

SPECIFICATION

Category: Cold Water Meter

Type: Ultrasonic Transit-Time

Size: 2" – 12"

Applicable AWWA Standard: C750



Version 2.18

1. GENERAL

Except as otherwise modified or supplemented herein, the latest revision of AWWA Standard C750 Transit-Time Flowmeters shall provide theory and operation specifics on the basic ultrasonic concept. This document will govern the materials, design, manufacture and testing of all meters furnished under this specification or equal as approved by the Director or his appointed agent.

AWWA Standard C750 is considered by the [\[Click here and type Name of Utility\]](#) to be only the minimum requirements and shall be supplemented herein to ensure the quality required by the utilities department.

Meters shall be manufactured by a company with a minimum of ten (10) years experience in manufacturing *various types* of cold water meters such as Multi-jet, Positive Displacement, Compound and Turbine Type water meters. The Manufacturer's corporate home office shall be in the United States.

Meters shall be bid without strainers and without companion flanges.

The water utilities department reserves the right to request a sample meter of a small size to study prior to awarding bids.

2. METER MAIN CASE

Outer cases shall provide full compliance with ANSI/NSF 372 (AB1953 or NSF61 G), and be made of one of the following materials:

- 1) 3" – 12": Cast ductile iron alloy equaling or exceeding AWWA Standards such as those listed in ASTM A536 or ASTM A126. The maincase shall be protected by a complete fusion-bonded coating conforming to AWWA C-550.
- 2) 2" – 8": Stainless Steel SAE Grade 316 equaling or exceeding AWWA Standards such as those listed in ASTM A269.

All external bolts and nuts shall be made of bronze or stainless steel, and shall be so designed for easy removal after having been in service for a long period of time.

The main case shall withstand a working pressure of 175 PSI without leakage, seepage in the castings, or distortion affecting the free and accurate operation of the measuring unit.

The size of the meter and the direction of flow shall be case in raised letters on the outer surface of the case.

3. REGISTER COVER

The register box shall be made of an engineering plastic with the manufacturer's serial number inside the register lid. Serial number of the meter shall also be permanently programmed in the electronic register.

Register cover box shall be attached to main case in a tamper resistant manner. The register cover box shall be equipped with a hinged lid that will overlap the register to protect the reading area.

4. REGISTER

The factory sealed register shall be electronically driven only and shall be furnished with a low flow leak detection symbol and with a reverse flow notification symbol. The register shall be identical within a given size or model subject to the programming of appropriate flow factors for the particular meter. An effectively tamper proof meter with a displayed tamper indication symbol, is required. The register shall be programmed initially to read in [US. Gallons or Cubic Feet](#) as ordered by the [\[Click here and type Name of Utility\]](#). The transparent LCD register glass lens shall be made of molded heat-treated 0.25" glass to ensure against scratching and breakage. Serial number shall be permanently programmed in the electronic register.

As defined in these specifications, a "factory sealed" register shall mean an NEMA 6P / IP68 rating which protects the meter and register against fogging, moisture, and dust, and is electronically driven by the measuring section transit time sensors. Registers and meters must be fully submersible, therefore meters that do not meet an NEMA 6P / IP68 rating shall not be considered.

Appearance of any fogging or moisture inside the register within the warranty period shall constitute component failure and will require a factory replacement.

The register shall have a multi-line display with a minimum of 12 digits on the totalizer with a stationary decimal separating single billable units from fractional billing units. The register shall have a 4 digit rate of flow indicator with a floating decimal to allow high resolution flow measurement. The register shall have the ability to display 1/1000th of a measurement unit to allow high resolution for low flow meter testing or on-site inspections. The LCD shall indicate reverse flow, rate of flow, low battery indication, leak alert, water temperature, as well as no flow condition. When the meter is providing an encoder output (as described in Section 6A), the LCD shall clearly distinguish the digits for the encoder output reading by displaying lines above the encoder reading.

5. MEASURING SECTION

The measuring section shall be a unitized unit, completely integral to the meter body. The measuring section shall not include any moving parts and the measuring section shall have an unobstructed flow passage area at least equal to 50% of the nominal Schedule 40 pipe size corresponding to the meter's size.

All parts of the measuring section shall be similar with assemblies of the same size and material.

The measuring section shall be secured in a position in the main case in such a manner that slight distortion of the outer meter case will not affect the sensitivity or registration of the meter.

To ensure longevity of service, the performance of the measuring chamber shall be guaranteed to meet required Compound meter accuracy standards of AWWA M6 Manual for a period of two years from date of manufacturer's shipment.

The measuring section shall be covered for this period by written warranty as required or mentioned elsewhere in these specifications.

6. SIGNAL PROCESSING

Paired transducers are to be mounted in the chordal direct configuration in the measuring section to measure the actual transit time of the initiated and reception-generated ultrasonic sound pulses. Transit time measurements for a single pass of initiated and return pulses are to be accurate to within 300 pico-seconds for a loop time.

Multiple measurements are sampled at a minimum of 1 second intervals of these transit time loops that are made to significantly improve accuracy over a single pass transit time measurements as employed in typical AWWA C750 ultrasonic meters to achieve low flow rate measuring accuracy.

When the meter is in storage or in transportation, the meter shall go into SLEEP mode to preserve the battery. Normal sampling and flow measurement shall be automatic and shall not require special software or tools to turn the meter on.

Ultrasonic meters using single directional sound transmission to determine flow measurements are not acceptable. Meters that use measurement principals based on Faraday's Law are not permitted.

