ENCARDIO RITE
METASENSING FOR MEGA STRUCTURES

USERS MANUAL

UNIVERSAL INDICATOR

Model EDI-55

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TUNNELS | HYDROELECTRIC | CONSTRUCTION | STRUCTURAL | METRO & RAIL | BRIDGES | MINING

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Disclaimer

Although the best effort has been made to ensure the completeness and accuracy of the information provided in this document, Encardio Rite instruments reserves right to change the information at any time and has no liability for accuracy.

List of Abbreviations

CSV Comma Separated Values

LED Light Emitting Diode

PC Personal Computer

USB Universal Serial Bus

VRLA Valve Regulated Lead Acid

EDI-55V Vibrating Wire Indicator

Introduction about the Manual

Purpose of this document

The purpose of this document is to show the entire functionality of the application for the device EDI-55. Please refer to Introduction section to know about the application.

This document serves as a help guide by showing the workflow of the entire processes. The document guides its user by providing a clear idea about how things have to be done in the application. All efforts have been made to clarify each and every step.

What the manual contains

The document is designed to provide step-by-step guidance using actual screenshots from the application.

How to Use the Manual

The document is intended to guide the user in a step-by-step manner starting from installing the application, accessing the application, taking the readings, viewing the plots. The screenshot guides to complete the task.

Battery Charging and care of Rechargeable Batteries

⚠ Warning
Always maintain Indicator battery in charged condition. Failure to do so will cause premature battery failure. A battery which gets damaged due to non-compliance with the instructions given below is not covered by our standard warranty and is also not eligible for free servicing.

Indicator's battery

The EDI-55 Universal Indicator uses a removable sealed rechargeable VRLA maintenance free battery as a power source. A separate battery charger unit operating from universal AC mains supply is supplied with each EDI-55 system. This battery charger operates from 90 to 270 V AC, 50 or 60 Hz which makes it suitable for operation from AC mains available throughout the world.

A fully discharged battery needs 6 hours of charge to get fully charged. A partially discharged battery will require proportionately less time but the time is difficult to calculate. As soon as the battery is fully charged the charging current gets automatically reduced to a safe value.

On receiving the EDI-55 system for the first time recharge the battery for 6 hours using the supplied mains powered battery charger.

If the EDI-55 is not going to be used for more than 30 days, fully charge the battery before storing the indicator. Also fully charge the battery before use if the Indicator has not been used for more than 30 days.

If the data logger is not going to be used for more than 30 days, recharge the battery at least once every 30 days or so.

When battery voltage is showing 5.9 V in system information screen (at Readout unit) it means approximately 10 percent of battery capacity is left. Fully recharge the battery at the first opportunity.

Turn off mains AC supply to the charger before connecting to or disconnecting charger from the Indicator.

The rechargeable battery needs replacement every 3 to 5 years (irrespective of hours of use). Replace battery with AMPTEK AT6-4.5 or an equivalent from another manufacturer.

Phone's Battery

The EDI-55 Universal Indicator uses a Smart Phone as a readout unit that has an internal sealed rechargeable Li-ion maintenance free battery as a power source. A separate battery charger/adaptor unit for the smart phone, operating from universal AC mains supply is supplied with each EDI-55 Indicator unit. This battery charger operates from 90 to 260 V AC, 50 or 60 Hz which makes it suitable for operation from AC mains available throughout the world.

On receiving the Readout unit for the first time discharge the battery fully and then recharge the battery for 2 hours using the supplied mains powered battery charger.

If the smart phone is not going to be used for more than 30 days, fully charge the battery and switch OFF the phone before storing the phone. Also fully charge the battery before use if the phone has not been used for more than 30 days.

1 INTRODUCTION

The EDI-55 Indicator is a next-generation, microprocessor-based multi-sensor indicator designed for use with a wide range of analogue and digital transducers.

List of Sensors:

Sr. No.	Sensor Name	Sensor Type	Description
1	Strain Gauge/Load Cell	Analog (Voltage output)	Measures force or weight through strain gauges forming a bridge circuit.
2	Potentiometric Sensor	Analog (Voltage output)	Measures linear or angular position by varying resistance proportionally.
3	Voltage Output Sensors	Analog (Voltage output)	Measures direct voltage signals from various sources, typically ±5V systems.
4	Electrolytic Tilt Meter	Analog (Voltage output)	Measures precise inclination or tilt using an electrolytic fluid cell.
5	4-20mA Sensors	Analog (Current output)	Measures industrial process parameters using standardized 4-20mA current signals.
6	Uniaxial/Biaxial MEMS Tilt Meter	Analog (Voltage output)	Measures tilt angles in one or two axes using MEMS-based sensing technology.
7	VW Sensor (Vibrating Wire)	Digital (Pulse Frequency)	Measures physical parameters like stress or pressure using wire vibration frequency.
8	Thermistor (Temperature Sensor)	Analog (Resistive)	Measures temperature based on change in resistance with temperature variation.
9	RTD (Temperature Sensor – PT100)	Analog (Resistive)	Measures temperature accurately using a platinum resistance element.
10	MODBUS Sensor (Digital Sensor)	Digital (RS-485 Modbus)	Industrial digital sensor communicating over RS-485 MODBUS protocol.

The indicator displays measured values directly in proper engineering units based on user-selected sensor type and calibration settings. Its operation is highly simplified through a smart Android-based readout device featuring a large capacitive touchscreen, making it extremely user-friendly and easy to operate.

The EDI-55 can store calibration coefficients and configuration parameters for each connected sensor, allowing real-time display of measured parameters without the need for manual calculations or lookup tables. Sensors that require polynomial calibration are supported up to 5th order, ensuring high accuracy across a wide range of applications.

For sensors equipped with built-in temperature measurement (e.g., RTDs or Thermistors), the EDI-55 can also display temperature values directly in degrees Celsius or Fahrenheit.

An internal non-volatile memory provides sufficient capacity to store over **5,00,000 readings**, with each reading time-stamped with the exact date and time of measurement. Data can be logged either manually by accepting individual readings or automatically through scheduled scanning based on user-defined intervals.

