

# ML-417 Low Power Data Logger



The ML-417 data logger is a small, low power, cost effective data logger with or without built-in LTE-m & NB-IoT cellular modem. This small data logger, is further provided with an internal temperature sensor, 8GB micro SD card and a 2FF SIM card slot. The data logger is available with several power provisions e.g. a 3.6 Volt Lithium batteries, 8..28V DC-input, 12V solar panel input or integrated solar panel with battery charger.

The data logger can acquire physical signals by 2 current loop inputs, 2 voltage inputs, 1 potentiometer input and 3 digital inputs. More or special inputs can be added by means of internal stackable option boards/converters.

The data logger is provided with one serial port to capture measurements from ASCII, MODBUS, NMEA or SDI-12 compatible sensors. External sensors can be powered by the data logger itself, to prevent them to consume power while the data logger is a sleep. Up to 8 mathematical channels are available to calculate meaningful engineering values derived from sensor input values (e.g. a polynomial to calculate a flow from a stream level). Supports up to 8 aggregation channels (e.g. to record 2 or 10 minute wind-speed averages sampled at 1Hz). Logged data, when equipped with cellular modem, can be pushed to a server by HTTP(S), FTP(S), secure TCP or MQTT(S) at configurable intervals.

The ML-417 is available with or without cellular modem:

- ML-017: without cellular modem
- ML-417: Global LTE-M & NB-IoT modem

When equipped with the integrated solar panel a complete self providing remote monitoring station can be arranged, all you need is a data logger and applicable sensor(s). This self providing cellular data logger is costs saving, because you don't need: a) solar panels, b) big batteries, c) cellular modem and d) encapsulating cabinet.



## Features

- LTE-m & NB-IoT Data Logger
- 8GB Data Storage
- Solar, Battery or DC Powered
- 12V@200mA Sensor Excitation
- Analog & Digital Inputs
- Derived Inputs
- RS232, R485 & SDI-12
- ASCII, MODBUS & NMEA-0183
- TCP, FTP(S), HTTP(S), MQTT
- CSV, TXT, JSON & JPG Files
- Alarm Output & SMS
- IP68, IP67 or IP54 Enclosure
- Remote Configuration

## Accessories

- Several option boards
- Camera (JPG)
- Satellite Modem
- GPS Receiver

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## Specifications

### Data Logging

- 1 second to 1 day intervals.
- Regular, alarm and independent intervals.
- 8GB industrial grade micro SD-Card (file storage), 512kB (program storage), 64kB SRAM (runtime memory).

### Data push

- 1 minute to 1 day intervals.
- Regular and alarm intervals.
- Direct push on alarm raise and fall.
- Native TXT, JSON, CSV, JPEG or Sparkplug B payload format.
- MQTT(S), HTTP(S), FTP(S)<sup>1)</sup> or secure TCP (AES-128).

### Alarming

- Alerts by SMS, e-Mail and MQTT(S).
- Open collector output (max. 100mA sink current)

### Internal Sensors

- Battery (voltage and rest capacity)
- Processor temperature
- GSM signal strength

### Analog Inputs (12bit resolution & <0.2% FS accuracy)

- 2x current loop inputs (0/4..20mA, 150 Ohm impedance)
- 2x voltage inputs (0..10V)
- 1x potentiometer input (0..3.3V, max. 10M Ohm)

### Digital Inputs (0..5V)

- 3x state, counter (max. 10kHz), on-time meter or trigger

### Serial Input (1x RS-232, RS-485 or SDI-12)

- **SDI-12** (up to 15 devices, max 20 channels per device)
- **MODBUS RTU/ASCII** (read registers from up to 15 slaves)
- **NMEA-0183** (standard and custom sentences)
- **ASCII** (sensors outputting readable lines of numeric values)

### Derived Inputs

- **8x calculation channels**, using mathematical operators and functions (e.g. cos, sin, atan2, ln, sqrt).
- **8x aggregation channels**, min/max, average, gust, std dev, rate of change and up to 3 different percentiles sampled at 1Hz max.

**Accessory Port** (1x RS-232 & 5V excitation, to connect and power a GPS receiver, Iridium SBD modem, JPG camera or TFT-display)

### Built-in cellular modem (ML-417)

- LTE-M (M2), NB-IoT (NB2) & GPRS fallback
- IPv4, IPv6, NTP, TLS (1.1, 1.2, or 1.3) & SNI
- Max transmission power: LTE 23dBm, GPRS 33dBm
- LTE bands: 1,2,3,4,5,8,12,13,18,19,20,25,26,27,28,66,71 & 85
- GPRS bands: B2, B3, B5 & B8
- TAC: 35224763, FCC ID: R17ME910G1WW
- 2FF (Class B) SIM-CARD slot.
- Integrated GSM antenna, external GSM antenna optional.