6A. SIGNAL OUTPUTS

The meter shall have 4 optional outputs – Analog (4-20), Digital pulse output (open drain or dry contact), Modbus, or encoder output.

The Analog Output is a 4 – 20 mA current loop (the end user must supply power to the unit). The 4 mA parameter is set to 0 GPM and the 20 mA parameter shall be scaled to the user's requirements, as long as it does not exceed the meter's maximum flow rate.

The Digital pulse output is to be either an open drain transistor output, or a dry contact relay, that provides pulse per quantity, configurable to the following options:

1. Net flow pulses
2. Forward flow pulses
3. Reverse flow pulses

The Modbus output is a Master-Slave protocol for monitoring the following alarms and system values:

1. Leak
2. Pipe Burst
3. Reverse Flow
4. Tamper
5. Low Battery
6. Flow Rate
7. Volume

The Encoder Output is to be serial communication collector utilizing UI1203 or UI1204 communication protocol. The [\[Click here and type Name of Utility\]](#) shall designate at the time of order if single or dual output is required and shall designate the type of wired output that is desired. Available options are 1) bare colored wires, 2) Nicor compatible connector, 3) Itron compatible connector, or 4) magnetic coupled TouchPad. Encoder output provides the following data through the output cable.

- 1) Encoder Single output provides the following
 - Meter ID
 - Meter Totalizer Reading (up to 8 digits maximum)
- 2) Encoder Dual output provides
 - One encoder reading with the following
 - i. Meter ID
 - ii. Meter Totalizer Reading (up to 8 digits maximum)
 - One scalable open drain pulse output with the following option
 - i. Net flow pulse
 - ii. Forward flow pulse
 - iii. Reverse flow pulse

The [\[Click here and type Name of Utility\]](#) shall choose one of these four basic output choices with dependent options on the Digital pulse option.

7. INSTALLATION REQUIREMENTS

Meters shall be designed so that no strainer or straightening vanes are required. There shall be no internal parts blocking the waterway. No straight runs of pipe shall be necessary before or after the meter.

8. ACCURACY AND HEAD LOSS TESTS

Meters shall EXCEED current AWWA C-702 test flow, head loss and accuracy standards as follows.

SIZE	SAFE MAXIMUM FLOW RATE	C-750 FLOW RANGE ACCURACY ± 0.5 %	NORMAL FLOW RANGE ACCURACY ± 1.5 %	EXTENDED LOW FLOW RANGE ACCURACY ± 5 %	HEAD LOSS @ SAFE MAXIMUM
2"	250 GPM	4- 200 GPM	1/2 GPM - 250 GPM	0.25 GPM	1.3 PSI
3"	500 GPM	5 – 350 GPM	1 GPM - 500 GPM	0.50 GPM	2.4 PSI
4"	1,000 GPM	15 – 700 GPM	1 1/2 GPM - 1,000 GPM	0.75 GPM	3.7 PSI
6"	1,600 GPM	20 – 1,150 GPM	3 GPM - 1,600 GPM	2 GPM	6.5 PSI
8"	2,800 GPM	50 – 2,000 GPM	5 GPM - 2,800 GPM	4 GPM	4.5 PSI
10"	5,500 GPM	90 – 4,400 GPM	14 GPM - 5,500 GPM	9 GPM	2.9 PSI
12"x10"	5,500 GPM	90 – 4,400 GPM	14 GPM - 5,500 GPM	9 GPM	2.9 PSI

9. REAL TIME CLOCK

Meters shall have a real time clock and be capable of providing:

1. Data logging direct from the meter, without the requirement of an RF endpoint. The data logger shall provide two data loggings; one data log in minute readings with a minimum of 2,700 data points, and the second data log in hourly readings with a minimum of 1,400 data points. Each log shall be configurable by the City. The meter shall be able to log at a minimum of one minute resolution on the first log and a minimum resolution of one hour on the second log. Data logger shall also log system events, tamper, low battery, and reverse flow measurement.
2. Meter shall have the *option* to be Sabbath compliant by turning off the visual LCD during Sabbath and other high holidays. During this time, the meter shall still measure flow but does not display the reading on the LCD until the designated time period has ended.

10. PRESSURE CAPABILITY

Meters shall operate up to a working pressure of one hundred seventy five (175) pounds per square inch (PSI) and to a temperature of 122 degrees Fahrenheit, without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure to possible distortion.

11. ACCEPTABLE METERS

In the interest of standardization, the following meter lines are acceptable to the [\[Click here and type Name of Utility\]](#) provided they fully comply with the above specifications and meet all requirements in the bid package:

1. MASTER METER OCTAVE
2. APPROVED EQUAL

All meter models above shall be at a minimum ultrasonic type with at least two transit time paths. All meters not listed above shall pre-qualify. In order to pre-qualify, the manufacturer shall send necessary drawings and technical data to the [\[Click here and type Name of Utility\]](#) and complete a minimum of six-months in field testing. Any exceptions to the specifications shall be pre-qualified by the above method.

12. BIDDERS RESPONSIBILITY TO THIS SPECIFICATION

It is the responsibility of each bidder to carefully examine these specifications and the bid documents and become familiar with the requirements set forth herein. In addition, it is the responsibility of each bidder to submit all necessary information concerning their product to the [\[Click here and type Name of Utility\]](#). Failure to do so could result in your bid being declared as non-responsive.
