

D175 WATER METER UNIT DESCRIPTION

MICROCONTROLLER

This section controls the operation of the unit. Under normal operating conditions, the micro keeps track of time and initiates various meter reading and RF transmission tasks according to a user definable schedule.

LOW POWER 32KHZ OSCILLATOR

The low power oscillator generates a 4 Hz interrupt to the micro. The microcontroller uses this for timekeeping functions. In normal mode, the microcontroller is asleep and wakes up with every 250 milliseconds and performs a schedule checking task. If a task is scheduled to execute, it will in turn execute that task and return to sleep.

NON-VOLATILE

The EEPROM is powered by the microcontroller output line. Once powered up, communications between the microcontroller and eeprom follow the IIC protocol.

BATTERY VOLTAGE MEASUREMENT

The battery voltage measurement circuit is powered by the microcontroller output line. The circuit contains a 1.2 volt reference device. The output signal from the circuit is connected to the analog-to-digital converter (ADC) in the microcontroller and the measurement is subsequently used to determine the battery voltage.

OPTICAL PORT

The optical port uses an infrared (IR) link. To initiate a session, a wake-up process is initiated by the external device. Once awake, the unit is in the test/installation mode. A command/response protocol is then followed with the external device initiating the commands.

5 VOLT CONVERTER

This circuit generates 5 volts from the 3.6 volt battery for use during operation of the 5 volt digital I/O circuitry. There is a charge pump that builds up a charge on a storage capacitor prior to use. The charge pump is turned off during operation of the 5 volt I/O and during RF transmissions. The regulated 5 volt supply is turned on by the micro.

5 VOLT DIGITAL I/O

This section has a 5 volt output and input. The logic threshold for the input is adjustable by the micro. The I/O is controlled such that meter reading data is read out of various encoded meters.

3 VOLT DIGITAL I/O

This section has a 3 volt output and input. The I/O is controlled such that meter reading data is read out of various 3 volt encoded meters. Also, this circuitry is used to interface to passive meters.

EVENT INPUT

This section provide that ability to sensor event signals generated by active pulse style meters.

RF COMMUNICATIONS

The meter unit periodically transmits a meter reading message on the RF link. The radio transmits at 916.5MHz, with on-off-keyed data at 9600 bits per seconds. The radio transmits data in packets or messages. These messages are transmitted at a repetition rate that has been initialized into the unit. This rate may be set between 1 second and 18 hours. Also, each RF transmission has another delay that assists in avoiding collisions between nearby transmitters. This additional delay is between 0 and 0.75 seconds.

The meter reading message contains the following fields: opening flag, message length, system number, message type, data, check sum, and closing flag. Data items in the include; Network ID, cumulative meter reading, clock time, battery voltage, sensor tamper, and trickle flags.

Following is the data format;

Modulation = on-off-keyed

Logic 0 = presence of RF

RFbyte = Each 8 bits of data is transmitted in the RF domain using a 10 bit byte that contains start and stop framing bits.

Meter reading message format as follows;

Opening flag = 2 bytes

Message length = 1 byte

System number = 1 byte

Message type = 1 byte

Network ID = 5 bytes

Meter reading = 4 bytes

Clock = 2 bytes

Battery voltage = 1 byte

Sensor tamper = 6 bytes

Trickle flags = 1 byte

Checksum = 2 bytes

Closing flag = 1 byte