Stored readings can be easily downloaded into the Android readout device and exported in **CSV format** for further analysis or reporting. The familiar smartphone interface ensures that users can navigate the system quickly, similar to operating any modern mobile application.

The indicator is powered by an internal **6V rechargeable sealed VRLA battery**. A universal battery charger is included for convenient recharging from standard AC mains supply.

The EDI-55 Indicator is housed in a rugged, splash-proof moulded plastic enclosure with weatherproof connectors for sensor and charger connections. A multifunctional **power ON/OFF push button cum status indicator** provides visual feedback for battery charging, Bluetooth connection, and sensor scanning activities through intuitive blinking patterns.

With its versatility, robust construction, and ease of use, the EDI-55 is an ideal choice for field and industrial measurement applications requiring high precision and reliability across multiple sensor types.

2 OPERATING PRINCIPAL

The application is designed in a very user-friendly manner which can be easily operated for downloading of the data and analyzing the readings. Even users with little experience with Geotechnical Instruments can connect, download data and change settings as required.

2.1 Strain Gauge Load Cell

The strain gauge load cell measures force or load by detecting minute changes in strain on a structural element. A strain gauge, which is a very fine resistive wire, is attached to the structure. When the structure is subjected to a force, the strain gauge stretches or compresses, causing a small change in its electrical resistance.

The strain gauges are arranged in a Wheatstone bridge configuration. When the structure is under load, the bridge becomes unbalanced and produces a small differential voltage output that is proportional to the strain (and thus the applied load).

Mathematically, the relationship between strain and output voltage can be expressed as:

Vout = K×strain

where **K** is a constant depending on the gauge factor and excitation voltage.

The EDI-55 Indicator supplies a stable excitation voltage to the load cell, measures the output voltage using a high-precision 24-bit ADC, and calculates the corresponding load or force in engineering units.

Polynomial Correction

Although the output of a strain gauge is approximately linear with load, small non-linearities may exist. For higher accuracy, the EDI-55 supports polynomial correction using a fifth-order polynomial equation.

Measurement Flow in EDI-55

- A stable excitation voltage is supplied to the load cell.
- The differential voltage generated due to strain is measured.
- The voltage is digitized with a 24-bit ADC.
- The measured value is converted into engineering units using calibration coefficients.
- The result is displayed on the Android application screen.
- Optionally, the reading is stored in internal memory along with a timestamp for future downloading.

2.2 Potentiometric Sensor

The potentiometric sensor operates based on the principle of a voltage divider. It consists of a resistive element with a movable wiper contact.
As the wiper position changes due to displacement or tilt, the voltage at the wiper varies proportionally between 0 V and the supply voltage.

The output voltage is given by: $$V_{out} = V_{supply} \times \frac{R_2}{R_1 + R_2}$$

where R1 and R2 are the resistances on either side of the wiper.

The EDI-55 reads this voltage, digitizes it using the 24-bit ADC, and calculates the physical parameter like displacement or tilt in engineering units.

Polynomial Correction

If the potentiometric sensor has slight non-linearity, polynomial correction can be applied to improve measurement accuracy.

Measurement Flow in EDI-55

- Excitation voltage is supplied to the potentiometer.
- The voltage at the wiper is measured.
- The voltage is digitized using a 24-bit ADC.
- The measured value is converted into engineering units using calibration coefficients.
- The result is displayed and can be stored for later download.

2.3 Voltage Output Sensor

Voltage output sensors provide an analog voltage directly proportional to the physical parameter they are measuring, such as pressure, displacement, or force.
Typical voltage ranges are ±5 V.

The EDI-55 accepts this voltage signal, conditions it for the ADC input, and digitizes it with high accuracy.

Mathematically:

$$V_{out} \propto \text{Measured Parameter}$$

Polynomial Correction

For sensors where the voltage-to-parameter relationship is not perfectly linear, polynomial correction can be used.

Measurement Flow in EDI-55

- The sensor's analog voltage output is read.
- The voltage is digitized using a 24-bit ADC.
- Polynomial or linear calibration is applied.
- The corresponding parameter is displayed and logged if needed.

2.4 Electrolytic Tilt Meter

An electrolytic tilt sensor measures tilt by detecting the movement of an electrolyte fluid inside a chamber between electrodes.
When the sensor tilts, the amount of fluid covering the electrodes changes, resulting in a proportional change in output voltage.

The output voltage varies symmetrically around a center voltage, typically ±2 V for full-scale tilt.

The EDI-55 measures this voltage and converts it into a tilt angle using calibration settings.

Polynomial Correction

Small non-linearities in tilt measurement can be corrected using polynomial equations for better accuracy.

Measurement Flow in EDI-55

- A stable excitation voltage is supplied to the tilt sensor.
- The differential voltage output is measured.
- The signal is digitized using a 24-bit ADC.
- Polynomial calibration is applied to compute tilt angles.
- Results are displayed and optionally stored.

2.5 4–20mA Current Sensor

4–20 mA sensors transmit the measured parameter as a current signal, where 4 mA represents the lower end and 20 mA represents the upper end of the measurement range. This method is widely used for long-distance industrial sensor communication.

The current is converted to a proportional voltage using a precision resistor inside EDI-55 and then digitized.

The relationship is:

Iloop ∝ Measured Parameter

Polynomial Correction

If the current-to-parameter mapping is not perfectly linear, polynomial correction can be applied.

Measurement Flow in EDI-55

- The loop current is converted into voltage.
- The voltage is sampled by a 24-bit ADC.
- Linear or polynomial calibration is applied.
- The measured parameter is displayed and logged.

2.6 MEMS Tilt Meter

A MEMS (Micro-Electro-Mechanical Systems) tilt meter uses capacitive sensing to measure tilt angles. It outputs analog voltages corresponding to tilt in one or two axes.

The sensor output is typically symmetrical around a mid-scale voltage.

The EDI-55 reads these voltage outputs and calculates the tilt angle through calibration.

Polynomial Correction
Polynomial correction is used to compensate for small non-linearities in MEMS sensor outputs.

Measurement Flow in EDI-55

- Excitation voltage is supplied to the MEMS sensor.
- Output voltages for each axis are measured.
- Signals are digitized using a 24-bit ADC.
- Calibration factors or polynomials are applied.
- Tilt angles are displayed and logged.

