metrinet®

Water Quality Monitor

MetriLog Data Logger

Badger Meter

ATI-UM-04435-EN-04 (January 2026)

User Manual

CONTENTS

INTRODUCTION

General

The MetriLog data logger is a portable battery powered tool for temporarily logging water quality data. It is a self-contained waterproof device containing a Q51 Mobile Calibrator/Data Logger and an internal flowcell assembly that uses Q32 water quality sensors. Any of the water quality sensors listed in the following table may be used in the MetriLog data logger:

Parameter	Range	Resolution
Free Chlorine	0–5.00 ppm	0.01 ppm
Combined Chlorine	0–5.00 ppm	0.01 ppm
Total Chlorine	0–5.00 ppm	0.01 ppm
Turbidity	0–40.00 NTU	0.01 NTU
pH	2–12.00 pH	0.01 pH
Conductivity	0–2000 µS	1 µS
ORP	0–1000 mV	1 mV
Dissolved Oxygen	0–20.00 ppm	0.01 ppm
Fluoride	0.1–10.00 ppm	0.01 ppm
Dissolved Ozone	0–2.000 ppm	0.001 ppm
Chlorine Dioxide	0–5.00 ppm	0.01 ppm
Peracetic Acid	0–200 ppm	1 ppm
Hydrogen Peroxide	0–20.00 ppm	0.01 ppm
Pressure	0–300 psi	1 PSIG
Nitrite	0–2.000 ppm	0.001 ppm

There are two versions of the MetriLog, one containing a clear flowcell that accommodates most sensor types and one containing a black flowcell. The black flowcell is required when using the turbidity sensor to avoid ambient light interference. Disconnect inlet and outlet tubing to switch from one type of flowcell to another.

On the side of the MetriLog are two quick-connect fittings where sample inlet and drain lines are connected. The unit is provided with two mating connectors, each with 5 feet of tubing. Also supplied are two ¼ inch MNPT × ¼ inch O.D. tube fittings used to adapt user plumbing to the supplied tubing. Note that all connectors have internal valves. When disconnected, sample flow stops and sample in the flowcell remains captured in the cell.

The flowcell in the MetriLog contains a fixed flow control element in the flowcell outlet fitting. It maintains a flow of approximately 3.2 gpm (0.20 lpm) when connected to pressurized sample lines between 10–50 PSIG (0.7–3.4 bar).

Figure 1: MetriLog data logger assembly

Q51 Data Logger

The MetriLog data logger is built around Badger Meter's Model Q51 portable calibrator and data logger. This device is designed for two functions: setup and calibration of Q32 M-Node sensors and temporary logging of sensor data for download to a PC. The M-Node sensor cable plugs into one of the connectors on the side of the logger, while a second connector with a protective cover is a USB port for downloading data to a PC. The logger uses 3 internal AA-size alkaline batteries.

In operation, the Q51 logs measurement data at an interval (minimum every 1 minute to a maximum of 99 minutes) that is programmed by the user. Data is stored in on-board non-volatile memory that may be offloaded with a PC using a USB cable and the Badger Meter Data Log Utility software on a PC.

Figure 2: Q51 calibrator/data logger

SPECIFICATIONS

MetriNet Controller (Q51)

Displayed Parameters (for each M-Node)	4-digit node measurement (ppm, NTU, pH) Sensor temperature: –10.0 to 55.0° C (14–131° F) Other measurement displays on lower line dependent on specific sensor
Display	128 × 64 OLED graphic display 2.2 × 1.1 in. (57 × 29 mm)
Data Logger	Internal 4 MB SPI Flash memory. Data is removed via USB cable and special Badger Meter PC program.
Controls	4-key polycarbonate keypad, UV-resistant coating
Power	Three AA batteries
Node Connection	M8 waterproof connector
Data Connection	USB connector with waterproof cover
Ambient Temperature	Operating: 0–5° C (32–122° F) Storage: –5 to 70° C (23–158° F)
Ambient Humidity	0–95%, indoor/outdoor use, non-condensing to rated ambient temperature range
Sample Inlet Pressure	Stable/fixed: 10–50 psi (0.7–3.4 bar), 20–30 psi recommended
Environmental	RoHS Compliant
EMI / RFI Influence	Designed to EN-61326-1
Enclosure	ABS, polycarbonate, thermoplastic rubber LWD: 11.1 × 6.9 × 3.9 in. (282 × 175 × 99 mm)
Weight	5 lb (2.3 kg) with batteries

MetriLog Performance Specifications

Accuracy	Sensor dependent
Repeatability	Sensor dependent
Sensitivity	Sensor dependent
Non-Linearity	Sensor dependent
Supply Voltage Effects	Sensor dependent
Power	When running continuously in *Service* mode with one Q32P sensor, approximately 30 mA DC @ 4.6V DC, or 138 mW. Off-state leakage current approximately 12 uA. When running in *DataLog* mode, the instrument shows the same 30 mA DC @ 4.6V DC, or 138 mW when a user is calibrating or configuring a single Q32P sensor. However, the instrument operates in ON-OFF cycles in *DataLog* mode and automatically drops to a *Sleep* mode during non-measurement times and after display time-out occurs. During *Sleep*, the instrument consumes approximately 1.4 mA @ 4.6 V DC, or about 6.4 mW. **NOTE:** Other than the Q32 turbidity sensor, all other M-Node sensors consume approximately the same amount of power. The Q32T consumes about 2x the power of the standard M-Node.
Service Mode	Battery operating time is highly dependent on user settings, type and number of sensors, and how often the instrument is used. Typical five hours per week with one Q32P: >3 months Continuous running with one Q32P: 2–3 days **NOTE:** Assumes 2500 mA AA-alkaline batteries are used. Other than the Q32T, all other M-Node sensors consume approximately the same amount of power. The Q32T consumes about 2x the power of the standard M-Node.
DataLog Mode	Battery operating time is highly dependent on user logging settings, and type and number of sensors. The OLED display is OFF the majority of the time in *DataLog* mode. A sleeping Q51 / MetriNet consumes about 1.4 mA @ 4.6V, or 6.4 mW. Active current, or "pulse power," then adds to that to calculate final average power over some period of time. Calculating this total power can be a little complex as the pulse of high current must be average over some period of sleep time. Batteries see average power. Some typical power examples based on user settings: 1. One Q32P sensor, sensor delay 10 sec, log interval 15 min. So the Q51/MetriNet + Q32P consumes 13 mA @ 4.6V when active for only 10 seconds per 15 min. Average active power per hour is then 0.6 mW. Add baseline sleep power of 6.4 mW for a total average power of 7 mW. **Run-time estimate of 1645 hours or about 2 months.** 2. One Q32P sensor, sensor delay 10 sec, log interval 1 min. So the Q51/MetriNet + Q32P consumes 13 mA @ 4.6V when active for only 10 seconds per minute. Average active power per minute is then 10 mW. Add baseline sleep power of 6.4 mW for a total average power of 16.4 mW. **Run-time estimate of 701 hours or about 30 days.** 3. Three sensors, Q32P, Q32T, Q32H0, sensor delay 30 sec, log interval 15 min. So the Q51/ MetriNet + Q32P/Q32T/Q32H0 consumes 35 mA @ 4.6V when active for only 30 seconds per 15 minutes. Average active power is then 5.4 mW. Add baseline sleep power of 6.4 mW for a total average power of 11.8 mW. **Run-time estimate of 974 hours or about 40 days.** **NOTE:** Display is off in all cases above. Assumes 2500 mA AA-alkaline batteries used. Other than the Q32T, all other M-Node sensors consume approximately the same amount of power. The Q32T consumes about 2x the power of the standard M-node. The biggest influence in battery life for *DataLog* mode is how often samples are taken, as all sensors are powered up at that time.