### Configuration by:

- USB (local) or secure TCP tunnel (remote)

### Power consumption

- 60mA@3.6V average operating<sup>2)</sup> current during a duty cycle of less than 1 sec<sup>3)</sup> per log interval.
- 250mA@3.6V average operating current during 20 to 60 seconds cellular communication.
- <80uA@3.6V sleep current.
- 12V@200mA excitation to power external sensors.
- Configurable daily operation time bracket to limit power consumption (e.g. 07:00AM to 20:00PM or 21:00PM - 06:00AM)

### Power supply (mounted in several different covers)

- **LI** : 3.6V Lithium battery holder(s)<sup>4)</sup>
- **PV** : 1Wp Integrated solar panel and LiFePO4<sup>4)</sup> charger
- **SLA/LFP** : 12V solar panel input and SLA or LiFePO4<sup>4)</sup> charger
- **DC** : 8..28V DC input with or without battery<sup>4)</sup> backup.

### Enclosure (several different covers)

- **LI /LFP/SLA/DC** : IP68 (30min@2m), 150x120x90mm, 420g.
- **PV** : IP67, 150x120x130mm, 450g.
- **TFT** : IP54, 150x120x85mm, 620g.
- UV stabilized polycarbonate.
- Wide temperature operating range -30°C to +75°C

**1)** TLS-Explicit. **2)** 60mA if no external sensors need to be powered.

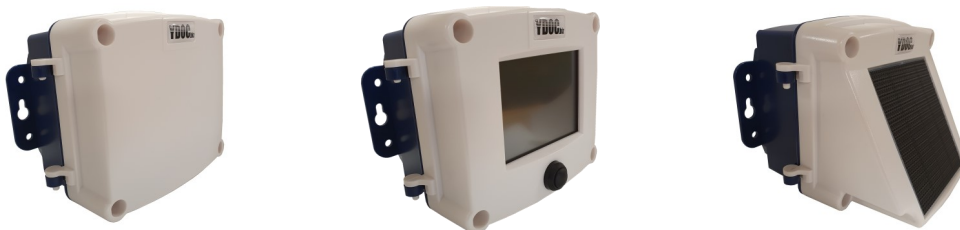
**3)** <1 sec. if external sensors don't require time to "warm up".

**4)** Lithium, LiFePO4 or NiMH batteries not included.

# ML-417 Low Power Data Logger



## Editions



## Stock Keeping Unit Table

**SKU format:** **ML-x17y-z** (x=Modem, y=Edition, z=Power Supply)

### Modem (x) Description

**ML-017y-z** Data logger without built-in cellular modem

**ML-417y-z** Data logger with built in global LTE-M & NB-IoT modem ,

### Edition (y) Description

**ML-x17TFT-z** With 4 analog & 3 digital inputs, serial port & TFT-display cover on accessory port.

**ML-x17ADS-z** With 4 analog & 3 digital inputs, serial & accessory port.

**ML-x17AD-z** With 4 analog & 3 digital inputs (no serial port, no accessory port).

**ML-x17DS-z** With 3 digital inputs & serial port (no analog inputs, no accessory port).

**ML-x17D-z** With 3 digital inputs (no analog inputs, no serial port, no accessory port).

### Power Supply (z) Description

**ML-x17y-LI** 3.6V Lithium battery powered (SAFT LSH20), 1x D-Size holder.

**ML-x17y-3LI** 3.6V Lithium battery powered (SAFT LSH20), 3x D-Size holder with safety electronics.

**ML-x17y-DC** Integrated 8..28V DC adapter.

**ML-x17y-DC-LI** Integrated 8..28V DC adapter and D-Size 3.6V Lithium backup battery holder.

**ML-x17y-DC-NM** Integrated 8..28V DC adapter and NiMH backup charger, 3x AA holder.

**ML-x17y-PV** Integrated 1Wp solar panel and 3.2V LiFePO4 cell charger, 1x 26650 holder.

**ML-x17y-LFP** Integrated 3.2V LiFePO4 cell charger for external 12V (21Voc) solar panel, 4x 18650 holder.

**ML-x17y-SLA** Integrated 12V Sealed Lead Acid/LiFePO4 battery charger for external 12V (21Voc) solar panel.

Example:

**ML-417ADS-PV** is a data logger with a built in LTE-m modem, PV-cover, digital & analog inputs, a serial and accessory port.

Remark: The data logger will be supplied with 3 unmounted PG7 cable glands, giving the user the freedom to choose the positions, number, size and type of glands/connectors best matching his applications. We recommend removing the PCB before drilling and to use a wood drill. We can also offer laser cutting services to make connector/gland cut-outs.

Data acquisition systems to monitor off-grid or hard to reach locations.  
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