

DGWLR-AT-01

# PIEZOMETER

Technical Guide



Engineering &  
Environmental  
Solutions



## GROUND WATER LEVEL RECORDER

“DGWLR-AT-v01”: An automated ground water recorder powered by ATMEL



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# 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 TM 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.

## 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:

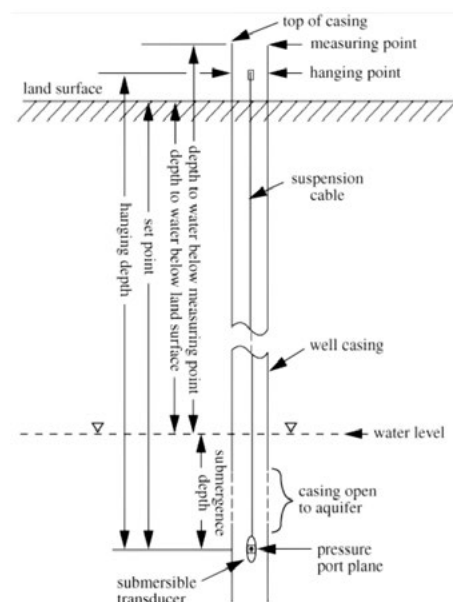
1. The sensor obtains the actual water level measurement. An optical sensor (or encoder—a measurement device that converts mechanical motion into electronic signals) , while a pressure sensor uses water pressure changes to get the data. Typically, older recorders use encoders, and newer ones are outfitted 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.
- $\pm 0.25$  % accuracy of the final output.
- $\pm 1.0$  % total error band.
- Compactly designed integration for making more sophisticated handling.
- Working temperature – Console: -20 -70 o C ; sensor : -40 to 105 o C.
- We are also providing solar based OEM instrument for remote usage.

## Sensor And Its 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 Specifications

PARAMETERS	MIN	MAX	UNITS	NOTES
Accuracy (combined non linearity, hysteresis, and repeatability)	-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 max	+125	°C	Except Cable 105c
Storage Temperature	-40 max	+125	°C	Except cable 105°C
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			

## Instruments

### ACCESSORIES:

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

### PIEZOMETER

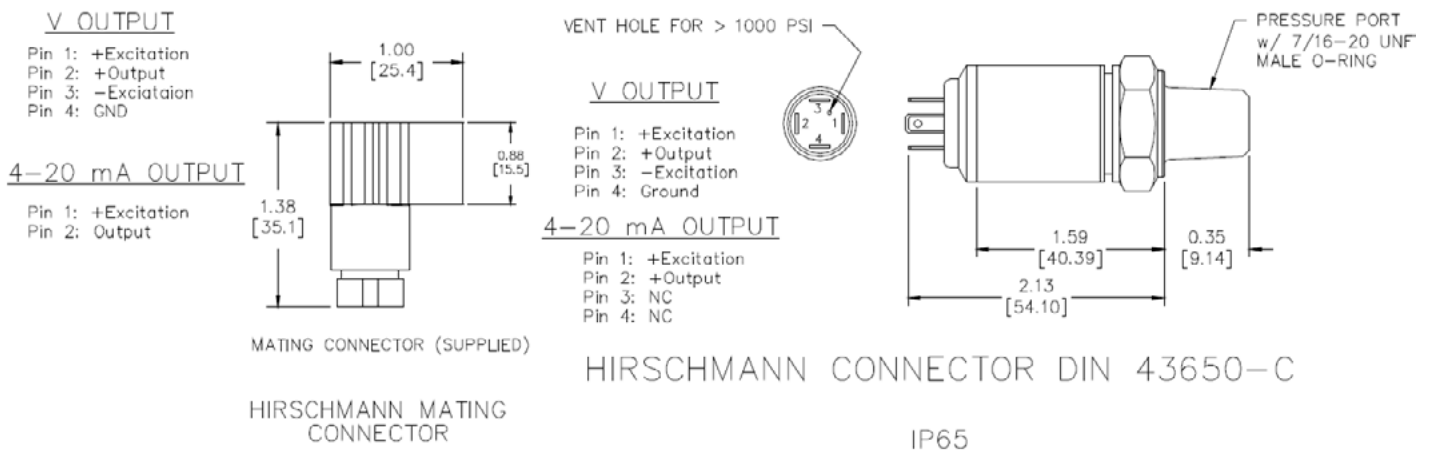
#### MODEL DGWLR-AT-01:

