



DATASHEET

AUTOMATIC WATER LEVEL MONITORING SYSTEM

MODEL EWLR-101



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 groundwater level. 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 has an advantage of having two way communication which reduces field costs considerably by providing an easy remote access for an update and maintenance of the system.

FEATURES

- Provides near real time data at your desk with telemetry option
- Two way communications allow remote access for configuration and managing
- Easy to install, simple to use with user friendly configuration application
- Large data storage memory
- Battery with long life, easy to replace
- Weather resistant housing
- In-built barometric pressure sensor; maintenance free system with barometric correction
- Facility to connect rain gage

APPLICATION

- Automated groundwater monitoring-long term studies, resource management
- Groundwater level and rain fall monitoring
- Dewatering monitoring during construction
- Geotechnical applications
- Rainfall monitoring

DESCRIPTION

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.

Model EWLR-101 is also used for monitoring water level in a river, lake or reservoir by lowering the sensor in a gauge well.

System components

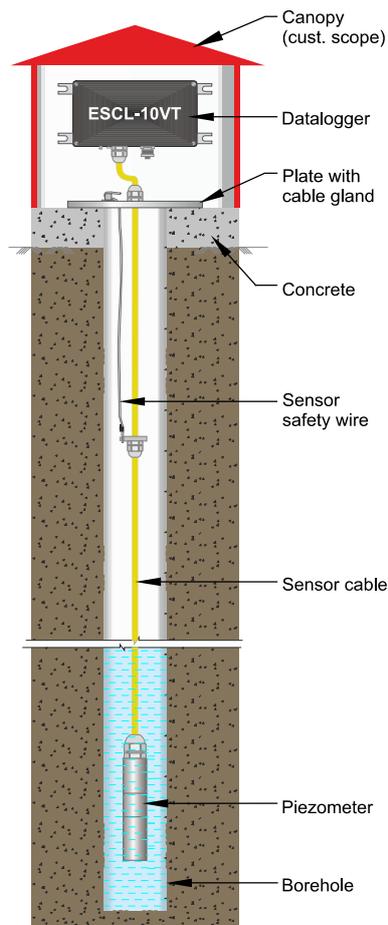
The model EWLR-101 automatic water level monitoring system basically consists of three components:

- Absolute pressure sensor with interconnecting cable
- Automatic data logging system
- 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. A thermistor is incorporated in the sensor for measurement of water temperature. The sensor is connected to datalogger for automatic collection of data. The data is then transferred by the datalogger to a remote server/cloud server.

Encardio-rite model EPP-30V, EPP-40V and EPP-60V absolute pressure sensors cover the entire range required for any water level monitoring. The sensor is hermetically sealed by electron beam welding with a vacuum of around 1/1000 Torr inside it.



Typical installation scheme of model EWLR-101 automatic water level monitoring system

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.

The dataloggers measure the output from the absolute and barometric pressure sensors as well as temperature 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.

Barometric pressure correction

The datalogger has an inbuilt barometric sensor 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.

Specific gravity correction

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

MODEL ESCL-10VT DATALOGGER

Model ESCL-10VT single channel datalogger is designed for collecting data automatically from a vibrating wire sensor. With telemetry option, it transfers the data to cloud server through in-built GPRS/GSM modem at set intervals.

Automatic collection and transmission of data helps in reducing field costs and provides easy access to near real-time data with early alarms. The datalogger has the facility of two way communication. This further reduces field costs significantly as it provides remote access to configure, receive system status update, and carry out maintenance or diagnostics and preventive actions from office itself. This eliminates any need of site visit after installation.

ESCL-10VT datalogger can be programmed to take a measurement from **5 seconds to 168 hours** in linear mode. The number of measurements taken per day should however be kept to a minimum as higher frequency of measurement drains the power supply battery at a faster rate. The datalogger has a number of power supply options.

The datalogger has Windows based application software with features that allow 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 conveniently. Real time clock's time synchronization facility is provided with IST. User can **monitor readings, battery voltage 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.



