

AUTOMATIC WATER LEVEL MONITORING SYSTEM

MODEL EWLR-101BX/BH



INTRODUCTION

Monitoring of water level is of great significance in view of depleting water resources. Encardio-rite model EWLR-101 automatic water level recording system is extensively used for monitoring water table in the ground. A variety of solutions are available ranging from unattended maintenance free monitoring of a single borehole for use by industry to statewide monitoring of hundreds of boreholes from a central location.

The system can also be used for monitoring water level in a river, lake or reservoir by lowering the sensor in a gauge well.

FEATURES

- Easy to install, simple to use and user friendly
- Large data storage memory allows data to be monitored for longer time between retrievals
- Weather resistant housing
- Maintenance free system with barometric correction
- Dataloggers with telemetry allows data to be collected remotely from hundreds of kilometers away
- Rain gage can also be attached to box version datalogger

APPLICATION

- Automated groundwater monitoring-long term studies, resource management
- River, lake level monitoring
- Open channel monitoring
- Tank level measurement

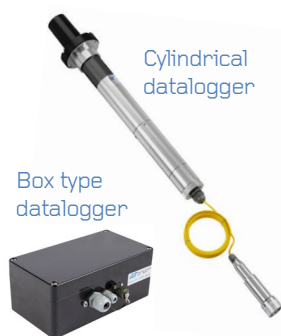
MONITORING OF WATER TABLE

To monitor water level at a particular location, either an existing well/borehole is used or a borehole is drilled down to the aquifer that contributes most to the water table. A casing pipe is installed in the borehole to prevent the borehole wall from collapsing. At the level of the aquifer, a highly porous filter is provided at the lower end of the casing pipe. The filter generally consists of a section of slotted pipe covered with geotextile to prevent soil particles from clogging the borehole. The level of water in such a borehole or well corresponds to the water table at that location. The water level is generally referenced to mean sea level and is known as the elevation of the water table.

SYSTEM COMPONENTS

The model EWL-101 automatic water level monitoring system basically consists of three components:

- Absolute pressure sensor with interconnecting cable
- Automatic data logging system (box or borehole version)
- Data retrieval/transmission



ABSOLUTE PRESSURE SENSOR

The water level/table is monitored by using a high accuracy fluid pressure sensor installed at a depth below the minimum expected water level. Encardio-rite model EPP-30V, EPP-40V and EPP-60V absolute pressure sensors cover the entire range required for any water level monitoring. A thermistor is incorporated in the sensor for measurement of water temperature.

The sensor is hermetically sealed by electron beam welding with a vacuum of around 1/1000 Torr inside it. The outer body of the sensor is of stainless steel construction with resistance to rusting or corrosion against several kinds of dissolved impurities found in water under field conditions. For saline water application, a special sensor with additional protection is provided.

Output of the pressure sensor is proportional to the head of water (piezometric head) above the pressure sensor. The absolute pressure sensor with an integral water proof four conductor signal cable is supplied with an individual barometric pressure sensor (fitted inside the datalogger) which allows the water level to be corrected for barometric pressure variation. The use of barometric pressure sensor eliminates the apparent variation in water level due to variation in atmospheric pressure. The system provides the correct value of water level along with barometric pressure and temperature to the user.

The use of an individual barometric pressure sensor eliminates the necessity of using a vent tube in the sensor cable for atmospheric pressure correction. This results in a reliable system as the output is free from any error that may be generated due to clogging of the vent tube. The

system is almost maintenance free as no desiccant is used which requires periodic replacement to avoid moisture ingress in the vent tube and consequent blockage of the vent tube.

PRESSURE SENSOR SPECIFICATIONS

Range EPP-30V (\geq 20 m WC)	0.2, 0.35, 0.5, 0.7, 1.0, 1.5, 2.0, 35 MPa (20, 35, 50, 100, 150, 200, 350 m WC)
Range EPP-60V (Upto 20 m WC)	0.10, 0.20 MPa (10, 20 m WC)
Range EPP-40V (\geq 35 m WC)	0.35, 0.5, 0.7, 1.0, 2.0 MPa (35, 50, 70, 100, 200 m WC)
Accuracy	\pm 0.2 % fs standard \pm 0.1 % fs optional
Repeatability	\pm 0.05 % full scale
Long term stability	\pm 0.1 % full scale
Temp. range	- 20° to 70°C
Temp. accuracy	\pm 0.5°C standard. (Higher accuracy option available)
Overvoltage protection	Provided
Protection	IP 68
Dimension (ϕ x L)	42 mm x 185 mm (EPP-30V) 30 mm x 160 mm (EPP-60V) 19 mm x 155 mm (EPP-40V)
Cable	Two pair screened cable with Kevlar strength member

AUTOMATIC DATALOGGING SYSTEM

The automatic datalogger containing the barometric pressure sensor, batteries and GSM/GPRS modem for telemetry is available in two options:

- **Box version** - suitable for installation above ground level near the borehole or in a close-by room
- **Cylindrical version** - housing is mounted at the ground level inside a borehole casing.

