# SPECIFICATION

**Category:** Cold Water Meter

**Type:** Ultrasonic Transit-Time

**Size:** 5/8” x ¾” and 3/4S”

**Applicable AWWA Standard:** C715

**Version 02.18**

Master Meter, Inc. 101 Regency Parkway, Mansfield, TX 76063 T: 817-842-8000 F: 817-842-8100

## 1. GENERAL

Except as otherwise modified or supplemented herein, the latest revision of AWWA Standard C715 Electromagnetic and Ultrasonic Type, for Revenue Applications 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 their appointed agent.

AWWA Standard C715 is considered by the [type name of the 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 couplings.

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

Meter main cases shall provide full compliance with ANSI/NSF 372 (AB1953 or NSF61 G), and be made of *High Performance Glass Reinforced Polymer.*

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, model, manufacturer's meter serial number, and direction of flow through the meter shall be permanently marked on the outer surface of the meter.

## 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.

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. The register shall be programmed initially to read in [US. Gallons or Cubic Feet] as ordered by the [type name of the utility]. 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 9 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 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, as well as no flow condition. For 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 unit shall not include any moving parts and the measuring section shall have an unobstructed flow passage area. All transducers and reflectors must be mounted in the side walls of the flow tube.

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 accuracy standards of AWWA C715 for a period of two years from date of manufacturer's shipment.

The measuring section shall be covered for this period by Master Meter's written Consolidated 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 to achieve low flow rate measuring accuracy.

Ultrasonic meters using transducers mounted in the top of the flow tube or ultrasonic meters that utilize reflectors that block the center of the pipe are not acceptable. Meters that use measurement principals based on Faraday's Law are not permitted.

### 6A. SIGNAL OUTPUTS

The Encoder Output is to be serial communication collector utilizing UI1203 or UI1204 communication protocol. The 3 wire cable exiting the meter body cable shall be available, upon request by the utility, as 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.

- Meter ID
- Meter Totalizer Reading (up to 8 digits maximum)

## 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

Meters shall EXCEED current AWWA C715 test flow, head loss and accuracy standards as follows.

| SIZE | SAFE MAXIMUM FLOW RATE | NORMAL FLOW RANGE ACCURACY ± 1.5 % | EXTENDED LOW FLOW RANGE ACCURACY ± 5 % |
|---|---|---|---|
| 5/8" x ½" | 25 GPM | 0.1 - 25 GPM | 0.03 GPM |
| 5/8" x ¾" | 35 GPM | 0.1 - 35 GPM | 0.05 GPM |
| ¾" | 35 GPM | 0.1 - 35 GPM | 0.05 GPM |
| 1" | 55 GPM | 0.38 - 55 GPM | 0.11 GPM |

## 9. REAL TIME CLOCK

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

## 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 [type name of the utility]. provided they fully comply with the above specifications and meet all requirements in the bid package:

1. MASTER METER SONATA
2. APPROVED EQUAL

All meter models above shall be at a minimum ultrasonic type with unobstructed transit time paths. All meters not listed above require prequalification. In order to prequalify, the manufacturer shall send necessary drawings and technical data to the [type name of the utility]. and complete a minimum of six-months in field testing. Any exceptions to the specifications shall be prequalified 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 [type name of the utility]. Failure to do so could result in your bid being declared as non-responsive.