METER

DATALOGGER

Brand: METER Group, Inc.

Model: ZL6

Updated review 2024

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Feature summary

- Ultra-rugged and durable construction
- Download data via Bluetooth (shuttle data to ZENTRA Cloud via Bluetooth with ZENTRA Utility mobile, then download)
- Plug and play with METER sensors
- Six sensor ports
- Low cost
- Simple setup
- Powered by six alkaline batteries that last up to two years (1 year with ATMOS 41W)
- Stores 20,000 to 30,000+ records depending on configuration
- Best for researchers who have no cell coverage or don’t need continuous data visualization (See the ZL6 for viewing data on the go)

Main features of the ZL6 Datalogger

METER Group 's ZL6 data logger is designed to facilitate the management of devices, users and data, and to ensure data is recorded safely and consistently in field conditions.

It is not necessary to have programming knowledge, nor to waste time managing data files and prior analysis.

METER Group's new data recording and management platform

The ZL6 datalogger is METER Environment's new data recording and storage platform.

The ZL6 datalogger allows remote work through GPRS and cloud connectivity or in the ZC Utility program via Bluetooth or USB cable.

It also allows you to access your location using GPS, update firmware online and set your specific location metadata.

The ZL6 Datalogger uses ZENTRA Cloud software to manage devices and users, as well as to use data, in near real time, wherever and whenever it is needed.

Access to data in ZENTRA Cloud makes it easy to download, organize and visualize data, allowing you to correlate the influence of different factors, see important trends or discover problems almost instantly (ZL6 connectivity is via Bluetooth, SIM card or USB cable).

The simplest and most complete datalogger

The ZL6 has six input channels, which allow the connection of different types of sensors manufactured by METER Group, obtaining data on climatic parameters, soil moisture and soil water potential, all at the same time.

It also has built-in barometric pressure and GPS to eliminate the need to install additional sensors.

Ensures data registration and access with robustness and security

The ZL6 Datalogger is extremely robust and low maintenance.

The integrated solar charging panel reduces the need for energy maintenance.

The ZL6 electronics are protected by an IP56 box.

In addition, it requires little configuration, the ZL6 datalogger auto-recognizes digital sensors manufactured by METER Group without the need to configure each connection port (channel).

ZENTRA Utility software uses Bluetooth to configure sensors on any device, so you can take a mobile phone into the field instead of a heavy laptop.

Sensors can even be configured from the office using the ZENTRA Cloud .

It also has an integrated GPS system, so it automatically tracks the location of the recording point where the data is collected.

And the new network firmware upgrade capability allows the ZL6 firmware to be updated automatically and remotely.

HARDWARE COMPONENTS

The ZL6 data logger is housed in a weather-resistant enclosure (IP56 rated) (Figure 1). In extremely wet environments or environments with prolonged high humidity, enclose a desiccant packet inside the logger or enclose the logger in a waterproof case. The ZL6 and ZL6 Pro have an integrated solar panel to recharge NiMH batteries.

Figure 1

The ZL6 is purpose-built to collect data from environmental sensors sold by METER. The data logger has six ports for sensors and a micro-USB port for communicating with a computer (Figure 2). The data logger interior also contains a TEST button and two status lights, OK and ERROR. The logger uses six batteries.