The dataloggers can be programmed to take a measurement from every 5 seconds to every 168 hours in linear or event sampling mode. However, number of measurements taken per day should be kept to a minimum as higher frequency of measurement drains the power supply battery at a faster rate.

Water level/table reading from a pressure sensor is dependent on specific gravity of water at that location. In coastal areas or in water with high dissolved solid content, the specific gravity of water will have a value higher than 1.0. The measured value of specific gravity can be entered in the datalogger for corrected value of water level/table.

The dataloggers measure output from the absolute pressure, temperature & barometric pressure sensors and calculates the pressure in terms of water column after correcting for the measured barometric pressure and water density. The data is stored, together with the



current date, time and battery voltage, as a data record in internal non-volatile memory of the datalogger.

The box version, Model ESCL-10VT-BX datalogger has an added advantage of having a number of power supply options and telemetry options. Another advantage is that, ESCL-10VT-BX has provision to attach model ERG-200 rain gage for simultaneous monitoring of rain fall (for rain gage details, refer to datasheet 1327-13).

In case telemetry is not required, the GSM/GPRS modem is not provided in the dataloggers.

DATA RETRIEVAL AND TRANSMISSION

Following options are available:

- Telemetry through GSM/GPRS modem
- Readout/data retrieval using laptop
- Readout/data retrieval using mobile phone

Telemetry through GSM/GPRS modem

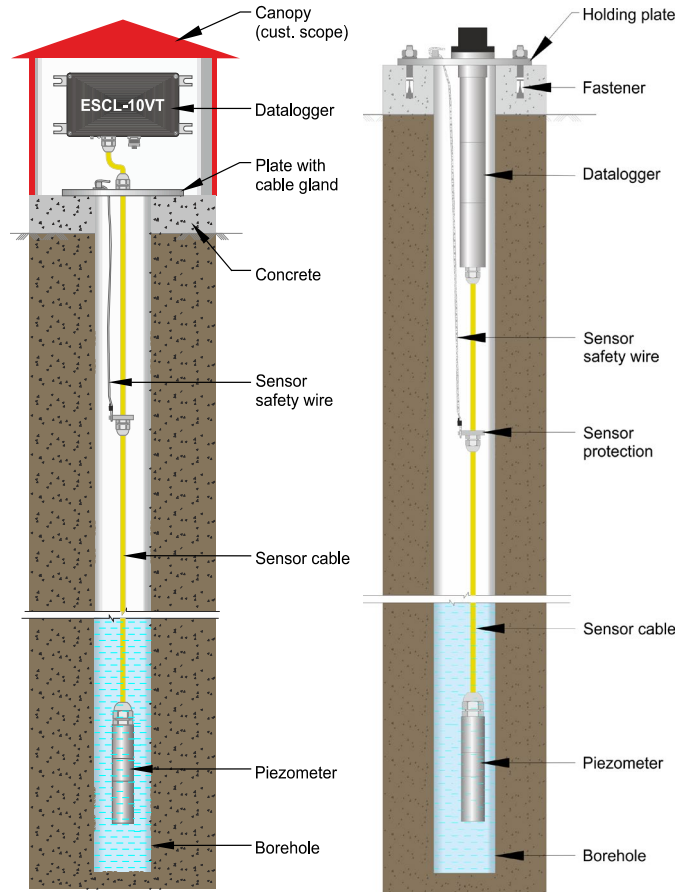
In a network covered by any GSM/GPRS service provider, the data from the automatic datalogger can be transmitted remotely to a PC at a central location. The user will need to get a data SIM card for each GSM/GPRS modem under a suitable data plan from the local mobile phone service provider depending on the volume of data transfer expected.

The user will have to maintain a central PC configured to work as an ftp server. Data is transferred to the user's server or a central PC for display as a table or chart for further analysis.

The PC will need an internet connection with a static IP. All the dataloggers in the network will be configured to send the data to this server PC at predetermined intervals.

The system is supplied with Windows based datalogger application software with many features which allows the user to set the sensor calibration coefficients, recording intervals, datalogger or borehole code (identification tag numbers), sensor serial number, real time clock time etc. of the datalogger convenient.

User can monitor readings and GPRS signal strength for diagnostic purpose. User can start or stop scan or can manage data files, download data from the datalogger, perform data correction and save and export the data files.



