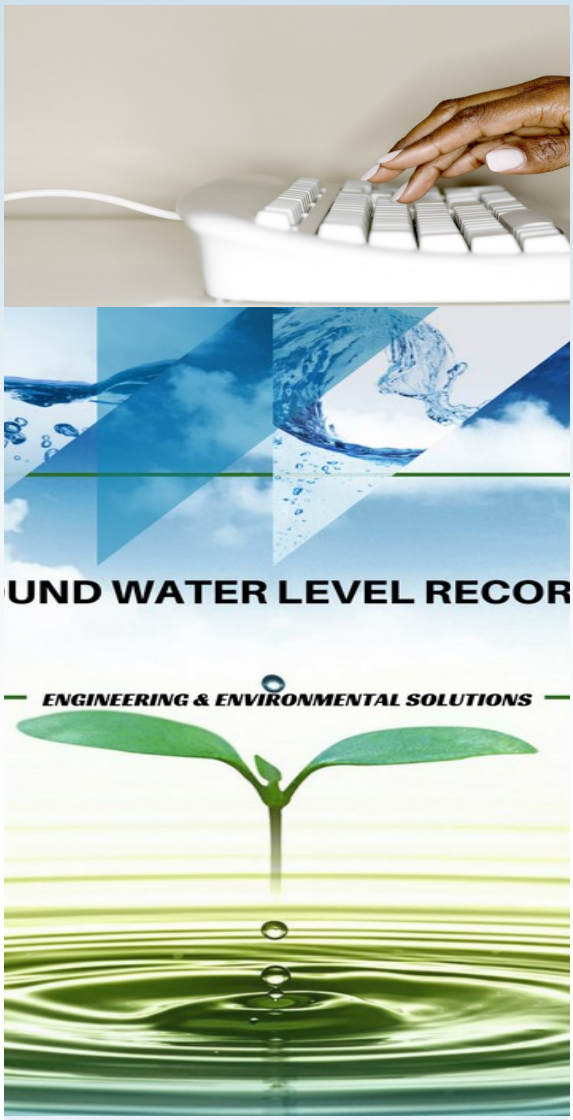
PIEZOMETER

Technical Guide

ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

GROUND WATER LEVEL RECORDER

"DGWLR-01": An automated ground water recorder powered by ATMEL



Digital Ground Level Water Recorder

The purpose of this manual is to provide basic operating knowledge of the components of the automated recorder (see Figure 1) used for periodic water level measurement. Much more than just a supplement to the broader water level program, these automated recorders provide a means to India that cannot be discerned from annual level readings. The design of document day-to-day changes and seasonal patterns in the aquifers of these units also allows for remote satellite transmission of collected data, so that aside from installation and occasional maintenance, no additional work is required to obtain these measurements. This manual will primarily discuss the 3 major technical components of the automated recorder— the sensors, loggers & transmitters— for automated water level monitoring.

E&E Solutions itself is an OEM and we use the M5100 series pressure transducers from the Micro-fused™ line of MEAS, set a new price performance standard for demanding commercial and heavy industrial applications.

This series of piezometer is suitable for measurement of different mediums like liquid or gas pressure, even for difficult media such as contaminated water, stream and mild corrosive fluids.

Engineering & Environmental
Solutions
Primary business address
4/1309
New Sir Syed Nagar
Aligarh-202002
U.P., India.
: +91-9540990415
Email: enggenvsolution@gmail.com

APPLICATIONS

- Industrial water level monitoring.
- Agriculture bores.
- Ground water elevations.
- Wells.