2.7 Vibrating Wire Sensor

A vibrating wire transducer consists of a stretched steel wire whose natural resonant frequency changes with applied force or pressure.
The EDI-55 excites the wire by sending an electrical pulse, causing it to vibrate at its natural frequency. The frequency is measured, and the physical parameter is calculated using calibration constants.

The basic relationship is:

$$X = K(f_2^2 - f_1^2)$$

where:

- **X** is the measured parameter,
- **f1** is the reference frequency,
- **f2** is the current frequency,
- **K** is the calibration constant.

Polynomial corrections are supported to handle non-linear behaviour if needed.
Measurement Flow in EDI-55 includes:

- Exciting the wire
- Measuring the resonant frequency
- Applying calibration constants
- Displaying the final result.

2.8 Thermistor

A thermistor is a temperature sensor whose resistance varies significantly with temperature. Most commonly used are Negative Temperature Coefficient (NTC) thermistors, where resistance decreases with increasing temperature.

The EDI-55 measures the resistance of the thermistor and calculates the temperature using standard lookup tables or mathematical models like the Steinhart–Hart equation.

No polynomial correction is applied as temperature-resistance relationships are pre-characterized.

Measurement Flow in EDI-55

- A known current is passed through the thermistor.
- Voltage drop across the thermistor is measured.
- Resistance is calculated.
- Temperature is derived using lookup tables.
- Temperature is displayed and logged.

2.9 RTD (PT100)

RTDs (Resistance Temperature Detectors) like PT100 sensors measure temperature by exhibiting a nearly linear increase in resistance with temperature.
A PT100 has a resistance of 100 Ω at 0°C.

The EDI-55 uses a precision RTD interface to measure resistance and calculates the corresponding temperature based on the standard PT100 characteristics.

The basic formula is:

$$R_t = R_0(1 + \alpha \times T)$$

where:

- Rt is the resistance at temperature TTT,
- R0 is 100 Ω,
- Alpha is the temperature coefficient (~0.00385 per °C).

Measurement Flow in EDI-55

- A known excitation current is applied to the RTD.
- The voltage drop is measured and resistance calculated.
- Temperature is computed using standard RTD formulas.
- Temperature is displayed and logged.

2.10 MODBUS RTU Sensor

MODBUS RTU sensors are digital sensors that communicate via an RS-485 bus. The EDI-55 sends MODBUS requests to the sensor and receives measured data like pressure, temperature, displacement, or other parameters.

Since data is already digitized by the sensor, no analog measurement is required.

Polynomial correction is generally not needed as the data is directly provided in engineering units by the sensor.

Measurement Flow in EDI-55

- EDI-55 sends a MODBUS read command to the sensor.
- The sensor responds with the requested data.
- The result is displayed and stored.

3 GETTING STARTED

3.1 Readout Unit

The EDI-55 Universal Digital Indicator uses a Mobile Phone as a Readout Unit. The phone running on the Android operating system provides a powerful and convenient platform to manage the EDI-55 application efficiently. It has many built-in features like phone calls, SMS, internet access through 4G/5G/Wi-Fi, Bluetooth communication, USB connectivity, and a high-resolution camera. Users can use the phone not only for reading sensor data but also for site communications, sending photographs of site conditions, and quick data backup.

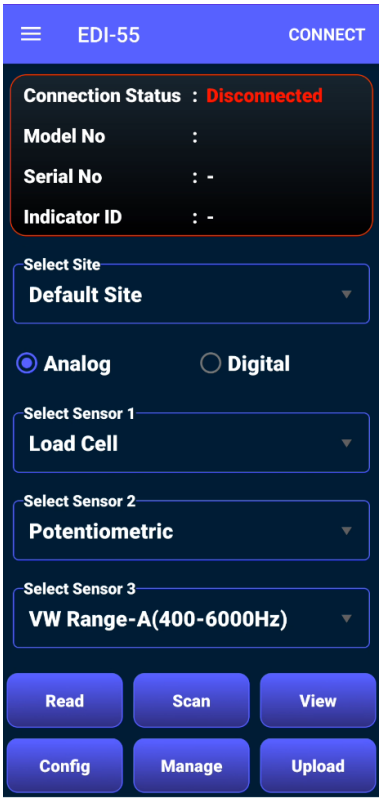


Figure 3-1

The mobile phone should have at least 8GB internal storage memory, allowing it to store a large amount of sensor data, photos, and backups. Data backup can be taken regularly by connecting the phone to a PC via a USB cable.

3.2 System Requirements

The EDI-55 application runs on an Android smartphone. The minimum recommended phone specifications are:

Parameter	Minimum Requirement
Mobile OS	Android Version 12.0 or higher
RAM	4 GB (Recommended 3GB or above)
Storage Memory	8GB or above
Display Size	720×1280, 1080×1920 pixels or higher
Display Type	Capacitive Touchscreen
CPU Speed	1.4 GHz or above
Bluetooth	Version 4.2 or above

Note:

- Higher RAM and storage are preferred for smooth operation and data handling.

3.3 Using the Readout Unit

The EDI-55 application installed on the mobile phone can take sensor readings, store them into memory, and display them immediately.

The application allows viewing logs in a tabular format and also plots graphs based on sensor data automatically after each reading.

Sensor data files are created and stored automatically by the application. These files can be extracted from the application database at any time when required. Sensor data files can also be uploaded to a remote server through the mobile phone's internet connection via 4G, 5G, or Wi-Fi.

3.4 Establishing Bluetooth Connection

The EDI-55 system uses Bluetooth Low Energy (BLE) connection to communicate between the Phone and the Indicator. Follow the steps below to establish a Bluetooth connection:

- Turn ON the Indicator's Bluetooth modem by pressing the push button provided on the Indicator's panel.
- After pressing the button, the LED indicator on the device will blink faster, indicating that the Bluetooth modem is ON and ready.
- The LED will glow bright RED when the Bluetooth modem is ready to advertise over BLE.
- Power ON the phone and open the EDI-55 Application.
- In the application, navigate to the Device Connection screen.
- The application will automatically scan for nearby EDI-55 Indicators.
- Select your Indicator from the list (identified by serial number).
- Tap on Connect.