EWLR-101BX INSTALLATION

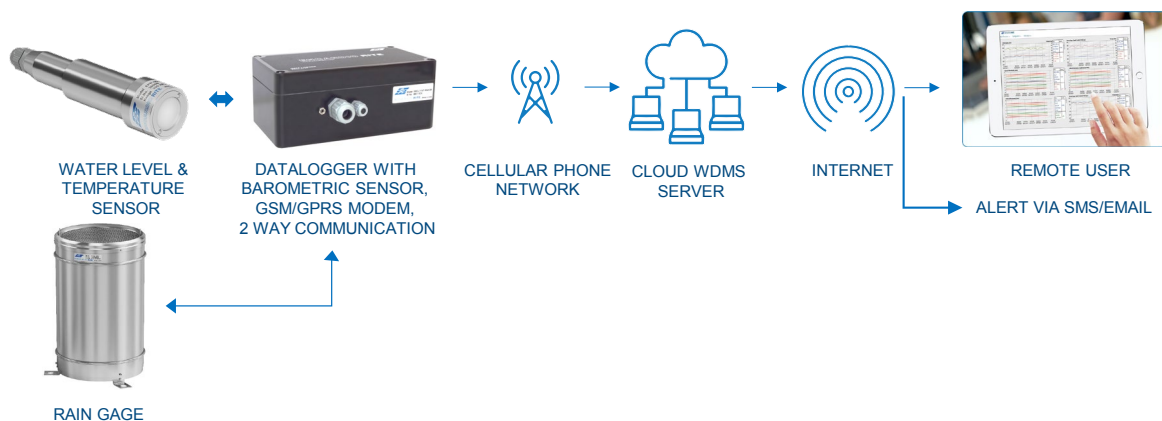
EWLR-101BH INSTALLATION

Readout/data retrieval using laptop

The logged data from the datalogger in the field can be directly downloaded to a laptop. Data can then be transferred to the server or central PC from the laptop using either a USB pen drive or through Internet.

Mobile phone readout/data retrieval

The datalogger can also communicate with an Android mobile phone readout running the supplied datalogger configuration/application software through a detachable Bluetooth dongle. Data can then be transferred to the server or central PC from the mobile phone either by USB cable/Bluetooth interface or through Internet.





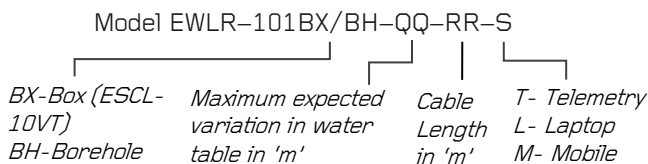
DATA PRESENTATION, ARCHIVING AND WORLD WIDE ACCESS THROUGH ENCARDIO-RITE PUBLIC CLOUD SERVICE

Encardio-rite offers public cloud based web monitoring service to its customers for retrieving data from Encardio-rite EWLR-101 dataloggers, archiving the retrieved data in a SQL database, processing the data and presenting the processed data in tabular and most suitable graphical form for easy interpretation of logged data. The tables and graphs related to any site or sites can be accessed by authorized personnel who can login to their site using the supplied login ID and access password from anywhere in the world over the internet. No special software is needed for accessing the user sites as the information can be viewed using most standard and popular web browsers like Microsoft Internet Explorer, Mozilla Firefox and Google Chrome etc.

Data from Encardio-rite cloud based web monitoring service can be accessed from just about any type of device that supports a standard web browser like a desktop or laptop PC, Tablet, smart phone or most other mobile computing devices. Users can have two types of access. A user with lower level access can only view or access the data whereas a higher level user has the authority to set or modify many of the settings.

Encardio-rite cloud services work on a rental model. User has to pay a small setup fee for first time and then a monthly rental has to be paid for accessing the data over the cloud as long as required.

ORDERING CODE



SPECIFICATIONS

Input	Pressure sensor
Resolution	18 bits. (Better than 1 mm for 70 m WC sensor)
Temperature measurement range	-20° to +70°C with 0.1°C resolution
Logging interval	5 seconds to 168 hours
Memory capacity	8 MB Flash RAM. Can store 3,145,728 data points
Data output format	CSV text file. Can be easily imported in many third party applications like Microsoft® Excel
Communication port	One RS-232 serial port. Interface cable for connecting to USB 2.0 port supplied as standard
Operating temperature range	- 30° to 70°C
Power supply boxed version (BX)	2 x D size 3.6 V/19 Ah Lithium cells
	2 x D size 1.5 V Alkaline high power cells
Power supply (BH)	12 V SMF battery chargeable from solar panels or AC mains
	2 x D size 3.6 V/19 Ah Lithium cells. Battery life > 5 years for 4 measurement/day and one transmission/day
Housing	Box version: Weather proof enclosure Cylindrical version: Corrosion resistant stainless steel, AISI grade 316L.
Dimensions (BX) (W x L x H)	120x 220 x 91 (mm) for box version with suffix BX
Dimensions (BH)	50 mm dia. x 500 mm
Humidity	100 %
Modem (In telemetry option)	Quad Band GSM/GPRS/ EDGE, 850/800/1800/1900 MHz
Antenna (In telemetry option)	Built-in or separate mounted antenna available in boxed version