Equipment bearing this marking may not be discarded by traditional methods in the European community after August 12, 2005, per EU Directive 2002/96/EC. End users must return old equipment to the manufacturer for proper disposal.

MECHANICAL

MetriLog data loggers are self-contained instruments housed in an IP-68 enclosure and can withstand nearly any type of installation environment. The data logger must be used only when temperatures are above 0 °C (32 °F). Note that most batteries do not provide full rated amp-hours when operating at cold temperatures. If used outdoors, avoid locating the unit in direct sunlight if ambient temperatures above 40 °C (104 °F) are expected.

Samples to the logger must be a fixed and stable pressure value in the range of 10–50 psi (0.7–3.4 bar) and sample temperatures must be below 50° C (122° F). Use a pressure regulator ahead of the logger for applications where sample pressure is above 50 psi (3.4 bar). Badger Meter offers an optional PRV/Valve/Strainer Assembly for applications where a stable input pressure within 10–50 psi cannot be achieved.

Avoid applications where sample temperature can change rapidly by more than 10 °C in 5–10 minutes, as rapid thermal expansion and contraction can shorten sensor life. Slow temperature changes of a few degrees per hour have little effect on sensor life.

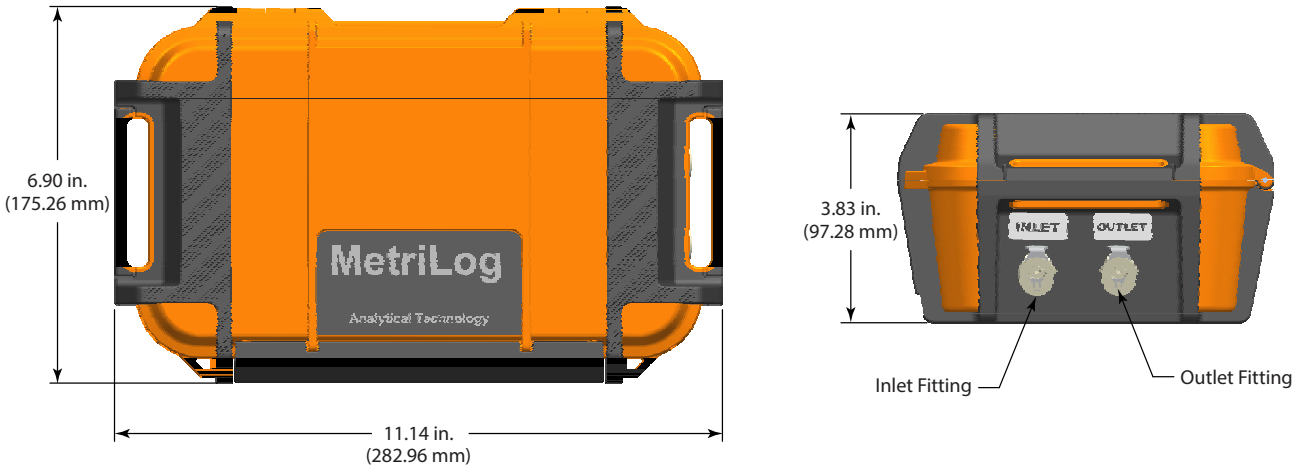


Figure 3: MetriLog dimensions

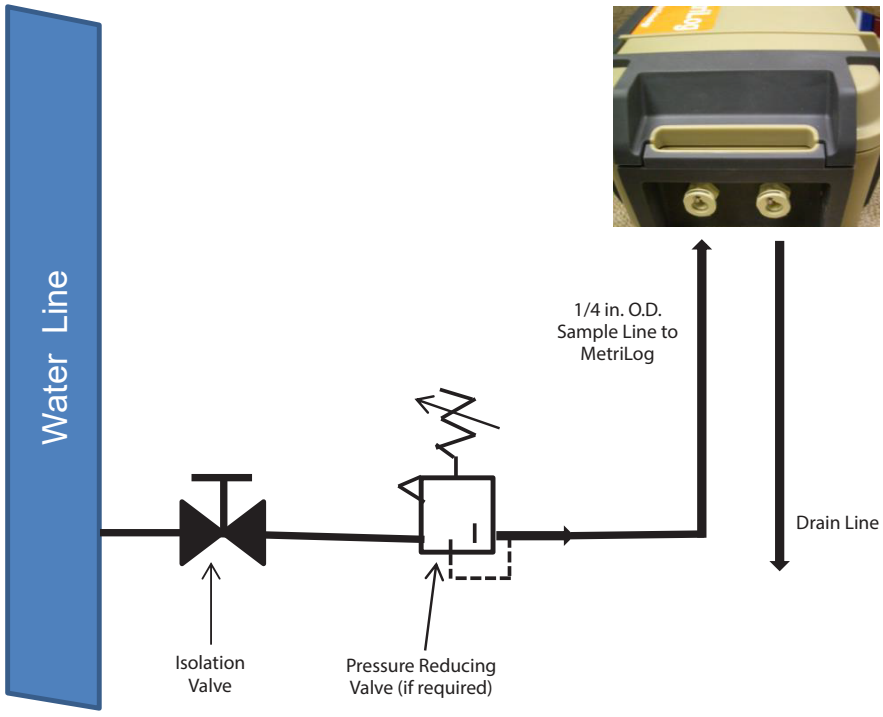


Figure 4: Typical installation

OPERATION

General

The Q51 Logger operates in three distinct modes of operation: *Service* (Srvc), *DataLog* (DLog) and Bluetooth Low Energy (BLE) mode. These modes are selected the moment the instrument is first turned ON.

- *Service* mode is for general calibration and configuration of M-Node sensors.
- *DataLog* mode is selected to create a complete remote data logger system.
- *BLE* Mode is Bluetooth Low Energy mode used for wireless connection to the data logger system.

Power and Battery

To turn the instrument ON, momentarily press and hold **ON/OFF** key. To turn the instrument OFF, press and hold the **ON/OFF** key for 7 seconds. The query "Shut Down?" appears, with *NO* displayed. Change *NO* to *YES,* and then press **ENTER**.

The display has a battery icon in the upper right corner that indicates how much battery life remains. This symbolic representation varies based upon the measured battery voltage. In addition, one of the lower *INFO* screens displays the specific battery voltage level. The unit operates down to about 2.7V of total battery voltage. Battery life examples are shown in the *"MetriLog Performance Specifications" on page 6.*

If the instrument is plugged into a USB host device and is currently OFF, the message "Bus Power On" periodically displays. The instrument is in *Sleep* mode when plugged into USB power, as the USB connection is only used for off-loading data. However, the sensor bus power is turned on, so the unit can be used in this way to polarize sensors without using up battery power.

In *Service* mode, the display and sensor measurement remains active until the instrument is turned OFF, or until no key is pressed for 30 minutes. After 30 minutes of no key press, the instrument automatically shuts down.

Battery Replacement

Batteries are easily replaced by removing the protective boot, and then sliding off the lower battery cover.

Figure 5: Battery replacement

Instrument Interface

The user interface for the portable Q51 MetriNet consists of a graphical OLED display and a membrane keypad. All functions are accessed from this user interface.