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

### PERFORMANCE:

- Accuracy -  $\pm 0.25\%$  F.S
- Linearity -  $< \pm 0.65\%$  F.S
- Resolution -  $\pm 0.4\%$  F.S (minimum)
- Thermal Drift -  $\pm 0.5\%$  F.S /  $^{\circ}\text{C}$

## 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.

### Precautions -

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

## Installation -

1. Choose a suitable location to mount the console, secure from unauthorized access to prevent tampering with the instrument, not too distant from the bore well and has easy reach to power socket.
2. After finalizing the mounting location, check the availability of power by connecting a 12 volts 1A DC adapter
3. 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.
4. At this step, feed the length of cable measured in the instrument by referring to the Operation Manual section no: 3.2.
5. Next, insert the port at the end of the cable into the socket provided on the instrument body.
6. 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

### **If preparing a new installation:**

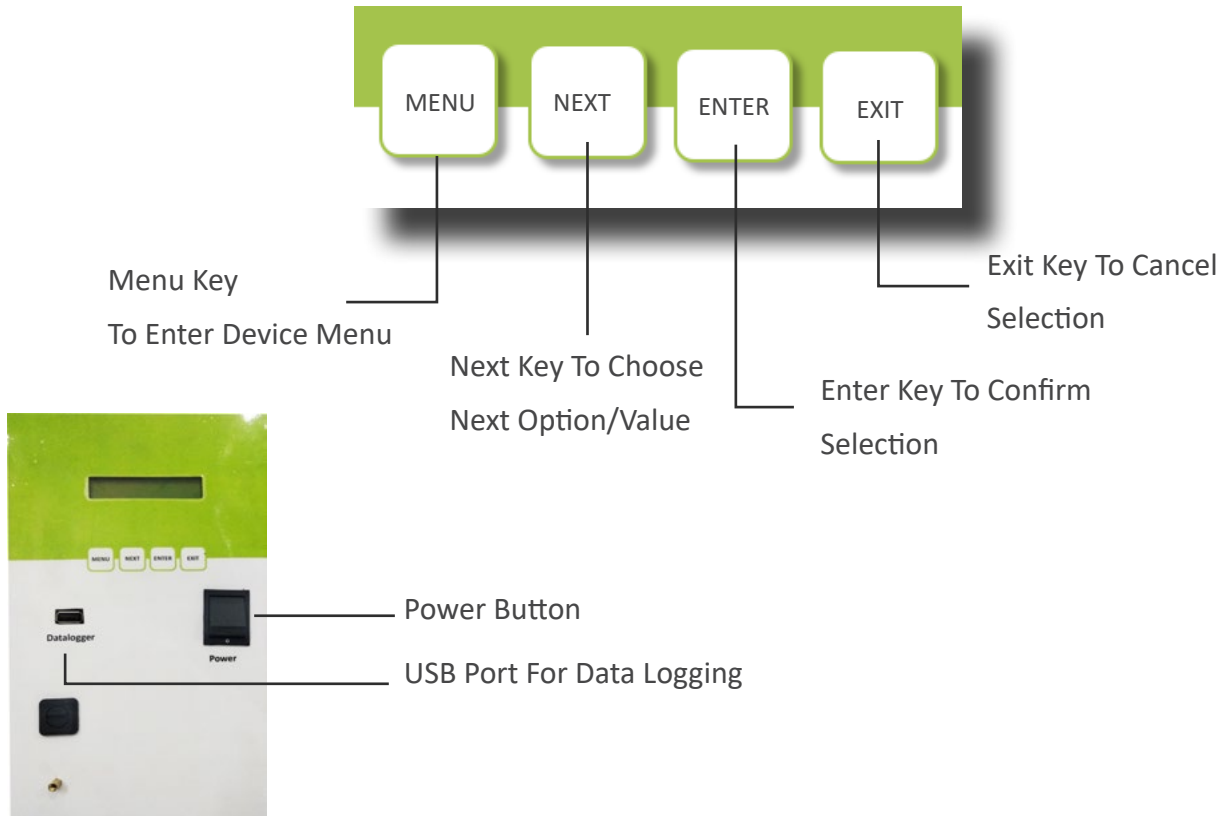
1. Check that the well is unobstructed. Clear obstructions .
2. If the well depth is not known, measure the total well depth .
3. If necessary, install an instrument shelter that will protect the transducer and data logger from vandalism and weather.
4. Keep the transducer packaged in its original shipping 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.
5. 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.
6. 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.
7. 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.
8. 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

