the service using the by-pass line. With valves #1 and #2 in Figure 4 (below) closed, open valve #5. (If the by-pass line previously existed and was operational during meter installation, skip to Step 2, below).
2. Close the multi-jet meter line. The DB Compound Meter is equipped with two shut-off valves on the low flow line (Valves #3 and #4 below). Close these valves to avoid severe water hammer in the multi-jet measuring chamber.
3. SLOWLY open outlet valve #1 to create back pressure on the closed differential pressure valve.
4. SLOWLY and carefully open inlet valve #2 to purge air slowly from the line. Quick opening of this valve can cause damage to the differential pressure valve.
5. Open #3 Multi-jet line valve slowly.
6. Open #4 Multi-jet line valve slowly to purge air from the low flow line.
7. When the DB Compound Meter is pressurized, check for leaks. If leaks are discovered, shut down the line slowly by reversing steps 3 to 6. After repairing leaks, restart the line following procedures 3 to 6 above.
8. Close by-pass line valve #5 to place the meter fully in service.

9. If appropriate, install locks in valves #3 and #4 to prevent customer shut-off of low flow measurement, and in valve #5 to prevent unregistered usage from the by-pass line.

Installation With By-pass Line:

Installing the DB Compound Meter directly in the line, without the installation of a by-pass line, is not recommended. When a permanent by-pass line cannot be installed, it is always a good practice to work with a temporary by-pass line for installation and maintenance. However, if the installation of a by-pass line (permanent or temporary) is not possible, the following steps should be followed when placing the meter into service.

1. Close the multi-jet meter line (Valves #3 and #4 in Figure 4 below).
2. Open partially (about 10%) outlet valve #1. This opening will provide pressure relief for the air trapped in the meter when performing Step 3.
3. SLOWLY and carefully open inlet valve #2. At the lack of back pressure on the line, this operation must be performed with special care to purge the air from the meter without causing damage.
4. Open valve #3.
5. Open valve #4.
6. Fully open outlet valve #1 to place the meter in full service.
7. When the DB Compound Meter is pressurized, check for leaks. If leaks are discovered, close all valves slowly. After repairing leaks, restart the line following procedures 1 to 6 above.
8. If appropriate, install locks in valves #3 and #4 to prevent customer shut-off of low flow measurement.

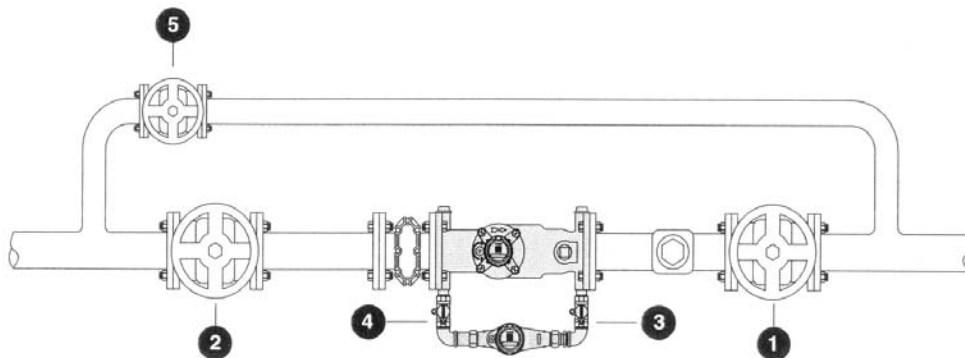


FIGURE 4: START-UP VALVE SEQUENCE

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