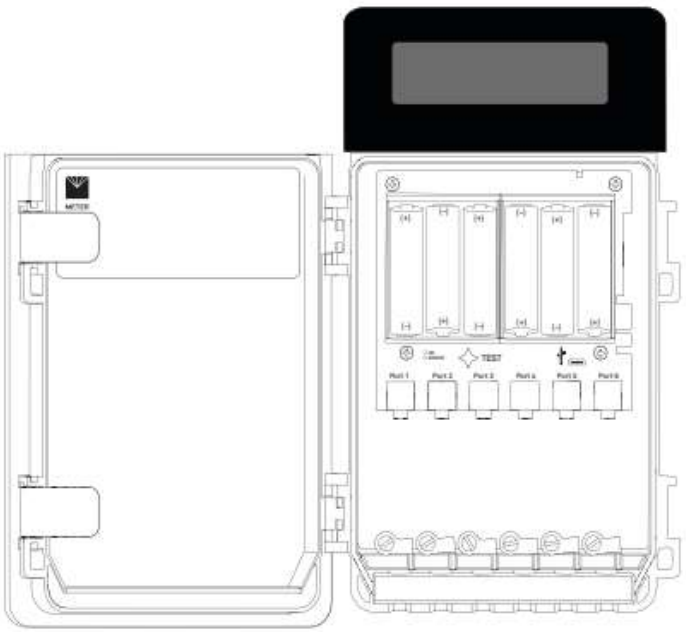

Figure 2

SENSOR INTERFACE

The ZL6 will detect the presence of METER sensors when connected to the sensor ports. For METER digital sensors, the ZL6 will detect and autopopulate the Sensor Type dropdown on the Manage Settings dialog in ZENTRA Utility. For METER analog sensors, the ZL6 will show Unrecognized Sensor in the Sensor Type dropdown. Some sensors (such as pulse sensors) will not be detected by the ZL6. In these latter two cases, the sensor will have to be manually selected from the dropdown menu.

NOTE: It is critical that the ZL6 is configured correctly for the attached sensors. Without correct configuration, the ZL6 will not record useful sensor information.

The ZL6 is able to detect when many of the METER sensors are unplugged or malfunctioning. The logger stores error codes in the place of normal sensor measurements in this event. ZENTRA software will display these errors to help troubleshoot problems with the sensors. The ZL6 cannot determine the difference between an intentionally uninstalled sensor and a malfunctioning sensor. Update the sensor configuration each time sensors are removed from or added to the ZL6.

SENSOR MEASUREMENT INTERVAL

The measurement interval controls how often the ZL6 records sensor data to internal nonvolatile data storage. The interval applies to all ports on the ZL6 (i.e., the ZL6 cannot store data for one sensor at a faster rate than another sensor). This setting is controlled in the Sensor Configuration tab of the Manage Settings dialog (Section 4.2.5.1). The measurement interval works relative to the ZL6 internal real-time, 24-h clock. For example, a measurement interval of 60 min results in the ZL6 storing data every hour, on the hour (e.g., 12:00 am, 1:00 am, ..., 10:00 pm). The ZL6 and ZL6 Pro minimum measurement interval is 5 min and the maximum measurement interval is 12 h. For most applications, a measurement interval of 60 min is appropriate. The ZL6 Basic measurement interval is 60 min. The ZL6 makes a measurement from each of the sensor ports in use every 60 s. When the ZL6 internal clock reaches the user-configured measurement interval, the ZL6 processes and stores the results from all the 60-s sensor readings taken since the last storage interval. For most sensors, the stored results are a simple average of the per-minute readings. For example, if the measurement interval for a TEROS 12 soil moisture sensor is 60 min, the ZL6 stores an average of the past 60 sensor readings. For a pulse-based sensor, like a rain gauge, the ZL6 stores summed sensor readings. Some METER sensor user manuals contain more details of how the ZL6 processes sensor readings

NOTE: Setting the ZL6 measurement interval to Off (not logging) turns off sensor measurement, data storage, and data uploads.

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TEST BUTTON

Pressing the TEST button initiates the self-test sequence. The self-test can take 60 s or more if testing communications over the cellular network. The following actions are part of the self-test sequence:

- Reboot the ZL6.

This ensures internal software restarts and operates in the expected way. Both status lights stay on during the reboot. This reboot will not erase data or reset settings.

- Perform basic functionality testing on internal systems and evaluates the amount of charge in the battery.

Both the green and red lights blink together slowly while the logger performs tests.

- Autodetect the connected sensors
- Start the embedded GPS receiver to obtain a current time and location fix
  This process takes as long as15 min to complete.
- Establish an internet connection over the cellular network and attempt to communicate with ZENTRA Cloud.
- Enable the Bluetooth module to allow connection with ZENTRA Utility Mobile.

  After completing the self-tests, the ZL6 will indicate success or failure by lighting either the green or red status light.

  A solid green light (for approximately 20 s) indicates that internal tests passed and there is successful communication over the cellular network.

  A solid red light indicates an error in the logger, which may indicate
- corrupt ZL6 logger firmware
- low batteries, or
- unsuccessful cellular communications (ZL6 and ZL6 Pro).

  Use ZENTRA Utility to identify where the self-tests may have failed or consult troubleshooting to resolve logger errors

STATUS LIGHTS

Lights near the TEST button indicate the status of the ZL6. A green light is labeled OK and a red light is labeled ERROR. There are several possible status states:

- The green light gives a short, single blink every 5 s to indicate the ZL6 is configured to log sensor data.
- The green light blinks slowly (1 s on, then 1 s off), to indicate the logger is communicating to a computer or using the cellular module.
- The green and red lights blink together during self-test procedures (after pressing the TEST button or pulling the battery tab).
- The solid green or the red light at the end of the self-test sequence indicates the results of the tests.
- The lights remain off if the logger measurement interval is set to Off (not logging).