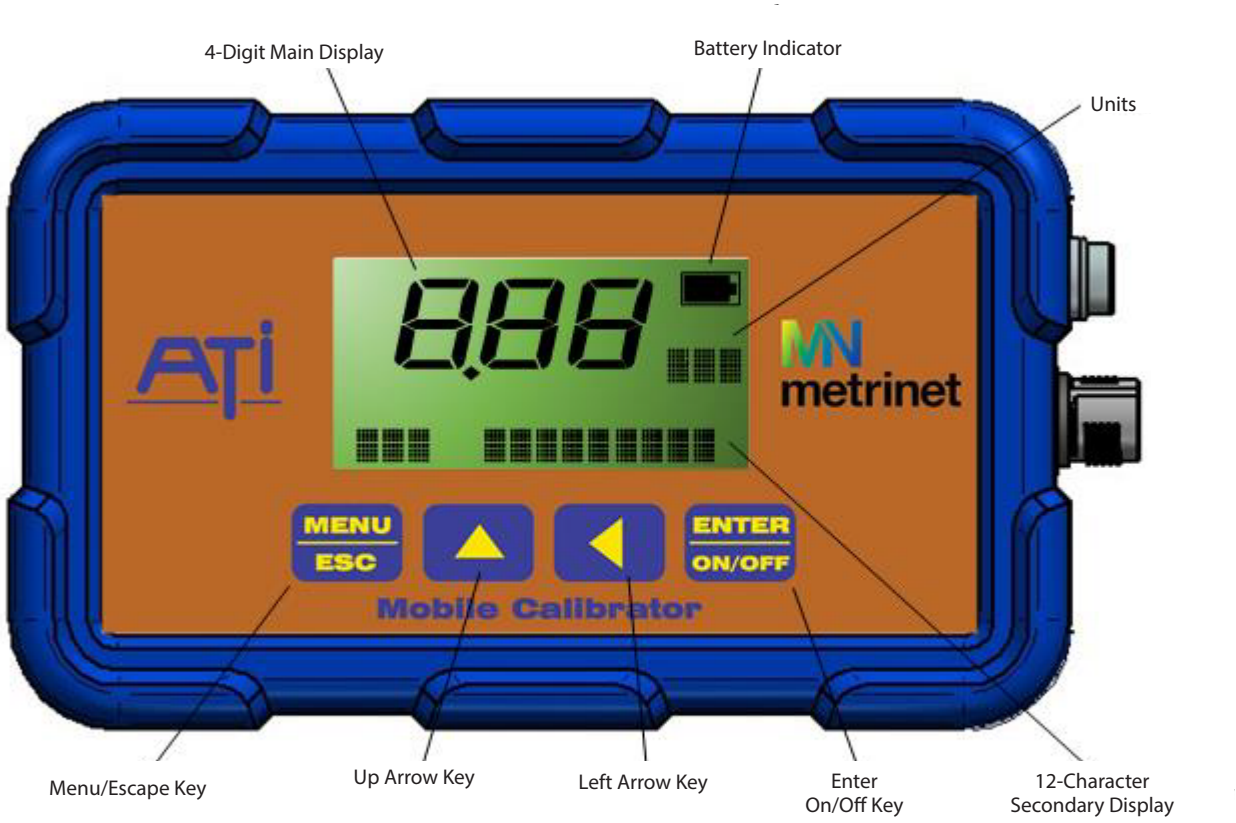


Figure 6: Portable MetriNet interface

The interface is organized around four main menu tree branches: *MEASURE, INFO, SENSOR* and *CONFIG*. The *MEASURE* and *SENSOR* menu displayed data is controlled by the individual M-Node sensor, while *INFO* contains display-only information about the Q51 MetriNet system. The *CONFIG* menu contains Q51 MetriNet setup parameters. Depending on the mode of operation, the software map appears in two different arrangements. Refer to *Figure 7 on page 10* and *Figure 8 on page 11*.

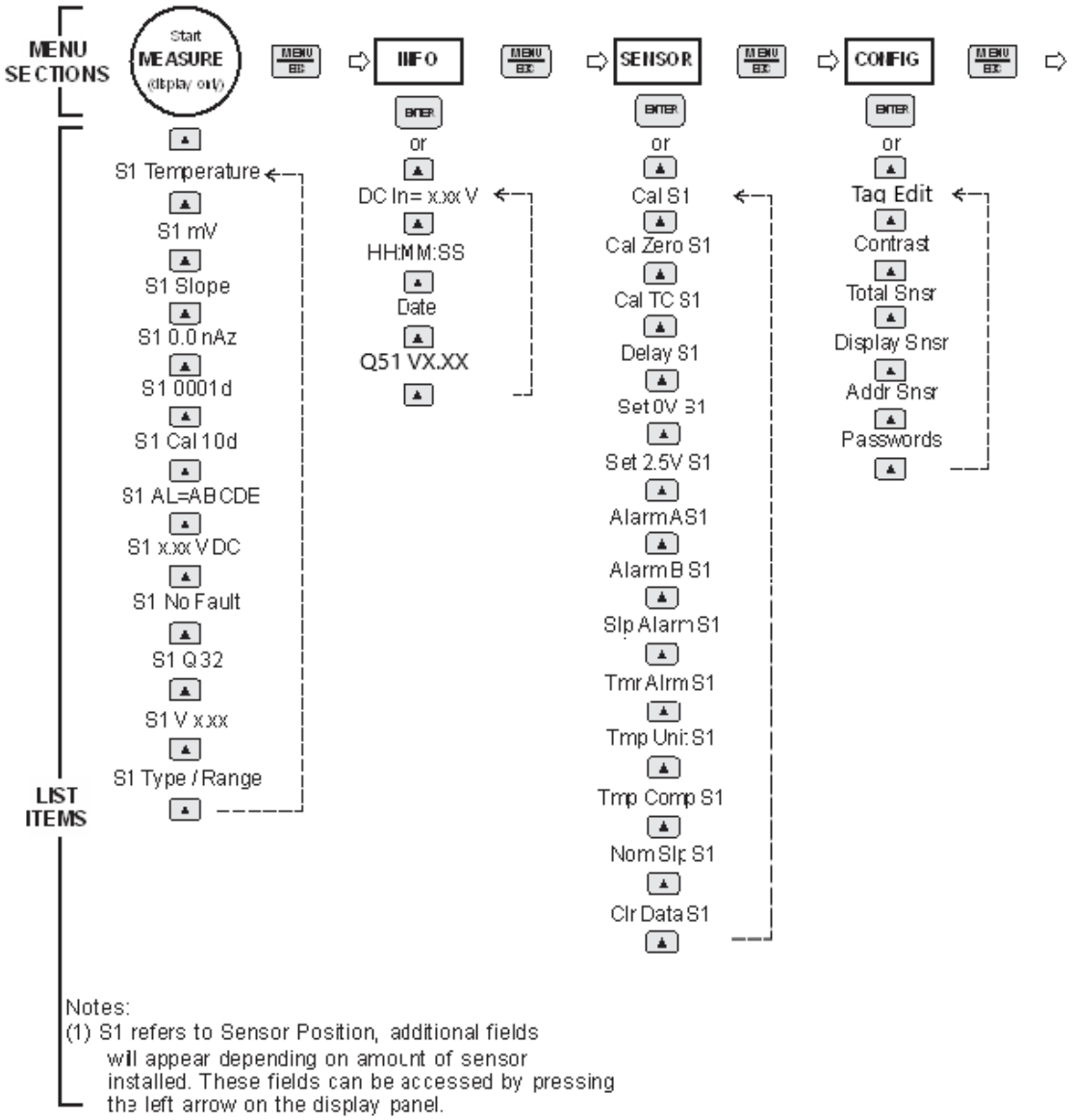
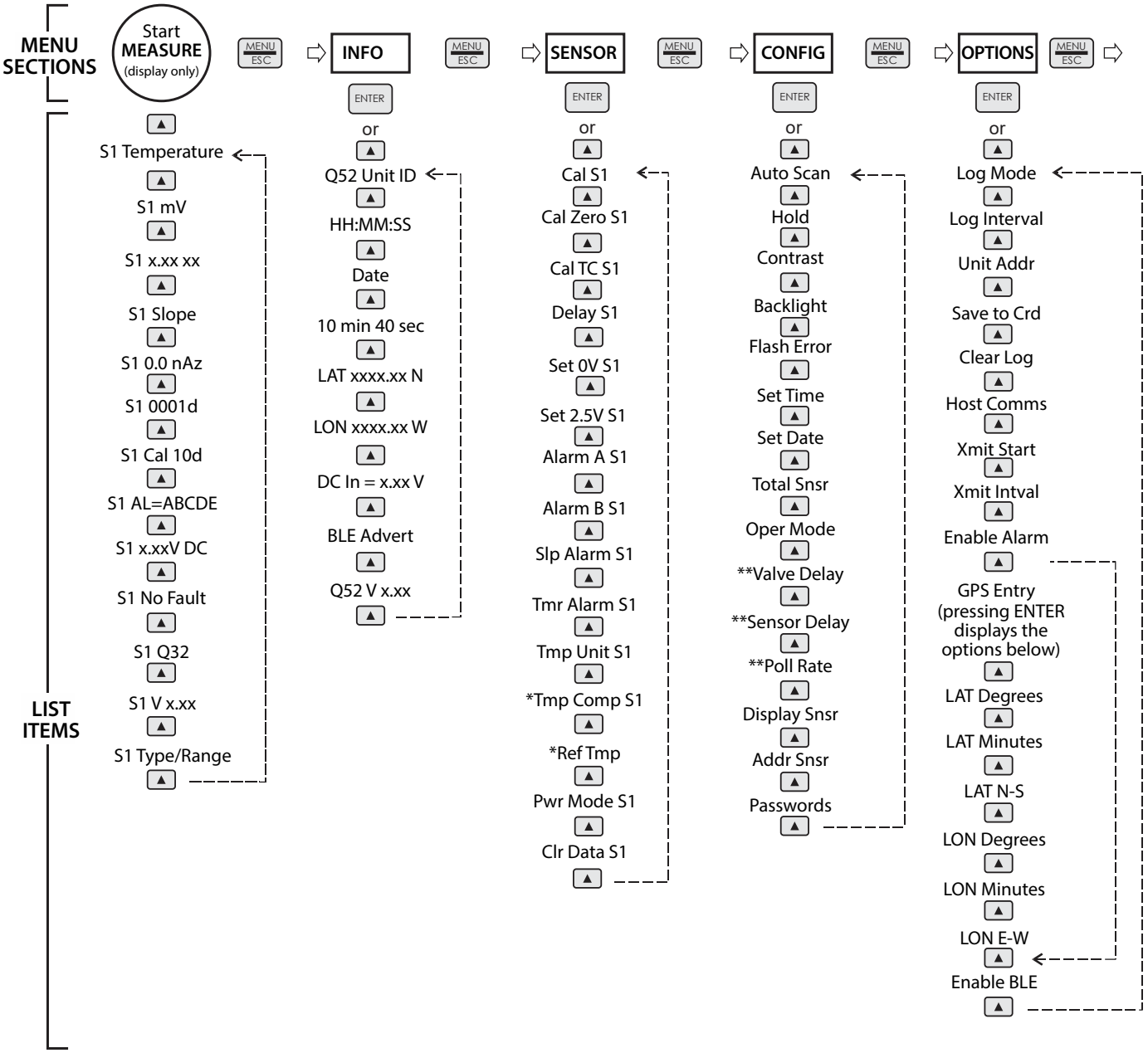