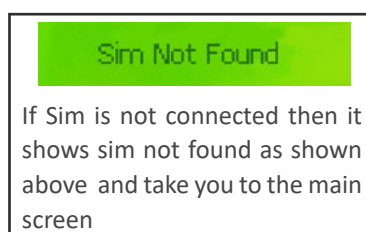
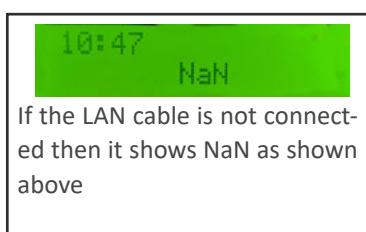


## Section 2: Starting up with the Machine

This is the window which appears as you power on the system. First it shows

**The machine Name** → **Company name where the machine manufactured** → **Searching Networks**  
**Sim Name** → **Then they Automatically sends the location where the machine is placed** → **Sent Time with length of the wire.**

As showcased be-low.



## Section 3: Menu

When you are on the main screen where it shows you the time and the length of the cable . Then click on the menu button it shows you Setup ,then click NEXT button and it shows you another option of Copy Data and Product Info accordingly .It shows you three different options as shown below -

### 3.1 Setup

### 3.2 Copy Data

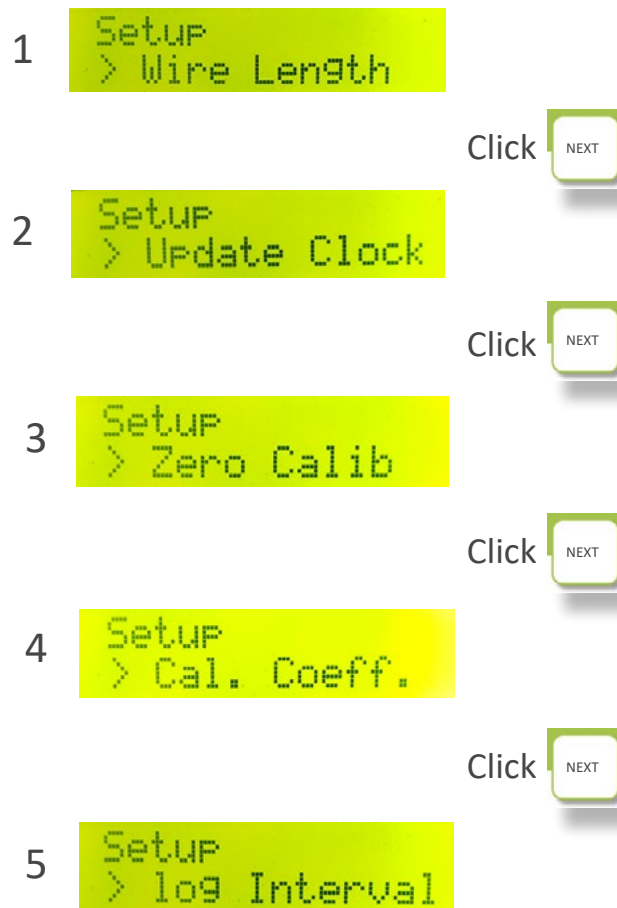
### 3.3 Product Info



### 3.1 Setup

When you press ENTER key on the setup option of the menu then it opens 5 new options

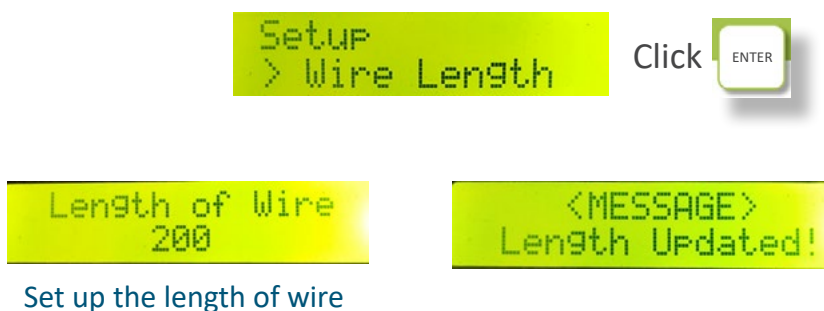
**Wire Length ,Update Clock, Zero Calibration, Calibration Coefficient, Log Interval** respectively as shown below