BATTERIES

The ZL6 or ZL6 Pro is designed to use either AA NiMH rechargeable batteries or AA alkaline nonchargeable batteries. The logger autodetects the type of batteries installed and automatically adjusts the internal thresholds to represent 100% and 0% battery power. The ZL6 Basic is designed for AA alkaline batteries.

NOTE: Do not mix NiMH and alkaline batteries together. Do not mix new and old alkaline batteries together.

Use NiMH batteries if the ZL6 or ZL6 Pro will be installed outdoors, where it can harvest solar energy to charge NiMH batteries. Orient the ZL6 enclosure to expose the solar panel to the maximum amount of sunlight available. In the northern hemisphere, this typically means that the data logger will face south; in the southern hemisphere, this typically means that the data logger will face north. There may be local obstructions that make another orientation more favorable. The logger will charge the batteries even during periods of low light levels (e.g., winter time or heavy overcast conditions). For extended periods of low light, the incoming energy may be lower than the energy needed to operate the logger. The batteries will buffer the energy needs of the logger for several months and will return to full capacity as the incoming energy exceeds the energy needed to operate the logger.

The ZL6 and ZL6 Pro will also harvest energy from the USB connection to a computer. Plugging the logger into a USB port for several hours will help restore NiMH batteries to full capacity.

Use alkaline batteries if the ZL6 or ZL6 Pro will be installed indoors or in a location where the harvested solar energy is not sufficient to keep the NiMH batteries charged. Alkaline batteries will last longer than NiMH batteries that are not being charged (6 to 7 months for typical configurations). The ZL6 and ZL6 Pro are designed to prioritize sensor measurements over both the GPS and cellular communications features. If the battery level reaches a critical threshold (showing 0% in software), the logger will continue to make sensor measurements until the battery charge is too low to provide excitation power to the sensors. When new batteries are installed or recharged, the GPS receiver and cellular radio functionality will automatically start working again. Logged data are stored with nonvolatile flash memory and will not be lost if battery power fails. However, power must be restored to the logger to download data

GPS RECEIVER (ZL6 AND ZL6 PRO)

The ZL6 logger has a built-in GPS receiver that provides the latitude, longitude, and altitude of the logger. It is designed to provide time fix and location metadata for the environmental monitoring location. The ZL6 does not record the location of each individual sensor reading and is not optimized for applications such as geotagging a moving sensor platform. The ZL6 enables the GPS receiver once per day. If the logger determines its location has not changed, it turns off the GPS receiver to save power. If the ZL6 detects a change, it keeps the GPS receiver powered for as long as 15 min to improve the accuracy of the location fix. Pressing the TEST button on the ZL6 triggers the logger to evaluate changes in location

TIMEKEEPING

The ZL6 keeps track of time using Universal Time Coordinated (UTC) seconds. All ZL6 models can synchronize time using ZENTRA Utility and ZENTRA Utility Mobile. Additionally, the ZL6 and ZL6 Pro synchronize time using the GPS receiver or the cellular network. The ZL6 prioritizes using GPS time since this will be the most accurate; however, the logger will fall back to the other sources of time when the ZL6 does not have a good GPS time fix.

NOTE: The ZL6 Basic requires a time sync to accurately save a time and date stamp with each sensor measurement record. This time sync happens when the logger connects to ZENTRA Utility or ZENTRA Utility Mobile. The time must be reset any time the logger loses power (when batteries are removed or replaced).

Data collected by the ZL6 uses the UTC time for the timestamp on each saved sensor record. ZENTRA Utility and ZENTRA Cloud display these data using local time based on where the logger is installed.

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DATA STORAGE

The ZL6 only stores data for sensor ports that are configured for sensors.

The ZL6 Basic stores 2 MB of data and the ZL6 and the ZL6 Pro store 8 MB of data. When the logger has filled its memory, it begins overwriting the oldest data in the memory. Data storage capacity varies between approximately 6 months to several decades depending on the logger, connected sensors, and set measurement interval. ZENTRA Utility software displays how many days of data the ZL6 can hold based on the current measurement interval, sensor configuration, and previously stored data.