ESCL-10VT is a rugged datalogger that can be used in a variety of application to provide accurate and reliable data. It features a wide operating temperature range, dependable standalone operation, low power consumption, compatibility with many telecommunication options and flexibility to support a variety of measurement and control applications. It is of durable construction and suitable for unattended applications.

RAINFALL MONITORING

ESCL-10VT datalogger has provision to attach model ERG-200/ERG-201 rain gage for simultaneous monitoring of rain fall along with the water level/table monitoring. This helps in correlating the water table data with the rainfall data.

DATA RETRIEVAL AND TRANSMISSION

Telemetry through GSM/GPRS modem

The datalogger has in-built modem and an in-built or separately mounted antenna. In a location covered by any GSM/GPRS service provider, the data from the datalogger can be transmitted remotely to a cloud server. The user needs to arrange a data SIM card. The system has ability to disable interrogation system in order to save power at remote site.

Readout/data retrieval using laptop

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

Readout/data retrieval using mobile phone

The datalogger can also communicate with an Android mobile phone readout running the supplied 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

CONFIGURATION AND ALARMS

Configuration

- Using USB to **RS-232 Cable** with laptop
- Using Bluetooth with Android phone or laptop
- **Remote configuration** using telemetry (two way connection). Data collection can triggered by interrogation from Data Center, or by event-based transmission triggered by remote site.

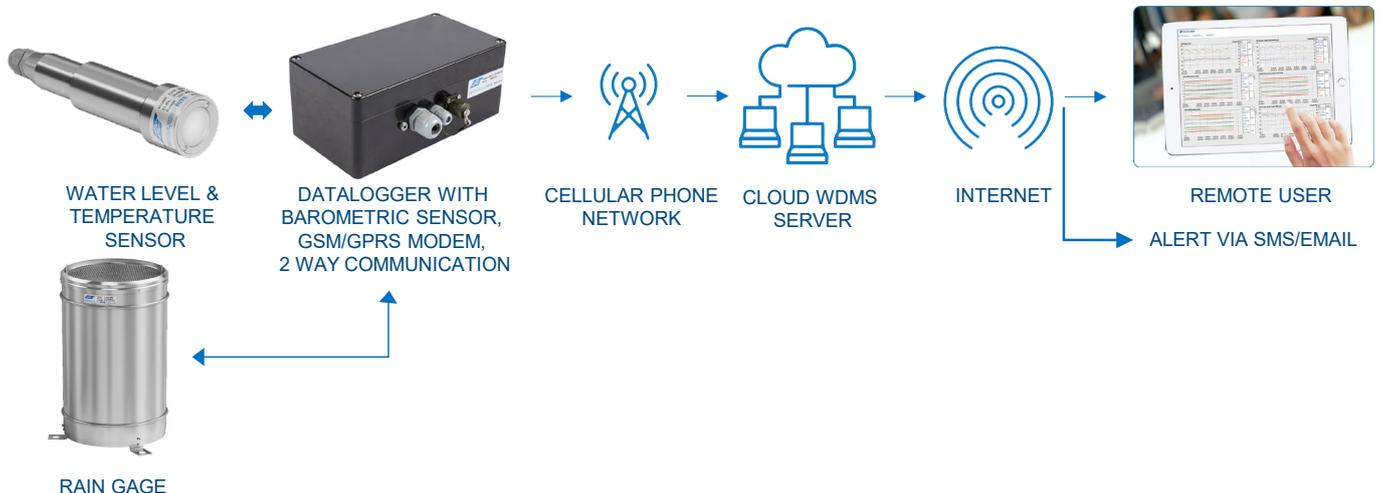
Alarms

- Upto 3 alarms can be programmed for water level
- Alarm for low battery (10% capacity remaining)
- Alarm via SMS up to 10 recipients

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 ESCL-10VT dataloggers, archiving the retrieved data in a SQL database, processing the data and presenting the processed data in tabular and most suitable graphical forms 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. Users can have two types of access – any user with lower level access can only view or access the data whereas a higher level user has the authority to set or modify some of the settings.