Once connected, the Indicator and Phone will stay bonded automatically for future use.

Note:

- BLE connection is fast and secure.
- No need to manually pair from Android Bluetooth Settings.
- Always connect from inside the EDI-55 application.

3.5 Application Installation

It is strongly recommended to close all open programs before installing the application. Follow the steps below to install the EDI-55 Application:

Important:
Make sure that the setting **Install Unknown Apps** (Allow installation from sources other than Play Store) is enabled.
Go to **Settings > Apps & Notifications > Special Access > Install Unknown Apps**, and allow permission for the File Manager or Browser App.

Steps:

- Copy the **EDI-55_xx.apk** file into the mobile phone using Bluetooth, USB cable, or downloading from a secure source.
- Navigate to the location where the APK file is copied.
- Tap on **EDI-55_xx.apk** and then tap **Install**.
- After installation, tap **Done** or **Open** to launch the application.
- The application icon will be available in the launcher for easy access.

3.6 Running the Application

Running the EDI-55 application is very simple. It is as easy as using any common mobile application. Go to the Applications menu and tap on the EDI-55 Indicator application icon.

- When launched, the application will briefly show a splash screen displaying the Application Name and Version.
- After a few seconds, the Main Menu screen will appear.

The user-friendly graphical interface ensures quick learning and easy operation, even for first-time users.

4 QUICK START GUIDE

4.1 Preparing the Setup

Use the step-by-step procedure to prepare the setup connections:

Step 1: Press the Power ON push button on the EDI-55 Indicator once to turn ON the Indicator.

Step 2: Press the power button of the Android smartphone to turn it ON.

Step 3: Open the EDI-55 application on the Android phone.

Step 4: From the Home Screen, press the Connect button located at the top right corner of the screen.

Step 5: The application will automatically scan for nearby Indicators.

Step 6: Select the Indicator from the list (identified by its serial number) and press Connect.

Step 7: BLE connection will be established automatically without any manual pairing or passkey entry.

Step 8: Connect the sensor cable to the desired sensor.

Note: BLE connection is handled inside the application. Do not try to pair the device manually from the phone's Bluetooth settings.

On the Home Screen:

When Analog is selected, users can configure up to three different types of analog sensors (e.g., Load Cell, Potentiometric, VW Sensor). More than one sensor of the same type is not supported.

When Digital is selected, users can select a single cluster of up to 32 sensors on a single RS-485 channel.

Home Screen Buttons:

Read: Used for taking live readings from the selected sensor.

Scan: Opens the Scan Setup menu for configuring data logging schedules.

Config: Opens the configuration menu where the user can create or delete sites, create, delete, or modify sensors, and add or edit sensor coefficients.

4.2 Configuring Sensor's Coefficients and Information

The configuration of sensors, sites, and calibration coefficients is handled through the **Config** button available on the Home Screen.

Use the following step-by-step procedure to configure the sensor's parameters like model, coefficients, serial number, sensor tag, etc.:

Step 1: Open the **Config** menu from the Home Screen.

Step 2: Create a new site or select an existing site.

Go to **Config >> Site List >> Create** to create a new site.

Step 3: Add a new sensor under the selected site.

Go to **Config >> Sensor List >> Create**.

Step 4: Provide all information like sensor manufacturer, model, serial number, parameter name, units, etc., while creating the new sensor profile.

Step 5: For all analog sensors (except RTD and Thermistor), enter the calibration coefficients. Coefficients allow the EDI-55 to accurately convert sensor signals into engineering units. *(Please do not change the coefficient values if they are not known.)*

Step 6: Save the sensor profile by pressing the Save button.

Step 7: To access System Information, press the three horizontal lines (Menu button) located at the top left corner of the Home Screen to open the side drawer, then select System Information from the menu.

Note:

RTD and Thermistor sensors do not require user-entered calibration coefficients as they are handled internally by standard temperature conversion methods.

4.3 Taking Readings or Starting Scanning

Use the following procedure to monitor sensor data or to configure the scan schedule for automatic data logging:

Step 1: Select the site and sensor from the Home Screen.

Go to **Home Screen >> Select Site / Select Sensor**.

Step 2: Press the **Read** button to monitor or store sensor readings.

Go to **Home Screen >> Read**.

Step 3: Reading average and noise bar range can be set using the **Settings** option from the Reading screen.

Step 4: Reference Reading can be set at any time from the **Settings** screen.

Go to **Home Screen >> Read >> Settings**.

Step 5: The Reading screen shows:

- Current value of the sensor
- Temperature value (if available)
- Deviation from last stored reading
- Deviation from initial reading

Step 6: Last stored reading is displayed for easy comparison.

Step 7: Press the **Accept** button to store the reading into memory.

Step 8: Press the **View Data** button from the Home Screen or Reading screen to view stored data.

Step 9: EDI-55 Indicator can also be used as a Single Channel Datalogger.

Step 10: Go to the **Scan** screen by pressing the **Scan** button from the Home Screen.

Go to **Home Screen >> Scan**.

Step 11: Choose **Scan Interval** and **Scan Start Time**, then press the **Start** button to start data logging.

Step 12: Press the **Stop** button to stop scanning.

4.4 Downloading and Viewing Data

Use the following steps to download and view the logged data:

Step 1: Press the **Download** button to download data into the phone's memory.

Go to **Home Screen >> Scan >> Download**.

Step 2: Press the **View Data** button from the Home Screen or Reading screen to view stored data.

Go to **Home Screen >> View**.

Step 3: Data can be viewed in tabular form by selecting the desired parameter from the drop-down menu.

Step 4: Data can also be viewed in graphical form by pressing the **Graph** icon from the View Data screen.

Step 5: To extract the logged data into CSV file format:

Go to **Manager** screen from the Main Menu.

Select Site, Sensor, Date Range, File Format, etc.

Press the **Generate CSV** button.

Extracted files are saved in CSV format at the following file path: Phone Memory >> EDI_55_CSV >> *.csv

Step 6: The Datalogger's Date and Time automatically synchronize with the phone's Date and Time every time a connection is established.

No manual date/time update of the logger is required.

