



# Water Use Analyzer System for a Flow-Versus-Time Data Collection PC-Based Metering System

## 1. GENERAL

These specifications cover the detailed description of a portable PC-based flow-versus-time data collection system. The system will have the flexibility to be used on 5/8" through 20" water meters.

## 2. DEFINITIONS

The following definitions shall apply in this specification:

- **Manufacturer**—The party that manufactures or produces the flow-versus-time data collection system in the specification.
- **Purchasers**—The party entering into a contract or agreement for the purchase of the flow-versus-time data collection system.
- **Vendor**—The party entering into a contract or agreement to supply a flow-versus-time data collection system.

## 3. MATERIAL

### 3.1 General

All materials used in the manufacture of the flow-versus-time data collection system shall conform to the requirements stipulated in Section 3.

### 3.2 Data Collection Recorder

The recorder shall be durable and made of ABS/polycarbonate blend. The front and back covers shall be sealed by means of an "O" ring gasket for use in harsh environments.

The recorder shall host all solid state electronics. The recorder shall also host the power supply which shall consist of either lithium or lead acid rechargeable batteries.

### 3.3 External Connections

There shall be three external stainless steel threaded terminal connections (two connections in the case of lithium batteries).

All connectors shall not be interchangeable to eliminate improper connecting of the recorder. The connections shall be the water-proof type and shall come with connector caps. Each terminal shall be labeled RS-232, Sensor, and Battery.

One connector shall be for use with the transmitter register or magnetic sensor; the second shall be for data retrieval; and the third connector for use with a battery charger or AC power.

### 3.4 Transmitter Register/Magnetic Sensor

The transmitter register shall be made of synthetic polymer for the upper half and made of copper for the lower half. The two halves shall be roll sealed. Terminal connectors shall be used to connect the cable to the recorder. The transmitter shall require less than 20 micro amps when operational. The magnetic sensor shall be encapsulated in hard epoxy.

### 3.5 Cables

Cables used shall be of the waterproof type and shall include stainless steel connectors.



## 4. GENERAL DESIGN

### 4.1 System Components

There shall be three basic system components: the data collection recorder, the transmitter register/magnetic sensor, and the PC software.

### 4.2 Data Collection Recorder

The data collection recorder shall be of one piece hosting all solid-state electronics and power supply. The recorder shall be compatible with Neptune and competitive meters.

#### 4.2.1 Mechanical Design

The enclosure shall be a self-contained data collection unit. The enclosure shall collect flow-versus-time data through the waterproof cable.

Operating temperature shall be between -40° F to +150° F. Storage temperature shall be between -40° F to +150° F.

The enclosure shall be submersible. Size shall be 8.6" x 5.4" x 2.1". Weight shall be 3.75 lbs. Power shall be supplied from either two lead acid rechargeable batteries or a lithium battery pack. Operating life shall be 3 months for the rechargeable batteries and 18 months for the lithium batteries. A pre-programmed unit ID number of five numeric digits is set to the serial number on the enclosure.

The recorder shall not need any field set up for usage profiling. The recorder shall require only the toggling of an on/off rocker switch to start and end recordings.

#### 4.2.2 Electrical

The recorder shall have the capability of recording up to 100 pulses per second. The data collected shall be counted over a user-defined time period that is programmable from 5 to 60 seconds. The data collected shall be stored in memory, which should be at least 130,00 intervals. The starting time of each period shall also be stamped with the calendar date and time.

### 4.3 Transmitter Register and Magnetic Sensor

The register shall be stacked between the meter maincase and the register. The sensor shall be fastened to the outside of the meter with velcro straps.

#### 4.3.1 Mechanical

Both the transmitter register and the meter register shall have a bayonet mount design, held in place with a synthetic polymer tamperproof seal pin. The transmitter register shall have two active terminal screw connections. The transmitter register shall be tamperproof, eliminating the ability to be removed by unauthorized personnel. A magnetic sensor using velcro straps is acceptable.

#### 4.3.2 Electrical

The transmitter register and magnetic sensor shall monitor the meter flow rate and provide an electronic output for storage at the data collection recorder.

### 4.4 Cables

#### 4.4.1 Mechanical

The cables shall consist of four cables (three in the case of lithium batteries). One cable shall be used for data retrieval or transmission. A second and third cable shall be connected to the transmitter register and magnetic sensor, respectively. The fourth cable shall be used for an external battery charger for use with the lead acid batteries. All connectors and plugs shall be stainless steel with the exception of the transmitter register cable, which is supplied with an



anodized aluminum plug. The cables shall be of the waterproof type. The connector pin configuration shall be different as not to allow for incorrectly cross-connecting the cables.

#### 4.4.2 Electronic

The cable shall be 22 AWG, PVC insulated, metallic braid, fine stranded copper conductors with a voltage rating of 300V and a temperature range of -20° C to 105° C.

## 5. DATA COLLECTION SYSTEM

### 5.1 Software

The data collection system software shall be PC and windows compatible and provide a means to interface with the data collection recorder. Once the data has been downloaded to the PC, the user shall have the option to display it in graphic or numeric form for analysis. The software shall have provisions for processing data from competitive meters.

#### 5.1.1 Software/Operation

The software shall be user-friendly and have a pull-down menu system for function selections. The software shall include both software to set up and unload from the data collection recorder. It shall also scale the data imported from the data collection recorder based on meter type and user-selected units of gallons, cubic feet, cubic metres, liters, or imperial gallons.

#### 5.1.2 Analysis Software/Graphics

The software shall produce the following analytical and graphical features:

- XY plot flow versus time
- Barplot of water usage versus flow range
- Pieplot of water usage versus flow range
- Zoom and pan features on graphs to find specific time periods of interest
- Tabular report of flow rate and water usage versus time
- Tabular report of water usage versus flow range
- Statistical report regarding a set of data
- Printable graphics screens and reports
- User-defined titles on graphs and reports
- Save/export to word processing, spread sheets, file managers, calendars, calculators, etc.

### 5.2 Operating Manual

A complete operating manual shall be provided.

### 5.3 System Requirements

- Minimum PC requirements are as follows:
- Microsoft Windows®
- Pentium processor
- 16 MB RAM
- 100 MB free hard disk space



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