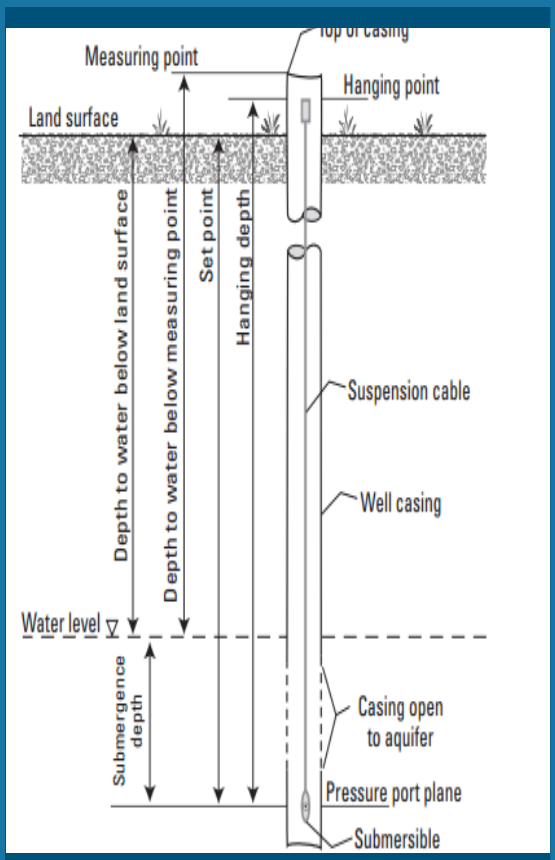
Range (Psi)	Range (Bar)
0 to 050	0 to 3.5
0 to 100	0 to 007
0 to 200	0 to 014
0 to 300	0 to 020
0 to 500	0 to 035

An automated groundwater recorder system is composed of six basic parts:

1) The sensor obtains the actual water level measurement. An optical sensor (or encoder—a measurement device that converts mechanical motion into electronic signals) , while a pressure sensor uses water pressure changes to get the data. Typically, older recorders use encoders, and newer ones are outfitted with pressure sensors/transducers.
2) The logger (or data logger) receives the data from the sensor and stores the measurements. This is the main unit that controls the system.
3) The transmitter receives data from the logger at scheduled intervals and transmits the information to a receiving site. Server recorders use the General Packet Radio Services (GPRS) system to relay data.
4) The antenna sends the signal with a moderate-speed data transfer, by using unused time division multiple access (TDMA) channels in, for example, through the GSM system.
5) The power supply of 12 V , 1 Amp DC is supplied to the device as per the input range of the sensor.
6) The shelter protects the recorder from weather, animals, and most human-caused damage.

FEATURES

- Heavy industrial CE approved pressure sensor.
- 10 V/m EMI protection according to HSE.
- Reverse polarity protection on input.
- Continuous data logging system using USB.
- Short circuit protection on output.
- ± 0.25 % accuracy of the final output.
- ± 1.0 % total error band.
- Compactly designed integration for making more sophisticated handling.
- Working temperature – Console: -20 -70 ° C ; sensor : -40 to 105 ° C.
- We are also providing solar based OEM instrument for remote usage.



SENSOR & IT'S WORKING

This type of sensor is lowered into the well on a reinforced cable and submerged below the water. Once in place, the initial water pressure reading is synced with the current water level. The unit then monitors the water pressure for changes, and the pressure difference is converted to a change in water level. The entire unit is hermetically sealed to prevent any moisture from getting into the instruments circuitry.

Pressure Transducer

- **CE Compliance.**
- **Wide Temperature Range.**
- **Compact.**
- **Variety of Pressure Ports and Electrical**
- **Configurations.**

Technical Specification:

PARAMETERS	MIN	MAX	UNITS	NOTES
Accuracy (combined non linearity, hysteresis, and repeata-bility)	-0.25	0.25	%F.S.	BFSL
Isolation, Body to any Lead	100		MΩ	@500VDC
Dielectric Strength	2		mA	@500VAC, 1min
Long Term Stability (1 year)	-0.25	0.25	%F.S.	
Compensated Temperature	-20	+85	°C	
Operating Temperature	-40	+125	°C	Except cable 105°C max
Storage Temperature	-40	+125	°C	Except cable 105°C max
Current Consumption	5		mA	Voltage Output
Wetted Material	17-4PH or 316L Stainless Steel Port, 316L Stainless Steel Snubber			
Vibration	±20g, MIL-STD-810C, Procedure 514.2, Fig 514.2-2, Curve L			

ACCESSORIES:

- High air entry filter.
- Console or cabinet box.
- Battery installed.
- Armored cable of IP-67 grade (length as per customers requirement).