## 1 - Wire Length

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 - Update Clock

Setting up time plays an vital role in Data-Logging. So, if you want to log the monitoring data, please update time when you newly purchased the system. The time will be automatically updated as per the location of the sim that is insert in the machine . so, you don't have to do anything just click the ENTER button and it will update the time for you according to the location



## 3 - Zero Calibration

Zero calibration simply removes the error, if there is any. Sometimes the length of the cable is shown less in comparison of the actual length for eg - the cable length is 100 but it shows 99.7, 98 or something else, in this case just do the zero calibration and it will automatically removes the error and show the exact length of the cable. For doing it just go to **Menu>Setup>Zero Calibration and press Enter** , a message shown Calibrating and it will automatically do it for you and removes the any error as shown below



## 4 - Calibration Coefficient

There are different bar sensors that is used in the machine . So in calibration coefficient you have to select the type of sensor which is used in your machine. Mostly 10 bar sensor is used in this machine but in some cases you have to use the other sensor so to tell the machine which sensor you are using this option is available. When you Click Enter button it will show you 4 types of different sensors bar as shown below from which you have select the one you are using.

```
Setup
> Cal. Coeff.
```

Click



```
>10 b    16 b
 12 b    18 b
```

You can select the different values with NEXT button

## 5 - Log Interval

In log interval option you can set up the time interval to save the data. There are four options given in log interval 6 hours, 12 hours, 24 hours, 2 minutes respectively, to select the other time interval press NEXT button and choose one of the interval to save your data as shown below

```
Setup
> log Interval
```

Click



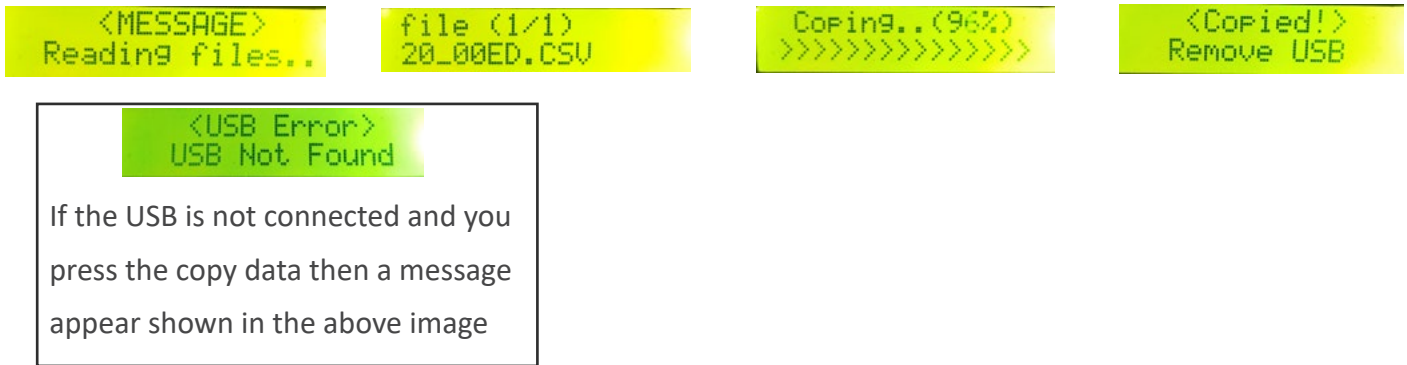
```
>6 Hr    12 Hr
 24 Hr    2 min
```

### 3.2 Copy Data

Copy Data is to For coping the data that is stored in the machine to your USB. For coping the data first you have to insert USB in the port as shown in the image Then go to MENU>Copy Data and press ENTER It will automatically read the files and show the file that is saved in your USB in which the details are saved, then hit ENTER and it will automatically coping the files and after completing the coping a message appear Copied (Removed USB). just remove your USB the data is saved in your USB as shown below.



USB Port



This option details the information about the system in three steps. In first it will show the unique number of the product and Product ID , In second it will show the wire length and current date , In third it will the show the sim information that is used in the system respectively as shown below.

## Wide Range of Products



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## CONTACT US



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