5 HOME SCREEN

The EDI-55 Home Screen acts as the central control panel for managing connections, selecting sensors, and accessing key functionalities.

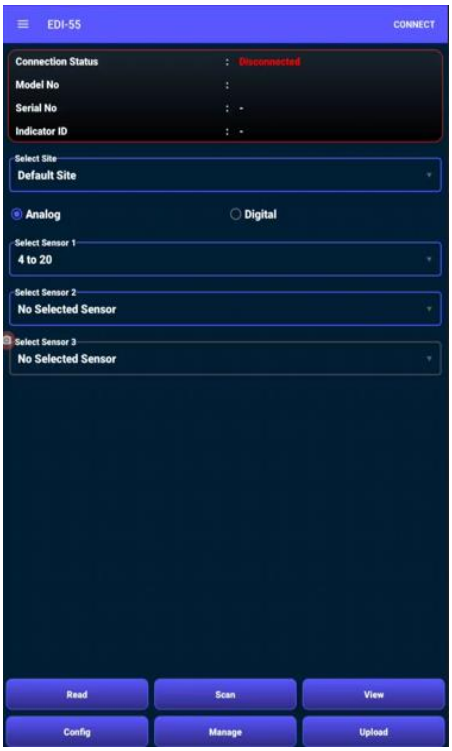


Figure 5-1 Home Screen

The Home Screen provides the following main features:

Connection Management: Connect or disconnect from the EDI-55 Indicator using the **Connect** button at the top right corner.

Site and Sensor Selection:

Choose up to three Analog Sensors or a Digital sensor cluster depending on the selected mode (Analog/Digital).

Operation Mode Selection:

Analog: Supports up to three different types of analog sensors. (Multiple sensors of the same type are not allowed.)

Digital: Supports a cluster of up to 32 sensors connected over a single RS-485 channel.

5.1 Home Screen Buttons

Button	Function
Read	Start live reading from the selected sensor. Displays the real-time sensor data on the screen.
Scan	Open Scan Setup to configure automatic data logging schedules such as Scan Interval and Start Time.
View	View the stored data in tabular or graphical format.
Config	Open configuration menu to create/delete sites, create/delete/modify sensors, and add sensor coefficients.

Manage	Create and export CSV files based on selected Site, Sensor, and Date range for data backup or transfer.
Upload	Upload the generated CSV files to an FTP server directly from the mobile device.

5.2 Side Drawer Menu (Accessed by pressing the ☰ Menu button)

The Side Drawer provides additional system-level information and settings:

Option	Function
Indicator	Shows details of the connected EDI-55 Indicator (Model No., Serial No., Indicator ID).
Site	Displays a currently selected Site
Sensor	Displays a currently selected Sensor
Battery	Shows Indicator Battery Status (Voltage/Charge Level).
Bluetooth	Shows the Bluetooth status of the phone and connection details.
Phone	Shows phone details like storage status, network connection, and device info.
Database	Allows browsing, managing, and exporting database entries for sites, sensors, and readings.

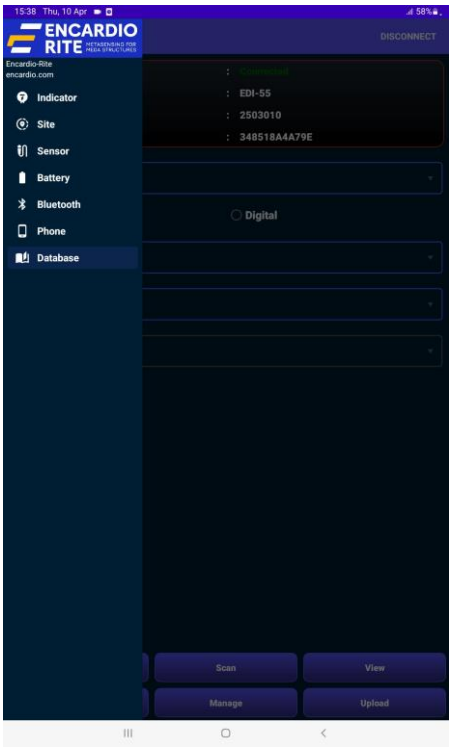


Figure 5-2 Side Drawer Menu

5.3 Connecting to an Indicator

Once the EDI-55 Indicator is powered ON and the Bluetooth is ready, users can establish a connection using the **Connect** button on the Home Screen.

- Press the **Connect** button.
- The application will scan and display a list of available Indicators (with Serial Number).
- Tap on the desired Indicator to initiate the connection.
- After a few seconds, the phone will establish a connection with the selected Indicator and update the connection status.

Note: BLE connection is automatic and does not require manual pairing or passcode entry.

6 SYSTEM INFORMATION

System Information can be accessed by pressing the three horizontal lines (Menu button) from the Home Screen and selecting the desired option. It shows important information related to the EDI-55 Indicator, Site, Sensor, Battery, Bluetooth, Phone, and Database.

6.1 Indicator Information

Pressing the **Indicator** button opens the Indicator Information screen. It displays the Indicator's model number, serial number, Indicator ID, firmware version, firmware revision date, connection time, and connectivity status.

6.2 Site Information

The **Site** button shows the site details of the selected site, including Site Name and Site Comments.

6.3 Sensor Information

The **Sensor** button displays the information of the selected sensor including Site ID, Sensor ID, Sensor Comments, Manufacturer, Model, Serial Number. It also shows calibration information for all the sensor inputs of the indicator.

6.4 Indicator Battery Status

The **Battery** button displays battery information such as Battery Type, Battery Voltage, Charging/Discharging Status, Battery Health, Battery Installation Date, Last Charger Connection Date/Time, and Last Full Charge Date/Time. Monitoring battery voltage is useful for assessing Indicator health. It is recommended to fully charge the battery before site deployment.

6.5 Bluetooth Information

The **Bluetooth** button displays the Bluetooth identification details including Indicator Bluetooth Name, Bluetooth Address, connection run time, and connectivity status.

6.6 Phone Information

The **Phone** button shows the mobile device information including Brand, Model, Android Version, Screen Resolution, Battery Type, Battery Voltage, Battery Charge, Battery Temperature, IMEI number, Network Service Provider, and the currently installed version of the EDI-55 application.