Figure 7: Service mode software map



NOTE: S1 refers to Sensor Position. Additional fields appear depending on the number of sensors installed. These fields can be accessed by pressing the **LEFT** arrow on the display panel.

* Item is used for select node parameters only.

** Menu options if Oper Mode is set to *CYCL*.

Figure 8: DataLog mode software map

MEASURE Menu

The default menu is *MEASURE*. This menu is display-only. When left alone, the unit returns to the *MEASURE* menu after 30 minutes. The lower line information applies to the node currently displayed. To look at information on an individual node, press the **LEFT** arrow key. After selecting the node you wish to look at, use the **UP** arrow key to scroll through variables on the lower display line. The information is not exactly the same for every node but includes the following:

NOTE: The S1 designation means sensor #1 and changes for each sensor.

S1 25.7° C	Temperature display. Can be displayed in °C or °F, depending on user selection.
S1 32.0 nA	Raw sensor data. Could be mA, mV or other.
S1 100%	Sensor output response vs. ideal calibration. Also referred to as sensor "slope" and indicates sensor condition. Value updates after each calibration.
S1 0.0 nAz	Sensor output current at a zero ppm input. Value updates after a zero-calibration.
S1 0001d	Sensor life run-time in days. Indicates how long the sensor has been in operation.
S1 Cal 10d	Calibration timer. Indicates number of days since last calibration.
S1 AL = ABCDE	Alarm indicator. Shows which alarms are active.
S1 2.50V DC	Sensor voltage output. (Only shown for Q32 sensors.)
S1 No Fault	Sensor fail message to define detected fault condition.
S1 Q32H0	Sensor model number.
s1 VX.XX	Sensor firmware version.
S1 Res Clr/0–5.00	Identifies type of measurement and overall range. Display alternates between measurement type and range. This is the text *TAG* field, and it can be modified in some newer sensors.

To manually sequence through the M-Nodes, press the **LEFT** arrow key. By pressing the **LEFT** arrow key repeatedly, you can cycle through all S1–S8 measurements. If no key is activated for 30 minutes, the display reverts to *Scan* mode. When you select a specific S-# sensor using the **LEFT** arrow key, you can then sequence through the information screens on the bottom line using the **UP** arrow key.

Once you have selected a specific node, you can go to the *SENSOR* menu for that node by pressing **Menu** twice. From the *SENSOR* menu, you can adjust sensor zero and sensor span, calibrate temperature, set alarms and adjust other settings.

NOTE: If passwords are enabled, you must enter your password in order to make sensor adjustments.

INFO Menu

The *INFO* menu provides some basic reference-only information on the Q51. Since the portable runs in two distinct modes, *Service* and *DataLog*, the display here changes slightly based on which mode is running.

INFO items shown in Srvc Mode:

13:59:40	Hour/Minute/Seconds time in 24-hour format.
Jan 20, 2000	Current date.
Q51 Ver X.XX	Q51 software version number.
DC In = 4.6	Measured DC input voltage (from battery or power supply).

INFO items shown in Dlog Mode:

13:59:40	Hour/Minute/Sec time. 24-hour format.
Jan 20, 2000	Current date.
10min 40sec	Time until next data point is recorded.
LAT 1234.56N	User entered latitude position.
LON 1234.56W	User entered longitude position.
Q51 VX.XX	Q51 software version number.
DC In = 4.6	Measured DC input voltage from battery supply.

SENSOR Menu

The *SENSOR* menu provides all M-Node sensor configuration and calibration functions. This menu information largely originates from sensor memory and *there is some variation in the exact menu displays from sensor type to sensor type*. The information below illustrates a Free Chlorine sensor as an example.

The functions outlined below allow users to adjust various parameters and calibrate sensors. When making adjustments, pressing **Enter** normally starts the process. Values may be adjusted using the **UP** and **LEFT** arrow keys. Pressing **Enter** again accepts the changes. Pressing **Menu/Esc** during a routine cancels the adjustment and go back to the starting screen.

