WDL-x14 Borehole Data Logger

The WDL-x14 is a small, battery powered, cost effective data logger with built-in cellular modem available for the EMEA, APAC and NA regions. The IP68 rated well data logger enclosure is slim enough to fit a 2" borehole and is designed to fit a www.prohydroinc.com lockable well cap. This well data logger, is further provided with a 4GB micro SD-card and an 2FF SIM-card slot. The borehole logger is powered by an internal 3.6 Volt Lithium battery (SAFT LSH20-CNR or equivalent only) that will last for years when the data logger is configured in a low power mode. The battery can be replaced by detaching the top cap, no need to remove the well data logger and sensor from the borehole.

External sensors can be powered by the data logger itself, to prevent them to consume power while the data logger is a sleep. The data logger is provided with an IP68 rated venting plug, integrated temperature and barometric sensor that can be used for compensating the readings of low cost absolute pressure level sensors. Make sure that the well cap and borehole is vented as well.

Logged data can be pushed to a central host by HTTP(S) FTP(S), e-mail, TCP or MQTT at configurable intervals.

The WDL-x14 is available with 3 different cellular modems:

- **WDL-214**: GPRS.
- **WDL-314**: 3G Europe, M-East, Africa and Asia-Pacific.
- **WDL-N314**: 3G North America.

The WDL-x14 is available in 2 editions:

- **WDL-x14AD-LI**: Can acquire physical signals by 2 current loop, 2 voltage inputs and 1 digital input.
- **WDL-x14DS-LI**: Has 1 digital input and is provided with one serial port to capture measurements from ASCII, MODBUS or SDI-12 compatible sensors.

Features

- 2G/3G Cellular Data Logger
- 4GB Data Storage
- Battery Powered
- 12V@100mA Sensor Excitation
- Analog & Digital Inputs
- Barometric Sensor
- Derived Inputs
- RS232, R485 & SDI-12
- ASCII, MODBUS & NMEA
- TCP, FTP(S), HTTP(S), e-Mail, MQTT
- CSV, TXT, JSON Files
- Alarm Output & SMS
- Vented IP68 Enclosure
- Fits a 2” borehole
- 7 pole Hirschmann connector
- Remote configuration

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

Data Logging

- 1 second to 1 day intervals.
- Regular, alarm and independent intervals.
- Daily operation time bracket (e.g. 07:00AM to 20:00PM or 21:00PM - 06:00AM)
- 4GB micro SD-Card for data and picture storage.

Data push

- 1 minute to 1 day intervals.
- Regular and alarm intervals.
- Direct push on alarm raise and fall.
- Daily operation time bracket (e.g. 07:00AM to 20:00PM)
- Native TXT, JSON or CSV log files by HTTP (SSL/TLS), FTP (TLS Explicit), e-Mail (SMTP), secure TCP (AES-128) or MQTT.

Alarming

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

Internal Sensors

- Barometric sensor (300. . 1200mBar, 0.1mBar accuracy)
- Battery (voltage and rest capacity)
- Processor & casing temperature
- GSM signal strength

Analog Inputs (12bit resolution & <0.1% FS accuracy)

- 2x current loop inputs (0/4..20mA, 150 Ohm impedance)
- 2x voltage inputs (0..10V)

Digital Input (0..5V)

- 1x state, pulse or counter (max. 10kHz)

Derived Inputs

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

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)
- **ASCII** (sensors autonomously outputting readable lines of numeric values)

Built-in cellular modem (3 different models)

- **WDL-214**: 2G (QUAD-band GPRS)
- **WDL-314**: 3G (900/2100Mhz UMTS/HSPA & GPRS fall-back)
- **WDL-N314**: 3G (850/1900Mhz UMTS/HSPA & GPRS fall-back)
- 2FF (Class B) SIM-CARD slot.
- Integrated GSM antenna, external GSM antenna optional.

Configuration by:

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

Power consumption

- 100mA@3.6V average operating[1)] current during a duty cycle of less than 1 sec[2)] per log interval.
- 250mA@3.6V average operating current during 20 to 60 seconds cellular communication.
- 100uA@3.6V sleep current.
- 12V@100mA excitation to power external sensors.

Power supply

- 3.6V D-Size SAFT-LSH20-CNR Lithium battery [3)]

Enclosure

- Rugged polycarbonate enclosure.
- IP68 (tested immersion: 2 meters for 30 minutes)
- NBR SHA70 O-ring sealings.
- M12 venting plug for barometric sensor
- 7 pole Hirschmann connector (male and female parts)
- 40mm bottom cap and tube diameter.
- 59.6mm top cap and flange diameter.
- 6mm top cap height.
- 8mm flange height.
- 350mm total length.
- 250g total weight, excluding battery.
- Wide temperature operating range –30°C to +75°C

1) 100mA if no external sensors need to be powered.

2) <1 sec. if external sensors are responsive and don't require time to "warm up".

3) SAFT LSH20 –CNR Lithium battery not included.

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Editions

Stock Keeping Unit Table

SKU format:	**WDL-x14y-z (x=Modem, y=Edition, z=Power Supply)**
Modem (x)	**Description**
WDL-214y-z	Data logger with built in 2G modem (Quad band GPRS)
WDL-314y-z	Data logger with built in 3G modem (900/2100MHz UMTS/HSPA, EMEA/APAC & GPRS fall-back)
WDL-N314y-z	Data logger with built in 3G modem (850/1900Mhz UMTS/HSPA, North America & GPRS fall-back)
Edition (y)	**Description**
WDL-x14AD-z	With 4 analog & 1 digital inputs (no serial port).
WDL-x14DS-z	With 1 digital input & 1 RS-232/RS485/SDI-12 port (no analog inputs).
Power Supply (z)	**Description**
WDL-x14y-LI	Powered from a 3.6V DC SAFT LSH20-CNR or equivalent D-size lithium battery.

Example:

WDL-314AD-LI is a borehole data logger with a built in 900/2100MHz 3G modem, 4 analog inputs & 1 digital input.

Remark:

1) The data logger will be supplied with a 7-pole Hirschmann female connector and a matching 7-pole male connector to be soldered to the wires of your sensor cable.

2) Due to space limitations we don't use brass inserts and all inner threads are made directly in the polycarbonate. Polycarbonate is a very tough material, but we still recommend to **not overtight screws/bolts** (finger-tight is more than enough for sealing the tube).