6.7 Database Information

The **Database** button allows users to export the complete database into a .dbc file or import a .dbc file into the app. It is used for backing up and restoring site, sensor, and reading information quickly and safely.

7 CREATING SITE / ADDING SENSOR

To create a new site or add a sensor, press the **Config** button from the Home Screen. This will open the Site and Sensor List screen as shown in **Fig 7-1**. The list displays all created sites at the top and the associated sensors below. The user can select between **Analog** and **Digital** mode based on the type of sensor to be added. Clicking on any site or sensor will display the corresponding comments. To return to the previous screen, press the back key.

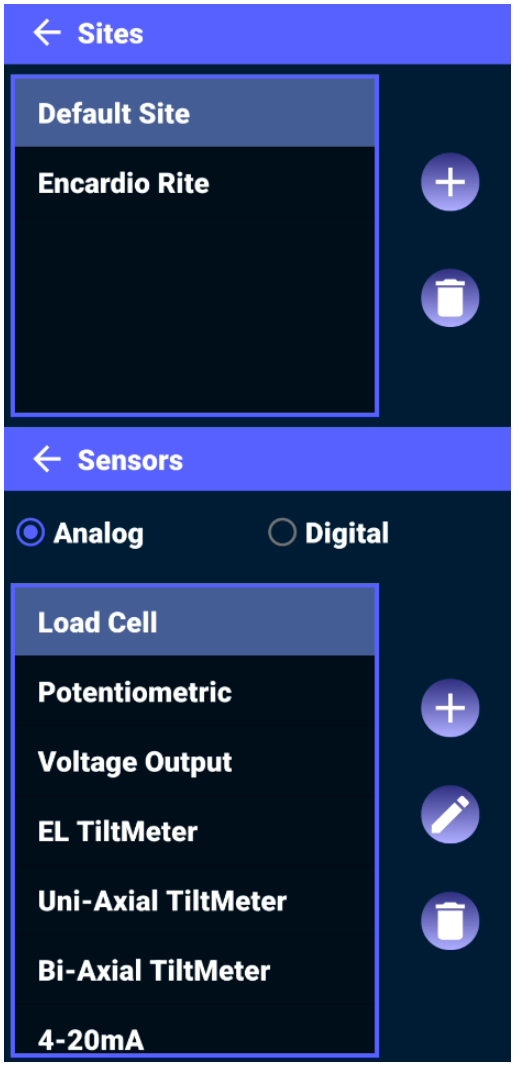


Figure 7-1 Site and Sensor List

Figure 7-2 Site Creation Screen

7.1 Creating a Site

To create a new site, press the **+** button under the Site List. The Site Creation screen, shown in **Fig 7-2**, will appear. Enter the Site ID and any relevant Site Comments. Once the information is entered, press the **Save** button to create the site. If a site needs to be removed, it can be deleted by selecting it from the list and pressing the **Delete** button.

7.2 Creating an Analog Sensor

After selecting the desired site, ensure the **Analog** option is selected. Press the **+** button under the Sensor List to open the Add Sensor screen as shown in **Fig 7-3**. Fill in the necessary details such as Sensor Type, Manufacturer, Model, Sensor ID, Comments, and Serial Number. Once all information is filled, press the **Next** button to proceed.

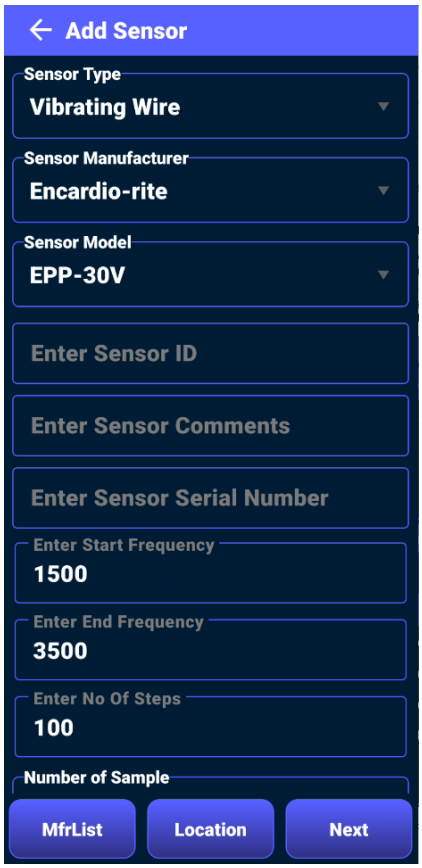


Figure 7-3 Add Sensor – Sensor Settings

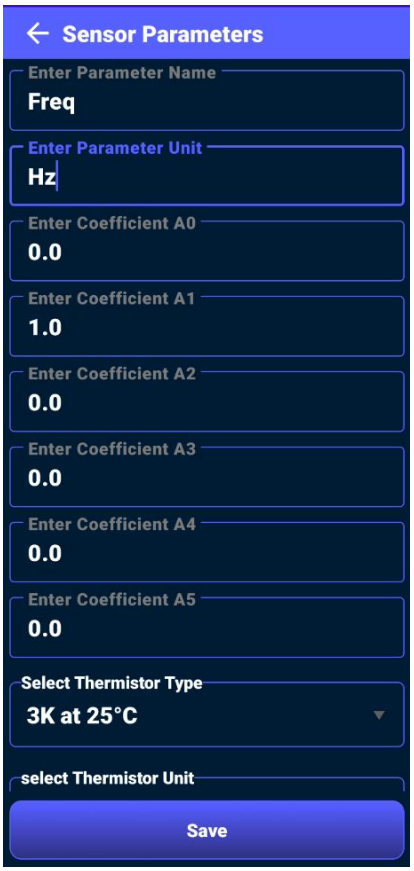


Figure 7-4 Sensor Parameters Screen

The Sensor Parameters screen will then appear as shown in Fig 7-4. Here, the user must enter the Parameter Name, Parameter Unit, and the calibration coefficients A0 to A5. Once all entries are completed, press the Save button to finalize the sensor configuration.

7.3 Creating a Digital Sensor

To add a digital sensor, select the desired site and choose the **Digital** option. Press the **+** button under the Sensor List to open the Add Modbus Cluster screen as shown in **Fig 7-5**.