Cal Chlr S1	Calibration routine for sensor span adjustment.
Cal Zero S1	Calibration routine for sensor zero adjustment.
Cal TC S1	Temperature calibration routine.
Delay S1	Routine for adjustment of sensor "damping" or response time.
Set 0V S1	Routine to adjust zero value for 0–2.5V output. No adjustment necessary for sensors used with MetriNet systems. Used to set up sensors for other applications. Q32 sensors only.
Set 2.5V S1	Routine to adjust full scale value for 0–2.5V output. No adjustment necessary for sensors used with MetriNet systems. Used to set up sensors for other applications. Q32 sensors only.
Alarm A S1	Setpoint for Alarm A. User may define an alarm limit above which the A alarm is shown in the *MEASURE* menu.
Alarm B S1	Setpoint for Alarm B. User may define a second alarm limit above which the B alarm is shown in the *MEASURE* menu.
Slp Alrm S1	User may define a "slope" alarm limit. If the sensor slope falls below that limit after a calibration, Alarm C is shown in the *MEASURE* menu.
Tmr Alrm S1	User may define an alarm limit for the time between calibrations. If a calibration is not done within the defined time period, Alarm D is shown in the *MEASURE* menu.
Tmp Unit S1	Allows temperature reading in °C or °F.
Tmp Comp S1	Allows modification of sensor temperature compensation.
Nom Slp S1	Normalizes slope to 100%. May be done after a sensor has been serviced and calibrated for the first time.
Clr Data S1	Resets all sensor stored data to factory default values.

CONFIG Menu

The *CONFIG* menu provides access to the Q51 MetriNet system configuration settings. Routines defined here are not sensor specific. Since the portable Q51 MetriNet can be operated in one of two modes, *Service* or *DataLog*, the menu listing appears slightly different in either case, as different functions are required.

Menus shown in Srvc Mode:

Tag Edit	Editor for *TAG* name in M-Node sensor.
Contrast	Sets *OLED* graphic display contrast level.
Total Snsr	Sets total number of sensors, 1–8, that the system queries.
Disply Snsr	Displays whether sensor 1–8 is readable.
Addr Snsr	Configures unique slave address of sensor.
Password	Sets system user passwords.

Menus shown in Dlog Mode:

Log Mode	Configures data log to either wrap or fill.
Log Interval	Sets measurement time period.
Clear Log	Clears old data from stored measurement memory.
Contrast	Sets *OLED* graphic display contrast level.
Dsp Timeout	Sets the amount of time display stays active after last key press.
Set Time	Sets current time of day.
Set Date	Sets current date.
Total Snsr	Sets total number of sensors, 1–8, that the system queries.
Sensr Delay	Sets the amount of time sensor is running before measuring.
Password	Sets system user password.
GPS Entry	Sets location.

Details on Individual Srvc/Dlog Menus:

Tag Edit

Used to edit the *Tag* field in the M-Node sensor. The tag editor function allows the user to edit the sensor tag field (two-line text string) in the M-Node sensors. The *Tag Edit* function is only available in the *Service* mode.

1. In the *CONFIG* menu, select *Tag Edit* and press **ENTER**.
2. The available characters that may be entered are displayed. On the lower line of the display, the tag stored in the selected sensor is displayed. The character that is blinking is the character that is changed or overwritten. The underlined character is the character that is selected. Use the **UP** arrow key to select the line, and the **LEFT** arrow key to move the characters on the selected line to the underlined position.
3. Press the **ENTER** key to select the character. The blinking character advances to the next position.
4. When finished editing the lower line, press the **MENU** key.
5. The unit prompts to "Write Data? (Yes/No)." Change the "Yes/No" prompt using the **UP** arrow key, then press **ENTER**.

NOTE: This feature may not yet be supported by all M-Node sensors.

Contrast

Used to adjust display contrast. Default is 1. Range is 1–8. Lowest value consumes the least amount of power.

Total Snsr

1–8. Total sensors connected.

1. Press **Menu** key to access *CONFIG* menu.
2. Press **UP** arrow key until lower line display shows "Total Snsr."
3. Press **Enter** and the main number on the display flashes.
4. Use the **UP** arrow key to adjust the flashing number to the total number of sensors in your system and then press **Enter**.

Display Snsr

Tests communication to each sensor. Press **Enter** to test the status of comms for each sensor. Sensors found indicate "Yes" while sensors not found indicate "No." Press **Enter** again to exit.

Addr Snsr

Each measurement node must have a unique sensor number. By default, all sensors shipped from Badger Meter are set to sensor #1. If there is more than one sensor in your system, a new sensor number must be assigned to each additional sensor. Only one sensor can be connected to the Q51 during this address setting operation. BEFORE SETTING ADDRESS, make sure you have correctly set the total number of sensors being used, as that setting limits the addresses you can enter here.

NOTE: This menu does not appear if more than one sensor is connected to sensor bus.

1. Press **Menu** key to access *CONFIG* menu.
2. Press the **UP** arrow key 5 times to access "Addr Snsr" and then press **Enter**.
3. The display flashes "NO." Press **UP** arrow once for "YES" and press **Enter**.
4. The controller shows the current sensor number assigned to that node and it flashes. Use the **UP** arrow key to set the required sensor number and press **Enter**.
5. Repeat steps 1–4 for each M-Node in the system until you have assigned a unique number to each one.

Passwords

0000. A single 4-digit password. The Q51 MetriNet is designed with a single level of password protection to prevent unauthorized adjustments. The password is numerical, consisting of 4-digit numbers. As shipped, the Q51 MetriNet is not password protected. The user must decide whether to use password protection.

1. Go to *CONFIG* menu and press **UP** arrow repeatedly until bottom line indicates "Password."
2. Press **Enter**. Display shows 0000 with right digit flashing. Using the **UP** and **LEFT** arrow keys, enter a 4-digit supervisor password.
3. Press **Enter** and that number is recorded.

NOTE: If the password is forgotten, consult factory for password reset instructions.

Log Mode Continuous/Full. Data held in flash memory may be recorded until the memory is full or it may be stored in a circular file, with the oldest data overwritten by the newest data once the memory is full. The selection is made here. Choosing "Cont" selects a circular file mode of operation. Selecting "Full" stops the data logging when the memory is full.

Log Interval 1–120 minutes. Interval of measured data storage.

Clear Log "YES/NO." This routine clears all data stored in flash memory. Once cleared, it cannot be recovered. Verify that all data has been saved (or is not needed) prior to clearing the log.

Display Timeout 15 sec, 30 sec, 1 min, 2 min, 5 min, continuous. Enter the time to shut off display after no key press. This is a power saving feature used to disable display during logging mode.

Set Time Used to program current time. After pressing **Enter**, use a combination of the **UP** arrow and **Enter** keys to adjust hours, minutes and AM/PM.

Hours 1–12
Minutes 0–59
AM/PM AM/PM

Set Date Used to program current date. After pressing **Enter**, use a combination of the **UP** arrow and **Enter** keys to adjust year, month and day.

Year 00–99. Enter current year
Month 1–12. Enter current month
Day 1–31. Enter current day

Sensor Delay 0–99 seconds. A delay time before sensor is read, after sensor has been powered up. This is used in datalogging mode when instrument is cycling on and off.

NOTE: The Q32T requires a sensor delay of at least 25 seconds after power up.

GPS Entry Manual entry of GPS latitude and longitude data.

Lat Degrees Range is 0–90. Enter the first two digits (DD) of the Latitude. Format for Latitude is DDMM.MM N/S.

Lat Minutes Range is 00.00–99.00. Enter the next four digits (MM.MM) of the Latitude.