The ZL6 data memory is nonvolatile flash. Removing the batteries or rebooting the logger will not erase stored sensor measurement data. T

he ZL6 stores encoded data for each sensor to make data storage and transmitting convenient. ZENTRA software automatically decodes the sensor data to display them correctly

CELLULAR COMMUNICATIONS

The ZL6 has a built-in cellular module for uploading measurement data to ZENTRA Cloud. This allows for near real-time monitoring of the environment at the measurement site.

The ZL6 powers the cellular module only long enough to upload the data collected since the last time the logger successfully reported. During these upload times, the ZL6 transfers data to ZENTRA Cloud, retrieves any pending settings changes, and occasionally performs system update to the logger.

Upload session frequency and timing can be changed in ZENTRA Utility or ZENTRA Cloud. The default setting is for the ZL6 to upload data once per hour at a random time within each hour of the day at optimal hours. Less frequent uploads conserve battery power.

NOTE: Contact Customer Support if more frequent uploads are needed.

The ZL6 is available with either a 3G or 4G LTE-M cellular communication module. For 3G coverage, the ZL6 operates with AT&T and T-Mobile networks in the United States and with 550 roaming partner networks in 190 countries. 4G coverage is currently only available in the United States on AT&T networks.

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TECHNICAL SPECIFICATIONS

MEASUREMENTSPECIFICATIONS	
Sensor Logging Interval	
ZL6 Basic	60 min (average or accumulation of 60, 1-min sensor readings)
ZL6 and ZL6 Pro	5 min to 12 h (average or accumulation of 1-min sensor reading)
Logger Reporting Interval	
ZL6 Basic	None
ZL6	Hourly with additional charges for more frequent reporting
ZL6 Pro	Hourly with the ability to enable more frequent reporting
Timekeeping	
ZL6 Basic	Synchronize with ZENTRA Utility or ZENTRA Utility Mobile
ZL6 and ZL6 Pro	Synchronize automatically and on-demand; GPS, cellular, or ZENTRA Utility software

COMMUNICATION SPECIFICATIONS	
Internet downloads	SSL/TLS encryption
Cellular communication Integrated Cellular Module Brand: u-blox AG Model: LARA-R6001D TAC GSMA: 35350072	ZL6 GSM850 / GSM 1900 WCDMA Band II / WCDMA Band V LTE Band 2 / Band 4 / Band 5 / Band 7 / Band 8 / Band 12 / Band 13 / Band 26 / Band 28 / Band 38 / Band 40 / Band 41 Power Out Máx.: GSM850: 33.5 dBm GSM1900: 30.5 dBm WCDMA Band II: 24 dBm WCDMA Band V: 24 dBm LTE Band 2: 24 dBm LTE Band 4: 24 dBm LTE Band 5: 24 dBm LTE Band 7: 23.5 dBm LTE Band 8: 24 dBm LTE Band 12: 24 dBm LTE Band 13: 24 dBm LTE Band 26: 24 dBm LTE Band 28: 24 dBm LTE Band 38: 24 dBm LTE Band 40: 24 dBm LTE Band 41: 24 dBm Up Link Modulations: GMSK/8PSK/QPSK/16QAM
Bluetooth 5.2: Support Bluetooth low energy protocol	2.4 GHz: 2400-2480 MHz Out Power máx.: 4 dBm Up Link Modulations: GSK
GPS Communication	Type: Integrated 56-channel GPS/QZSS receiver Update: Daily (automatic) and on demand (manual) Accuracy: +3 m, with good view of the sky

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PHYSICAL SPECIFICATIONS	
Dimensions	Length14.9 cm (5.9 in) Width: 6.3 cm (2.5 in) Height: 25.0 cm (9.9 in)
Enclosure Material	Weather-, impact-, and UV-resistant polymer
Enclosure Rating	IP56, NEMA 3R
Enclosure Access	Hinged door with latches and eyelets for lock or zip tie
Sensor Input Ports	6 (supports METER analog, digital, or pulse sensors)
Sensor Port Type	3.5-mm stereo plug connector
Memory Type	Nonvolatile flash, full data retention with loss of power
Data Storage	ZL6 Basic 2 MB (20,000 to 30,000 records depending on configuration) ZL6 and ZL6 Pro 8 MB (40,000 to 80,000+ records depending on configuration)
Battery Capacity	ZL6 Basic 6 AA alkaline batteries ZL6 and ZL6 Pro 6 AA NiMH or alkaline batteries
Battery Life	Alkaline 3–12 months depending on configuration NiMH 3+ years with unobstructed view of sun Charging through solar energy harvesting or USB
Operating Temperature Range	Minimum –40 °C Máximum +60 °C

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