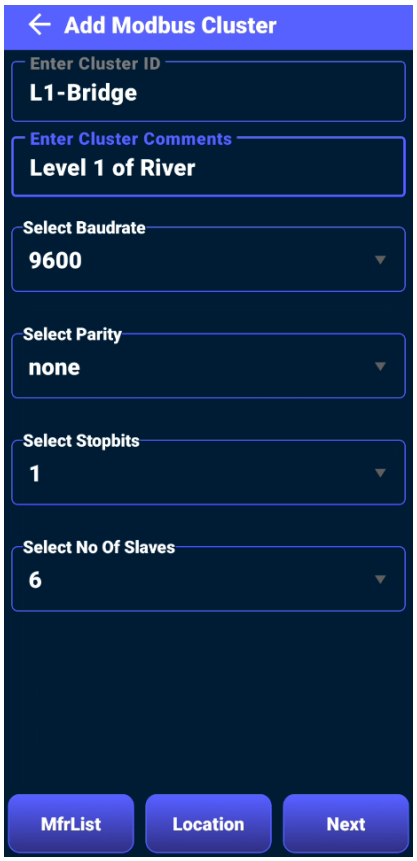


Figure 7-5 Add Modbus Cluster

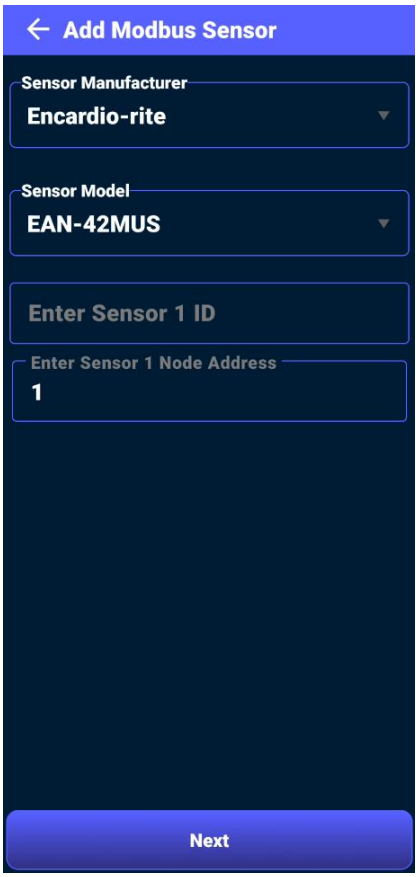


Figure 7-6 Add Modbus Sensor

In the Add Modbus Cluster screen, enter the Cluster ID and any Cluster Comments. Configure the communication settings by selecting the Baudrate, Parity, and Stopbits. Also, specify the Number of Slaves that will be part of this Modbus cluster. After completing these details, press the Next button.

Following this, the Add Modbus Sensor screen will open as shown in **Fig 7-6**.
In this screen, for each slave:

- Select the Manufacturer and Model.
- Enter the Sensor ID.
- Assign the Node Address.

This process is repeated for the number of slaves specified earlier. After entering details for all slave sensors, the configuration for the digital cluster is complete.

When a digital sensor is selected, an additional button with a settings icon appears at the bottom right of the Sensor List screen. Pressing this button opens the Monitor screen, shown in **Fig 7-7**.

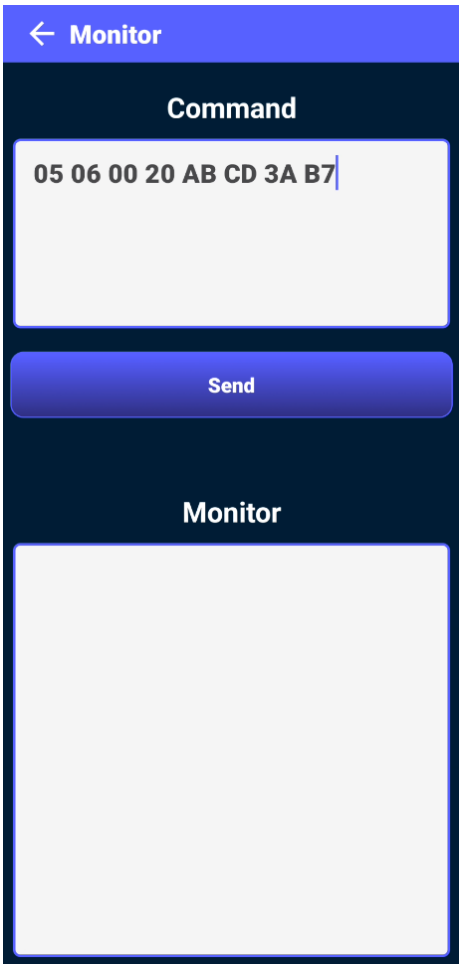


Figure 7-7 Monitor Screen

In the Monitor screen, users can send custom Modbus commands directly to the digital sensors and view the response. This feature is particularly useful for testing and troubleshooting digital sensor communication. The interface is similar to commonly used Modbus testing tools, allowing manual command entry and monitoring of replies from sensors.

7.4 Default Site and Default Sensor

The Default Site and Default Sensor are provided for demonstration and testing purposes. New sensors cannot be created under the Default Site, and neither the Default Site nor the Default Sensor can be edited or deleted. Readings can be taken from the Default Sensor but cannot be stored in the database.

7.5 Manufacturer List

Pressing the MfrList button on the Add Sensor screen allows the user to manage the Manufacturer List, as shown in Fig 7-8. New manufacturers can be added by entering the Manufacturer Name and pressing Add. Manufacturers can also be removed by selecting and pressing Remove. For managing models, select the Sensor Type and Manufacturer, then add or remove models by entering the Model Name and defining operating parameters such as Start Frequency, Stop Frequency, and Number of Steps.

7.6 Editing Sensor Parameters

Sensor parameters can be modified by selecting the site and sensor from the list and pressing the **Edit** button. Users can update fields like Sensor ID, Comments, Manufacturer, Model, Serial Number, Parameter Name, Units, and Coefficients. After making the necessary changes, press the **Save** button to update the sensor details.