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, Google Chrome etc. 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.





PRESSURE SENSOR SPECIFICATIONS

Model EPP-30, EPP-60 or EPP-40 pressure sensor:

Range - model EPP-30V (≥ 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 - model EPP-60V (up to 50 m WC)	0.10, 0.20, 0.35, 0.5 MPa (10, 20, 35, 50 m WC)
Range - model EPP-40V (≥ 35 m WC)	0.35, 0.5, 0.7, 1.0, 2.0 MPa (35, 50, 70, 100, 200 m WC) or specify
Sensor type	Absolute pressure sensor (non-vented hydrostatic), with individual barometric pressure correction (through datalogger)
Accuracy	± 0.2 % fs standard ± 0.1 % fs optional
Resolution	3 mm
Repeatability	± 0.05 % fs
Reproducibility	± 0.1 % fs
Long term stability	± 0.1 % fs (without any field calibration requirement, except barometric compensation)
Over range limit (overload pressure)	200% fs (2 times fs, without effect on calibration)
Temp. range	- 20°C to 70°C
Burst pressure	≥ 3 times fs
Long term stability	0.1 % fs
Thermistor	YSI 44005 or equivalent (3 kOhms at 25°C)
Temp. measurement accuracy	± 0.5 °C standard ± 0.2 °C optional
Output	Compatible with model ESCL-10VT datalogger
Material	Titanium, stainless steel or corrosion resistant alternative
Protection	IP 68 with impact resistance Sensor is hermetically sealed by electron beam welding with a vacuum of around 0.001 Torr inside it.
Overvoltage protection	Provided for lightening, over-voltage, surge protection
Dimension ($\Phi \times L$)	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 (for good longitudinal stability of cable), polyurethane sheathed yellow color, corrosion/moisture free, good flexibility, can be extended up to 200 m without degrading accuracy, stability & data communication.

DATALOGGER SPECIFICATIONS

Model ESCL-10VT datalogger:

Input	Vibrating wire sensor, freq. range 400-5000 Hz; Thermistor 3 kOhm
Resolution	18 bits (better than 1 mm for 70 m WC sensor)
Temperature measurement	-40 to +100°C with 0.1°C resolution
Scan interval	5 seconds to 168 hours
Memory capacity	Flash memory 2 million data points, cyclic memory storage capacity 4GB, 2.5 years (with 15 minute logging interval)
Data output format	CSV text file. Can be easily imported in many third party applications like Microsoft® Excel
Real Time Clock (built-in clock)	Resolution: 1 second (displayed time) Accuracy: ± 2 seconds/year (when auto-sync network time enabled; time synchronization with IST)
Measurement Resolution	24-bit with ± 1 bit LSB accuracy Water Level: 0.1 mm Temperature : 0.1°C Barometric pressure: 0.1 hPa
Barometric sensor	Has the provision to apply barometric pressure correction automatically
Communication port	RS-232 (standard) 115 kbps
Telemetry	Two way communication between datalogger and FTP server 4G: Quad-Band LTE: (1800, 850, 900, 700 MHz), Tri-Band UMTS: (WCDMA/FDD 2100, 850, 900 MHz), suitable for all 4G bands used in India
Operating temp. range	- 30 to 70°C
Power supply	2 x D size 3.6 V/19 Ah Lithium cells 2 x D size 1.5 V Alkaline high power cells 12 V SMF battery chargeable from solar panels or AC mains
Battery Backup	>3 Years with 7.2 V Lithium Battery (with 4 scans/day and 1 upload/day) >3 Years with 3 V Alkaline Battery (with 4 scans/day and 1 upload/day)
Housing	Corrosion resistant weather proof enclosure, with water tight connectors
Protection	IP 67 with impact resistance
Overvoltage protection	Provided for lightening, over-voltage, surge protection
Dimensions	120 (W) x 220 (L) x 91 (H) (mm)
Humidity	5-100 %

*All specifications are subject to change without prior notice

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