

OVERVIEW

MetriNet, derived from Network Metrics, is a low-power, modular system for monitoring water quality parameters and collecting data at remote locations. The MetriNet Mini system, in either the above ground or below ground configuration, is ideal for monitoring drinking water distribution systems and other clean water applications.

The MetriNet Mini provides monitoring for two or three different parameters in either an above ground enclosure or a below ground case and provides reliable collection and transmission of the acquired data. The system provides several methods for delivering this information including: cellular modem, wired Modbus, Modbus TCP/IP or Ethernet/IP, as well as cloud-based data storage.

At the heart of the MetriNet Mini system is a series of smart digital sensors. M-Nodes are a complete sensor and transmitter housed in a miniaturized body. M-Nodes operate as independent modules that can be linked via a communication bus.

Sensor and bus connectors are IP67 rated for maximum signal protection. Communication between M-Node sensors and the user data collection system is handled by the MetriNet controller. The controller allows set up and calibration of M-Nodes, as well as storing data and transmitting data to either local or remote locations.

Flexibility is the key to the MetriNet system. The modular nature enables users to assemble a monitoring package that fits individual site requirements.

All nodes plug directly into MetriNet systems and are powered directly from the communications bus. Nodes may be added or removed as needed, and removal of a node does not affect system measurements.

The MetriNet Mini is available in two enclosure options, the above ground enclosure and the below ground case to allow for effective long term or short term system deployment for a range of environments. The flow cells and sensors are certified to NSF 61, 372.

Data sampling rates are user selectable to minimize power consumption. Data is stored locally in standard .csv file format for easy manipulation with spreadsheet programs. Cellular data transmission can be directed to commercial storage sites or directly to the customer site.

The MetriNet Mini can be connected to BEACON for easy monitoring and visualization of water quality data.



Figure 1: MetriNet system

Above-Ground Configuration



Below-Ground Configuration



METRINET FEATURES

M-Nodes

- Complete sensor and transmitter housed in a miniaturized body.
- Electronic assemblies are galvanically isolated from the power supply and communication link.
- Zero and span data stored internally so calibration can be done anywhere.
- Internal clock records total run time on the sensor.
- Calibration timer can alert users when calibration is due.
- Two alarm set points are available.
- Sensor diagnostics report problems in clear message form.

Controller

- Has options for cellular modem or wired Modbus, Modbus TCP/IP or Ethernet/IP; Optional Bluetooth capability available for use with Q51 Mobile Calibrator.
- Stores data at user-defined intervals from 0.1–60 minutes.
- Stores over 300K values, or 30 days of data for 8 sensors at 1-minute data interval.
- Accepts up to 8 M-Node sensor inputs.
- Internal Micro-SD RAM card provides data backup in the event of communication problems.
- Addition of low power solenoid valve allows intermittent sample flow.
- Solenoid controlled by MetriNet UI, which also shuts down all M-Nodes to conserve power.

WATER CONSERVATION

A typical MetriNet system connected to a continuous sample flow of 200 ml/min consumes about 75 gallons per day. In many cases, this amount of water consumption is not significant. However, in some cases, the user may want to minimize the amount of water consumed by the MetriNet system. The MetriNet mini is a dual- or triple-parameter system and uses 2 or 3 flow cells. For more options, a MetriNet panel or bollard are recommended.

The MetriNet controller provides a cyclic operating mode that allows the user to minimize the daily water consumption. When the solenoid valve is closed, there is no flow to the system and no measurements are taken. At user specified intervals, the solenoid valve is opened to allow fresh water into the system. Sample continues to flow for a selectable amount of time, then a measurement is taken and data is stored locally. When this cycle is complete, the solenoid is returned to a closed position and flow is once again restricted from the system.

Cyclic sampling can reduce water consumption to less than 5 gallons per day at most sites.

MODULAR FLOW SYSTEM

MetriNet flow cells are modular, allowing assembly of 1–8 flow chambers. Each chamber holds one M-Node sensor with a simple bayonet connection.

A rotating lock-ring clamps flow chambers together for easy assembly. A flow control device is integrated into the outlet fitting of the MetriNet flow cell to control sample flow to 0.2 LPM over a fixed and stable pressure value in the range of 10–50 psi (0.7–3.4 bar), 20–30 psi recommended. A compact external pressure reducing valve and mesh filter assembly is included for proper pressure stability control. The first flow chamber is supplied with a push-to-connect fitting for rigid 1/4 inch O.D. tubing.

The MetriNet Mini is pre-configured with a PRV/Valve/Strainer Assembly to maintain a stable input pressure of 20 psi.

An internal mesh screen protects the flow element from particles larger than 100 micron that might enter the system and is easily removed for inspection and cleaning, if necessary.

DIN rail mounting clips attached to each MetriNet flow chamber allow assembled flow systems to be easily rail mounted.



Figure 2: MetriNet flow cells

POWER OPTIONS

Power consumption requirements of traditional water quality monitors prevent their use in locations where AC power is not available. The low power design of the MetriNet system allows these monitors to operate on 12–24V DC power, as well as battery power, without sacrificing reliability.

To further improve power consumption, the MetriNet system allows users to operate in either continuous or cycle modes. In full continuous mode, power is constantly applied to M-Nodes and measurements are continuously taken. When operating in cycle mode, the measurement nodes are placed in *sleep mode* for much of the time. Every 15 minutes, the Nodes are switched to *full power* for about 15 seconds in order to take a reading and store data. Operation in *cycle mode* extends battery life.