Lat N-S Enter **N** for North, enter **S** for South.

Lon Degrees Range is 0–90. Enter the first three digits (DDD) of the Longitude. Format for Longitude is DDDMM.MM E/W.

Lon Minutes Range is 00.00–99.00. Enter the next four digits (MM.MM) of the Longitude.

Lon E-W Enter **E** for East, enter **W** for West.

SERVICE MODE OPERATION DETAILS

General

As the Q51 MetriNet instrument operates in one of two distinct modes of operation on start-up, *Service* or *DataLog*, this section gives specific information on the use of the instrument in the *Service* mode using an example.

Individual M-Node Service

The primary usage of the portable MetriNet is to simply service or configure a single M-Node sensor. Only one sensor is connected, and it appears on the instrument at address 1–8 if the instrument is set to 8 total sensors. Once the sensor is connected to the instrument, the user simply scrolls through S1–S8 on the front *MEASURE* display until they see a valid sensor at a valid S address. From there, they can access all the internal menus of the sensor and configure or calibrate that single sensor.

Figure 9: Single M-Node calibration in beaker

An example of operation:

1. Make sure the Q51 MetriNet is set to 8 total sensors.
2. Connect one sensor.
3. Turn Q51 MetriNet ON, and select *SRVC* mode operation.
4. Once the Q51 MetriNet display comes up, it shows sensor S1 data, or "Err" as no sensor is detected at S1.
5. If this S1 is not the same as the sensor address connected, simply press the **LEFT** arrow key to move from S1–S2, S3 and so on. When valid data appears, this is the address of the connected sensor.
6. You may now operate all the sensor menus in the *SENSOR* menu listing to fully configure the sensor.

NOTE: The Q51 MetriNet only allows you to scan the number of sensors configured in the menu ^*Total Sensors*.

DATALOG MODE OPERATION DETAILS

General

As the instrument operates in one of two distinct modes of operation on startup, *Service* or *DataLog*, this section gives specific information on the use of the instrument in the *DataLog* mode using several examples.

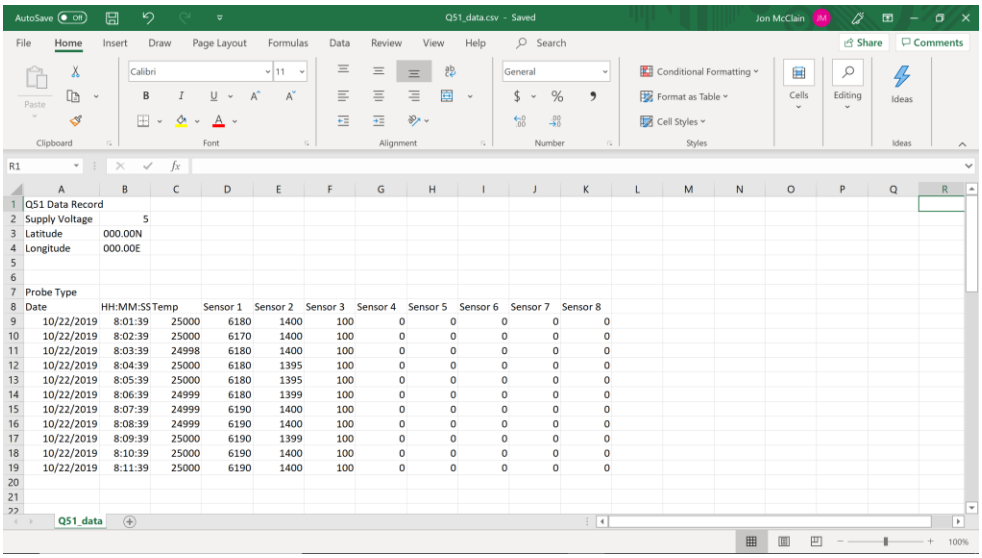
DataLog mode would be used in cases where the Q51 MetriNet might be deployed for a period of time to gather data from 1–8 sensors. It can run for up to 30 days in *cycle* mode operation, cycling and collecting data much like the Q52 MetriNet.

NOTE: The instrument is always in *cycle* mode of operation during data logging. So, the instrument only has an active display when a key is touched. The display is shut down and the unit goes to sleep in between measurement interval times to save power.

The display remains active for the *Display Timeout* time, and then shut down to conserve power. The instrument is still operating during this display-off time. The timer restarts any time a key is pressed. Once the display is active again, the sensors powers up and reads continuously, so that the user can scroll through them. Once the timer times out, the display turns off and the sensor power turns off, waiting for the next cycled measurement time. The *cycle* mode begins to wake up and poll the sensors at the selected *Log Interval*. Each time the sensor(s) are read, the data is written to the data log flash memory.

Data File Format

Data is stored inside the Q51 MetriNet in a standard *.CSV format. Data can be easily displayed and analyzed using Excel or other spreadsheet programs. *Figure 10* is part of a typical data file that has uploaded to the Badger Meter Q51 Data Utility.



	A	B	C	D	E	F	G	H	I	J	K
1	Q51 Data Record										
2	Supply Voltage	5									
3	Latitude	000.00N									
4	Longitude	000.00E									
5											
6											
7	Probe Type										
8	Date	HH:MM:SS	Temp	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Sensor 7	Sensor 8
9	10/22/2019	8:01:39	25000	6180	1400	100	0	0	0	0	0
10	10/22/2019	8:02:39	25000	6170	1400	100	0	0	0	0	0
11	10/22/2019	8:03:39	24998	6180	1400	100	0	0	0	0	0
12	10/22/2019	8:04:39	25000	6180	1395	100	0	0	0	0	0
13	10/22/2019	8:05:39	25000	6180	1395	100	0	0	0	0	0
14	10/22/2019	8:06:39	24999	6180	1399	100	0	0	0	0	0
15	10/22/2019	8:07:39	24999	6190	1400	100	0	0	0	0	0
16	10/22/2019	8:08:39	24999	6190	1400	100	0	0	0	0	0
17	10/22/2019	8:09:39	25000	6190	1399	100	0	0	0	0	0
18	10/22/2019	8:10:39	25000	6190	1400	100	0	0	0	0	0
19	10/22/2019	8:11:39	25000	6190	1400	100	0	0	0	0	0

Figure 10: Raw data format

All data is stored as 16-bit data with 4 decimal resolution. In order to convert raw data to actual engineering units, divide each value by 1000. For example, 7140 would represent 7.140 pH for a Q32P sensor. Since each instrument can accommodate up to 8 nodes, zero values are stored for each unused sensor input. Data manipulation such as appending files and generating graphical reports is left to the user.

The time period required to fill the memory depends on how many nodes are connected and how often data is stored. A controller with a maximum of 8 nodes logging data every 6 seconds can store 48 hours of data. That's about 230,000 data points. A more typical application with 4 M-Nodes taking data once every 10 minutes holds about 239 days of data.

Data held in flash memory may be recorded until the memory is full or it may be stored in a circular file, with the oldest data overwritten by the newest data once the memory is full. The selection is made in the "Log Mode" routine of the *CONFIG* menu. Choosing "Cont" selects a circular file mode of operation. Selecting "Full" stops the data logging when the memory is full.

Data Logging Example

As an example of a logging set up, consider a 3-sensor example, Q23H, Q32P, Q32T. This example assumes time and date are already correct, and GPS entered location is correct - if even required.

1. Turn on Q51 MetriNet and enter *Dlog* mode.
2. In *CONFIG*, set ^*Log Mode* to *Cont*.

   This means our storage log is in continuous mode.
3. In *CONFIG*, set ^*Log Intrval* to *15 Min*.