PIEZOMETER

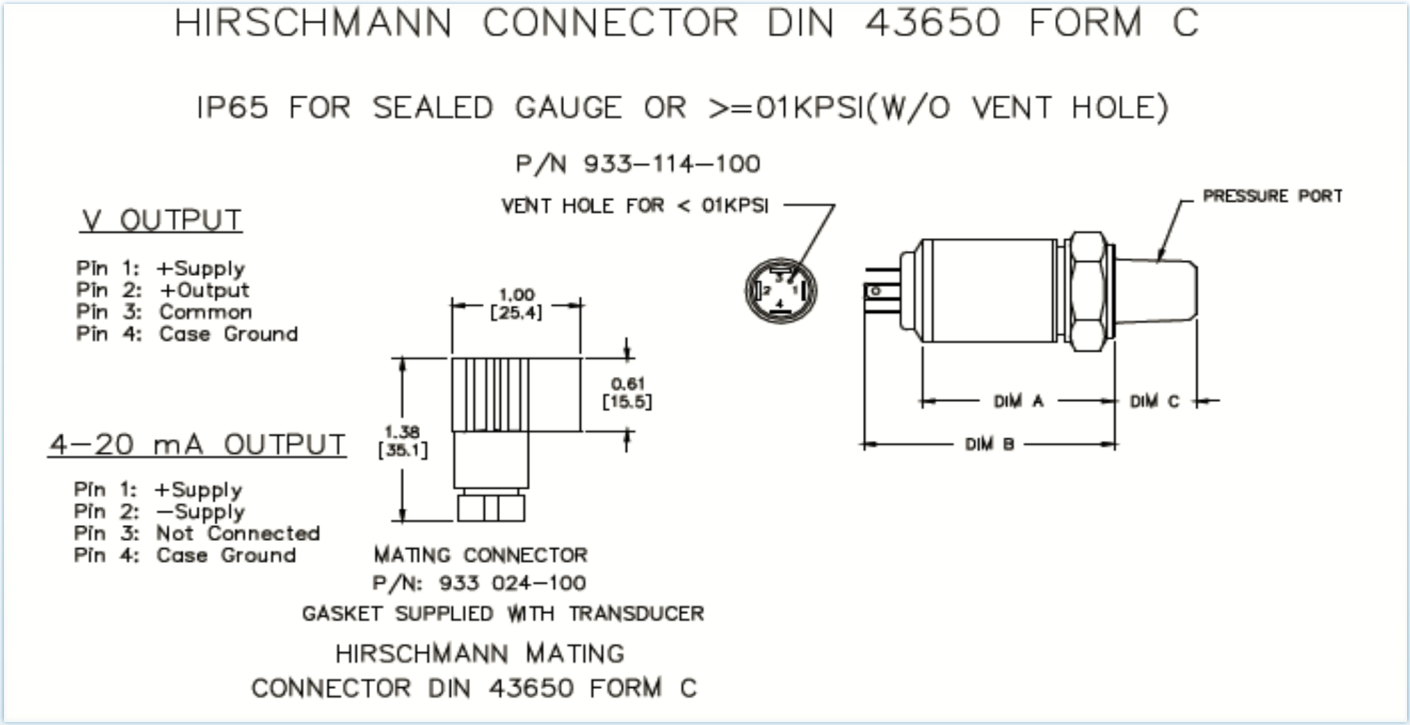
MODEL DGWLR-01:

- Length × Breadth × Height:
- Weight:
- Material: Stainless steel IP-65.

INSTRUMENT PERFORMANCE:

- Accuracy - ±0.25% F.S
- Linearity - < ±0.65% F.S
- Resolution - ±0.4% F.S (minimum)
- Thermal Drift - ±0.5% F.S / ^{o}C

Dimension and Connector of the Transducer



Notes:
Compensated Temperature: The temperature range over which the product will produce an output proportional to pressure within the specified performance limits.
Operating Temperature: The temperature range over which the product will produce an output proportional to pressure but may not remain within the specified performance limits.
Storage Temperature: The temperature range over which the product can be stored safely in occasions without pressure applied or power input and remains rated performance. Beyond this temperature range may cause permanent damage to the product.
All configurations are built with supply voltage reverse and output short-circuit protections.

PRECAUTION

1. Handle the Sensor head with care, it may get damaged on strong impact with hard surface or ground.
2. Use 1A 12 Volts DC adapter to power the instrument, or the one which came along.
3. Wind up the extra cable to prevent wear and tear. It may hamper with the sensor's reading.

Installation

a. Choose a suitable location to mount the console, secure from unauthorized access to prevent tempering with the instrument, not too distant from the bore well and has easy reach to power socket.

b. After finalizing the mounting location, check the availability of power by connecting a 12 volts 1A DC adapter .

c. Measure the length of cable to suspend into the bore well from the ground level and tie the cable firmly at the point where it leads into the bore well to avoid slipping.

d. At this step, feed the length of cable measured in the instrument by referring to the Operation Manual **section no: 3.2.**

e. Next, insert the port at the end of the cable into the socket provided on the instrument body.

f. To confirm that the instrument is set up successfully, power on the instrument and note the reading of the ground water level displayed on the screen. If the displayed reading is less than the value fed at step 4, then the instrument is functioning properly.