System Type	ON Always, Full Power Mode (12V)	ON/OFF CYCL Mode (12V)
12–24V DC with modem, Backlight ON, SD IN	24 mA + 3 mA/node, ON always	23 mA + 3 mA/node, ON Cycle 21 mA, OFF Cycle
12–24V DC without modem, Backlight ON, SD IN	24 mA + 3 mA/node, ON always	23 mA + 3 mA/node, ON Cycle 21 mA, OFF Cycle
12V Battery with modem, Backlight OFF, SD OUT	6 mA + 3 mA/node, ON always	3 mA + 3 mA/node, ON Cycle 1.3 mA, OFF Cycle (sleep)
12V Battery without modem, Backlight OFF, SD OUT	6 mA + 3 mA/node, ON always	3 mA + 3 mA/node, ON Cycle 1.3 mA, OFF Cycle (sleep)

NOTE: During modem operation, power draw can spike to about 150 mA for the duration of the data transfer. A typical daily data transfer takes about three minutes.

SITE LOCATION

MetriNet controllers record user entered fixed latitude/longitude location information, which is used to identify an instrument's exact location on cloud data sites or servers.

AVAILABLE M-NODES

M-Node sensors are available for a variety of water quality parameters. Users simply select the parameters required for a specific location and assemble them into an integrated system.

All Nodes communicate on a common RS-485 sensor bus using Modbus protocol. Each M-Node has an IP67 M8 water-tight connector for external communication. Power for the M-Node system is also supplied via the RS-485 bus.

Nodes may even be used independently by system integrators who wish to communicate directly with the nodes using their own PLC system.



Figure 3: M-Node sensors

MetriNet Mini Case (Below Ground Version)

Specify model number using the suffixes below.

Model MN-AA-BG-CC-MC-EE-WR-XXX-XXXX

Suffix AA - Number of Flowcells

Code	Description
F2	2 Flow Cells
F3	3 Flow Cells

Suffix BB - Power Supply

Code	Description
BG	Lithium Battery, 14.4V. 34 Ahr.

Suffix CC - Controller

Code	Description
LC	Lithium Battery w/SD Card & LTE Modem
LS	Lithium Battery w/SD Card & LTE Modem, CS Sim
LT	Lithium Battery w/SD Card, LTE Modem & Bluetooth
LV	Lithium Battery w/SD Card, LTE Modem, CS Sim, & Bluetooth

Suffix DD - Enclosure

Code	Description
MC	MetriNet Mini Case Assy

Suffix EE - Sim Card Plan

Code	Description
SD	Domestic
SI	International

Suffix FF - Flow Restriction

Code	Description
WR	with Flow Restriction

Sensor Configuration

Code	Description	
12	Chlorine Dioxide	0–5 PPM
34	Hydrogen Peroxide	0–20 PPM
4C	Free Cl2	0–5 PPM
3C	Conductivity	0–2000 uS
PH	pH	2–12 pH
RP	ORP	0–1000 mV
1D	Dissolved Oxygen	0–20 PPM
2D	Dissolved Ozone	0–2 PPM
1T	Turbidity	0–40 NTU
1C	Combined Cl2	0–5 PPM
2C	Total Cl2	0–5 PPM
1F	Fluoride	0.1–10 PPM
2P	Peracetic Acid	0–200 PPM
3P	Pressure	0–300 PSI
1N	Nitrite	0–2 PPM
1P	Plug	0000
XX	None	—

ORDERING INFORMATION

MetriNet Mini Enclosure (Above Ground Version)

Specify model number using the suffixes below.

Model MN-AA-BB-CC-ME-EE-WR-XXX-XXXX

Suffix AA - Number of Flowcells

Code	Description
F2	2 Flow Cells
F3	3 Flow Cells

Suffix EE - Sim Card Plan

Code	Description
SD	Domestic
SI	International

Suffix BB - Power Supply

Code	Description
BA	12V DC Power Supply
BF	Alkaline Battery (8 D-Cell)
BG	Lithium Battery, 14.4V. 34 Ahr.

Suffix FF - Flow Restriction

Code	Description
WR	with Flow Restriction

Suffix CC - Controller

Code	Description
CC	12–24V DC w/SD Card & LTE Modem
CD	12–24V DC w/Modbus RTU
CE	12–24V DC w/Modbus TCP/IP
CF	12–24VDC w/Ethernet/IP
CS	12–24V DC w/SD Card & LTE Modem, CS Sim
CG	12–24V DC w/SD Card, LTE Modem & Bluetooth
CH	12–24V DC w/SD Card, LTE Modem, CS SIM & Bluetooth
BC	12V Battery w/SD Card & LTE Modem
BF	12V Battery w/SD Card & LTE Modem, CS Sim
BT	12V Battery w/SD Card, LTE Modem & Bluetooth
BV	12V Battery w/SD Card, LTE Modem, CS Sim & Bluetooth
LC	Lithium Battery w/SD Card & LTE Modem
LS	Lithium Battery w/SD Card & LTE Modem, CS Sim
LT	Lithium Battery w/SD Card, LTE Modem & Bluetooth
LV	Lithium Battery w/SD Card, LTE Modem, CS Sim, & Bluetooth

Sensor Configuration

Code	Description
12	Chlorine Dioxide
34	Hydrogen Peroxide
4C	Free Cl2
3C	Conductivity
PH	pH
RP	ORP
1D	Dissolved Oxygen
2D	Dissolved Ozone
1T	Turbidity
1C	Combined Cl2
2C	Total Cl2
1F	Fluoride
2P	Peracetic Acid
3P	Pressure
1N	Nitrite
1P	Plug
XX	None

Suffix DD - Enclosure

Code	Description
ME	MetriNet Mini Enclosure Assy