   This is how often we power up the sensors and take a measurement. Battery power is consumed much faster at a lower interval rate.
4. In *CONFIG*, set ^*Dsp Timeout* to *15 seconds*.

   This is how long the display stays active after the last key is pressed. Battery power is consumed much faster at a higher timeout value.
5. In *CONFIG*, set ^*Sensr Delay* to *25 seconds*.

   This is how long the sensors stays powered up before a reading is recorded. Most sensors only require about 5–10 seconds for a valid reading after power up. However, the Q32T sensor needs at least 25 seconds before a reading can be produced, so we have to account for that requirement. Battery power is consumed much faster at a higher delay value.

Once set up, simply leave the Q51 MetriNet in a safe location connected to the sensors and it continually records data, cycling ON and OFF. The sensors are not active all the time. They are powered ON and OFF as required to save maximum power. Our 3 sensor example above runs for roughly 30 days on a fresh set of AA alkaline batteries. Quality rechargeable AA batteries like Panasonic Eneloop may also be used and are highly recommended. The run-time of the unit is highly dependent on the user settings above and on the number and type of sensors being used.

Badger Meter Data Utility

First, the Badger Meter free data management software must be installed. Install the Windows program to any Windows PC prior to connecting the Q51 portable MetriNet. The free software utility is located for download here:

badgermeter.com/software-firmware/

NOTE: When installing the software onto your PC, make sure you have internet access as the installation utility may look for drivers needed for the program to run that may not be on your PC during the installation. Also, when you connect your PC to the Q51 MetriNet for the first time, your PC may need to install the driver for the virtual com port needed to communicate with the Q51 MetriNet. Once all drivers are installed, everything works even if your PC is not connected to the internet.

Data Off-load

To remove data, first turn OFF the Q51 MetriNet. Next, make a connection via any USB cable to the Badger Meter Q51 instrument. Any USB cable along with the Badger Meter Q51 DataLog Utility is used to remove data stored on the Q51 MetriNet instrument.

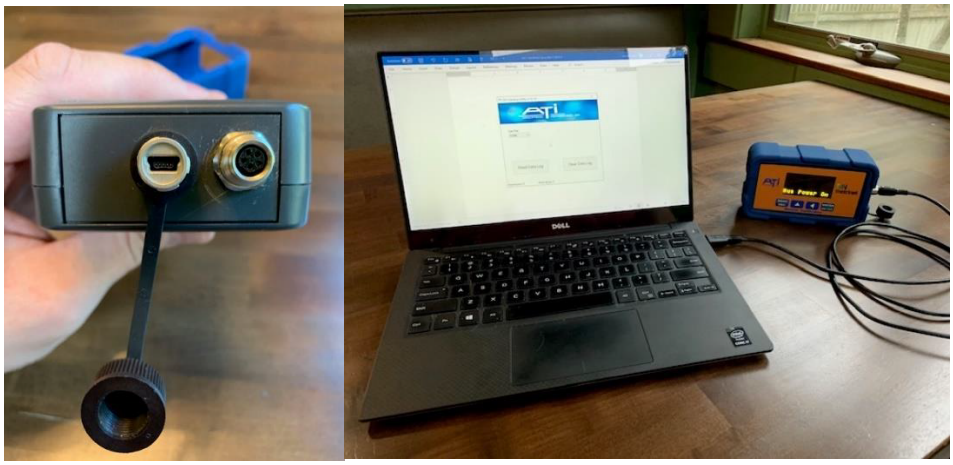


Figure 11: Connecting Q51 MetriNet to Windows PC via USB

Once software is installed and Q51 MetriNet is connected to that PC, launch the Q51 DataLog Utility. The screen below displays. Click on **Read Data Log**.

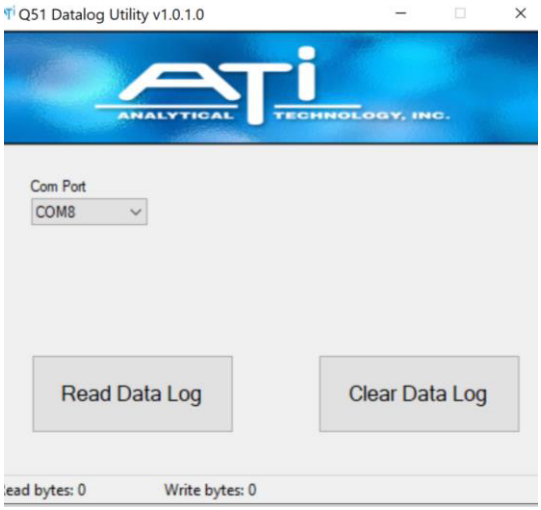


Figure 12: Badger Meter (ATI) Q51 Datalog utility

Clicking on **Clear Data Log** permanently removes all data memory from the Q51 MetriNet, like the *Clear Log* function on the instrument. Next, a window displays for the location of data storage. Enter a name for the file and press **Save**. The default location for data is **C:/This PC/Documents/Analytical Technologies/Q51 Datalog Files/**.

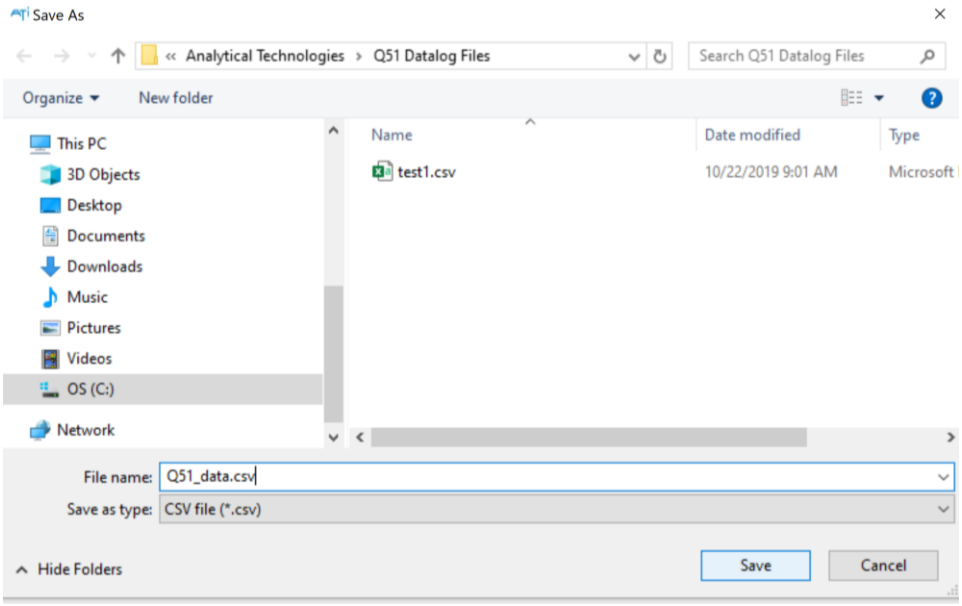


Figure 13: Storing Q51 Datalog file

A confirmation appears stating the file has been saved. Close window to finish program.