INSTRUCTIONS

Installation procedure

This procedure is limited to the installation of vented pressure transducers in observation wells and piezometers for long-term monitoring of water levels (fig. 3).

If preparing a new installation:

a. Check that the well is unobstructed. Clear obstructions .

b. If the well depth is not known, measure the total well depth .

c. If necessary, install an instrument shelter that will protect the transducer and data logger from vandalism and weather.

d. Keep the transducer packaged in its original shipping container until it is installed. Connect the transducer, data logger, power supply, and ancillary equipment. Record the model, serial number, and pressure range of the transducer in the field notebook.

e. Install the pressure transducer by lowering it into the well so that it is submerged below the water surface. Avoid dropping the transducer or permitting sharp contacts with the sides of the well casing. Do not allow the transducer to free fall into the well.

f. The transducer should be installed at a point in the well that will not go dry. Estimate the lowest expected water level, and lower the transducer to the desired depth below the water level.

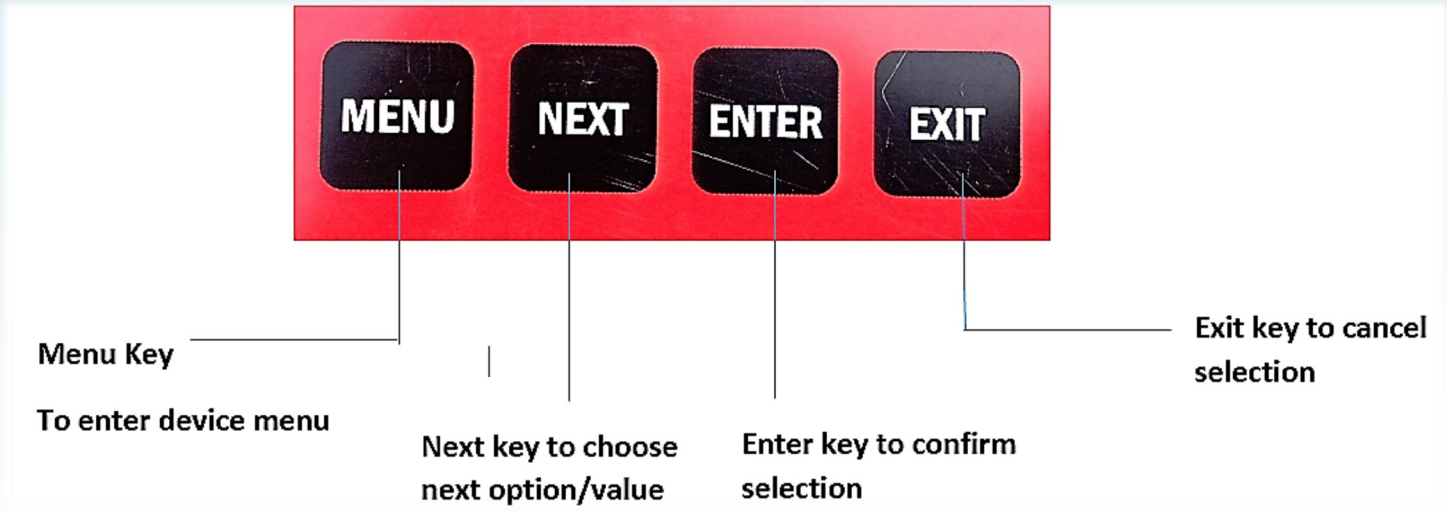
g. Fasten the cable or suspension system to the well head using tie wraps or a weatherproof strain-relief system. If the vent tube is incorporated in the cable, make sure not to pinch the cable too tightly or the vent tube may be obstructed.

h. Make a permanent mark on the cable at the hanging point so that future slippage, if any, can be determined.

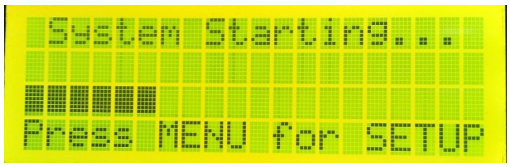
Operation-functionality

This section walks you through the step-by-step standard operational procedures on how to use the monitor/data logger.