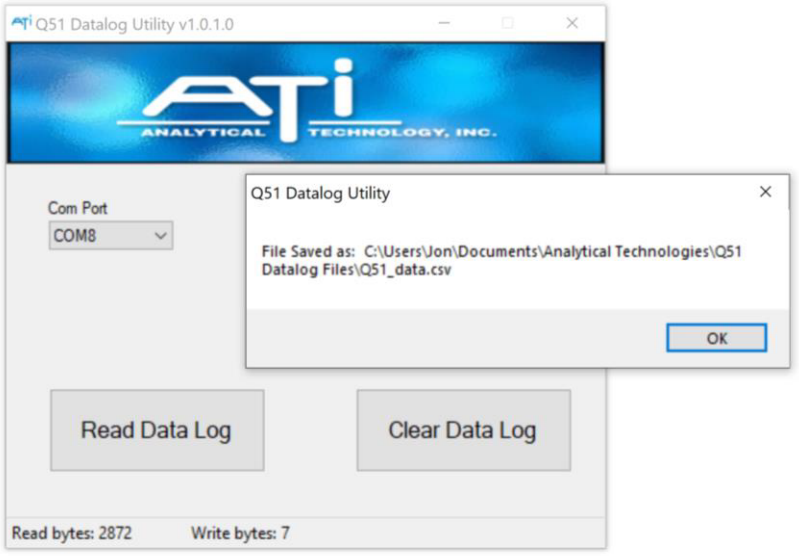
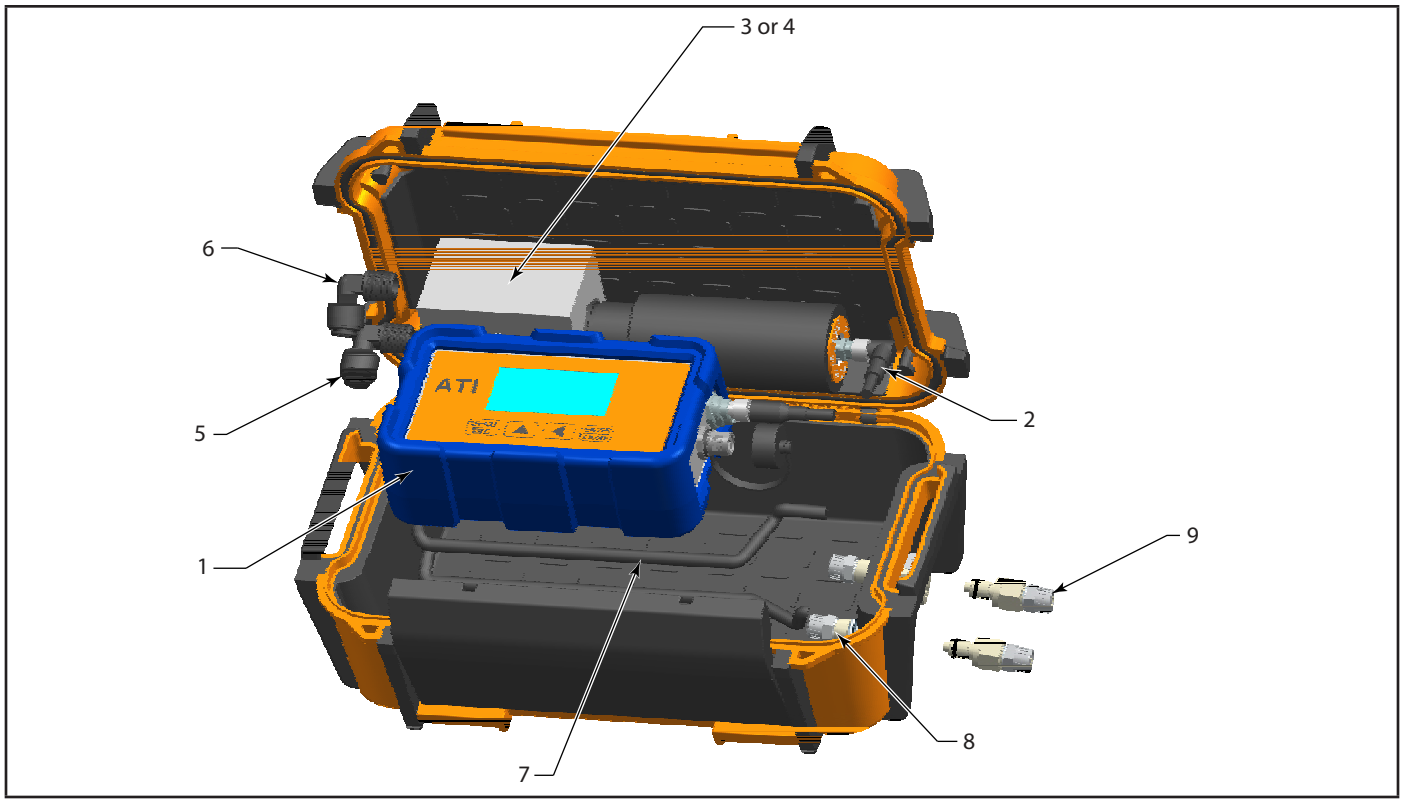


Figure 14: Confirmation of Q51 Datalog file storage

SPARE PARTS

Data Logger Assembly



Item No.	Part No.	Description
1	00-1798	Q51 Calibrator & Data Logger
2	31-0202	M-Node Sensor Cable
ns	31-0216	USB Data Cable
3	00-1920	Clear Flowcell with Fittings
4	00-1921	Black Flowcell with Fittings
5	44-0296	Flowcell Inlet Fitting, 1/4 in. NPT × 1/4 in. O.D. Tube
6	03-0525	Flowcell Outlet Fitting with 0.25 lpm Regulator
7	44-0276	Polyethylene Tubing, Black
8	44-0287	Enclosure Bulkhead Fitting with Valve
9	44-0288	Quick-Connect Plug with Valve for 1/4 in. O.D. Tube
–	05-0166	Inlet Assembly w/ T-Strainer, PRV Valve and Shut-off

Q32 Water Quality Sensors

Part No.	Description
00-1847	Free Chlorine M-Node, 0–5.00 ppm
00-1848	Conductivity M-Node, 0–2000 µS
00-1849	pH M-Node, 2–12 pH
00-1850	ORP M-Node, 0–1000 mV
00-1851	Dissolved Oxygen M-Node, 0–20.00 ppm
00-1852	Dissolved Ozone M-Node, 0–40.00 ppm
00-1853	Turbidity M-Node, 0–40.00 NTU
00-1854	Combined Chlorine M-Node, 0–5.00 ppm
00-1855	Total Chlorine M-Node, 0–5.00 ppm
00-1856	Fluoride M-Node, 0.1–10.00 ppm
00-1857	Chlorine Dioxide M-Node, 0–5.00 ppm
00-1858	Peracetic Acid M-Node, 0–200 ppm
00-1859	Hydrogen Peroxide M-Node, 0–20.00 ppm
00-1863	4E Conductivity M-Node, 0–2000 mS
00-1864	Pressure M-Node, 0–300 PSIG (0–20 bar)
00-1861	Nitrite M-Node, 0–2.000 ppm

Spare Sensor Components

Part No.	Description
03-0511	Electrolyte Chamber, Q32 Sensors
05-0121	Q32 Electrolyte Chamber O-ring Kit (3 ea. 42-0029 & 42-0061)
45-0354	Membrane Holder, PVC
48-0197	Membrane Holder, Titanium (for DO_2 and DO_3 sensors)
05-0120	Free Chlorine Membranes (pkg. of 10)
05-0128	Combined Chlorine Membranes (pkg. of 10)
05-0122	Total Chlorine Membrane Cap (pkg. of 2)
09-0087	Free Chlorine Electrolyte, 60 mL
09-0088	Combined Chlorine Electrolyte, 60 mL
09-0089	Total Chlorine Electrolyte, 60 mL
09-0091	pH/ORP/FI- Reference Gel
02-0245	pH/ORP/FI- Reference Junction
05-0135	D.O. Membrane, 2-mil (pkg. of 10)
09-0090	D.O. Electrolyte, 60 mL
05-0146	Nitrite Membrane (pkg. of 10)
09-0146	Nitrite Electrolyte, 60 mL