Section 1: Button functionality



Section 2: Starting up with the Setup Menu



If you escape the setup to load, it will direct you to the home screen as shown above.

This is the window which appears as you power on the system. Once you start up for the first time click MENU before loading of the page. This option is used to set the length of the cable, Date & Time, Data-logging frequency & APN. As showcased below.

2.1) Length of wire

First option is length of the cable. Kindly define the length of the wire you desired to immerse under water from the reference of the ground. Once you define and click ENTER, this message will appear.

2.2) Data-log

Define the frequency (or) interval of logging time of the data, the options are as mentioned. Once you update and click "ENTER", below message will appear.

2.3) Clock

Setting up date and time plays an vital role in Data-Logging. So, if you want to log the monitoring data, please check and update the date & time respective to your standard time. That would be one time update all you have to do if you newly purchased the system, afterward the Real-time clock built with-in would clock correspondingly.
Once you update the time, this message will appear.

2.4) Setting APN

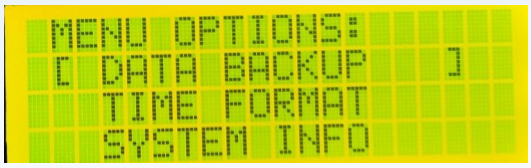
An Access Point Name (APN) is the name of a gateway between a GSM, GPRS, 3G or 4G mobile network and another computer network, frequently the public Internet. A

mobile device making a data connection must be configured with an APN to present to the carrier.

So that's more important to setup the network you want to opt for and insert the sim on the slot provided (SIM 800L).

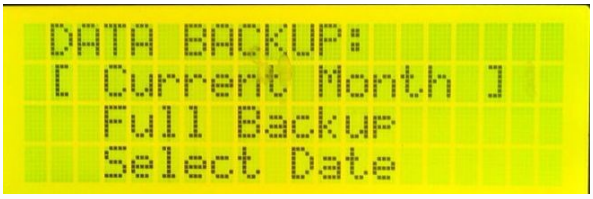
***NOTE: Initially @ first installation, our personnel will do the installation and upgradation of the APN and trains you how to read the data through telemetry.**

Section 3: Menu



This is the system menu options for further changes in the real-time processing system. This provides you the detailed description of your system, you can also change the time format and for downloading the data through USB. As shown on the above figure.

3.1) Data-logging/Data-Backup



This is the first menu option which appears as soon as the **Menu** key is pressed, and provides the functionality to log data along with time-stamp to a USB stick (Pen drive). Data is stored in the standard CSV file format and can be viewed on any Operating system using MS-Excel or any other compatible document viewer.

Once data has been copied, this message will pop-up as shown below in the figure.

*Data logger has been sophisticated by a provided internal memory to avoid any data loss and using USB you can retrieve or download data in a USB.

To start logging data follow these steps:-

a) Press **Menu** key to arrive at the above screen showing Data logging option.
b) Press **Enter** key and insert the USB pen drive (must be FAT32 formatted file system).

c) After inserting your FAT32 formatted pen drive, press **Enter** again to start data logging or press **Exit** to cancel and go back to home screen. The system will check whether the USB drive is properly inserted, and it will pop up an icon at the right top near network icon. This may happen if the USB Drive is not properly inserted, faulty pen drive or may be it is not formatted using FAT32 file system.

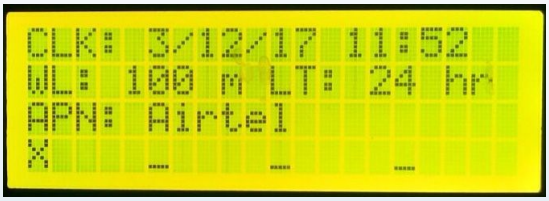
d) To remove the USB drive from the device, please long press **Exit** key before removing USB drive to ensure safely remove to avoid any error.

*Ensure the format of the USB is FAT32, and any USB can be read and also USB based micro-sd card reader also can be read.

3.2) Time Format

So, here you can change the format of time as you desire respective the country standards. And default would showcase the standard format of the country you put up in.

3.3) System Information



This option details the information about the system with the unique number of the product.

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Primary business address

4/1309
New Sir Syed Nagar
Aligarh-202002
Mobile: +91-9540990415