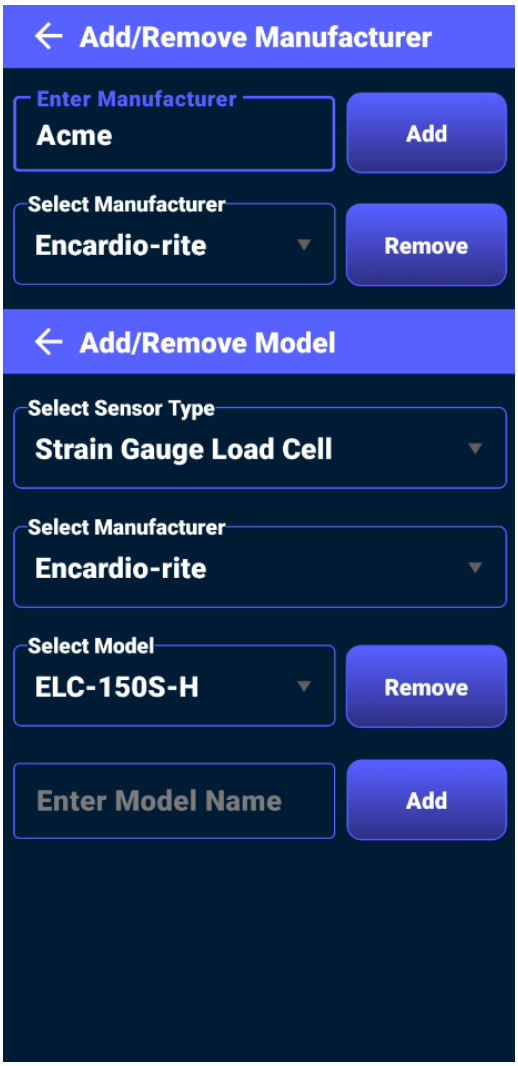


Figure 7-8 Manufacturer and Model Management Screen

8 TAKE READING

Once the Site and Sensor are selected from the Home Screen and the phone is connected with the EDI-55 Indicator, readings can be started by pressing the **Read** button from the Home Screen. Pressing the **Read** button opens the Reading screen as shown in **Fig 8-1**.

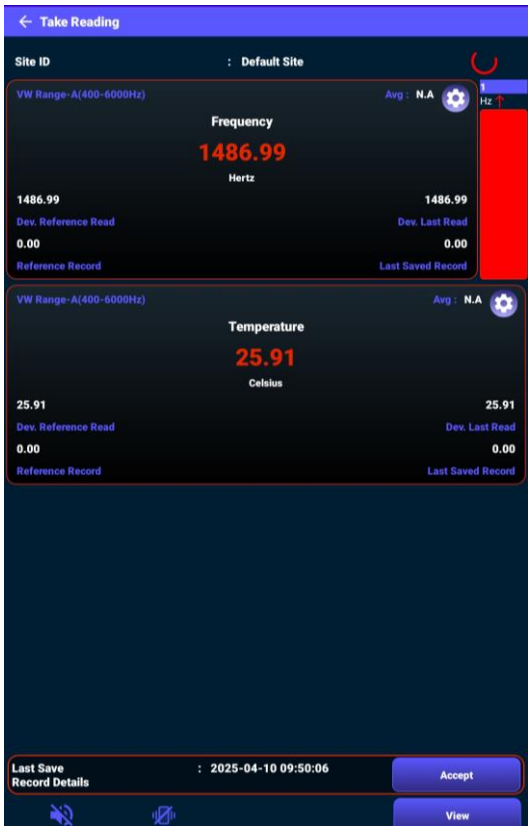


Figure 8-1 Reading Screen

The current readings of the parameter and temperature are displayed on the screen. In case of vibrating wire type sensors, the output in terms of Frequency and Period is also displayed. Deviation from the last saved reading is shown below the current reading. Deviation from the Reference Reading is displayed on the left below the current reading. The last saved record is also displayed, assisting in quick data verification and troubleshooting.

The vertical noise bar on the right side of the screen represents the current noise level detected in the sensor readings. The green label below the noise bar indicates the Noise Bar Limit, calibrated in frequency units. A red arrow appears above the noise bar if the noise exceeds the set limit. Noise stability is important for ensuring accurate readings, and it is recommended to accept readings only when the noise level is within the defined range.

Displayed readings are calculated based on the average of several sample readings. The number of readings used for averaging is shown at the top left side of the screen and can be set from the Reading Options menu. Increasing the number of samples improves accuracy but may slightly slow down the real-time update rate. User can enable and disable vibration and sound notification on this page by simply clicking on the icon once.

In case of Vibrating Wire Sensor noise bar, user can click on the top of the noise bar to select the resolution of noise bar.

Press the **Accept** button to store the current reading into the phone's memory.

8.1 Reading Option Settings

Pressing the **Settings** button from the Reading screen opens the Reading Options menu as shown in **Fig 8-2**.

Figure 8-3 Reading Option Setting Screen

In the Reading Options menu:

- **Reading Average:** Sets the number of samples used to compute the average reading.
- **Parameter Decimal:** Sets the number of decimal places for displaying the parameter.

Reference Reading can also be selected in this screen. The selected reference reading will be used for calculating deviations shown during subsequent readings.

After making the required adjustments, press **Apply** to save the settings or **Cancel** to exit without saving.

9 SYSTEM SETUP

The EDI-55 Datalogger can be configured to take automatic measurements at a specified interval through the **System Setup** screen. To access this, press the **Scan** button on the Home Screen. This will open the System Scan Setup screen as shown in **Fig 9-1**.

In the System Setup screen, the user can set up all necessary configurations for automatic data logging:

- **Indicator ID:** The user can assign a name or ID to the Indicator or Datalogger for easy identification, especially when multiple Indicators are being used. Enter the desired Indicator ID and press the **Send** button to update it.
- **Scan Interval:** The time interval between two consecutive scans can be set under Scan Interval. It can be configured in hours, minutes, and seconds. After entering the desired interval, press the **Update** button to apply the changes. Scan Interval can range from as fast as a few seconds to as long as 7 days (168 hours).
- **Scan Start Time:** The Scan Start Time defines when the automatic scanning should begin. Set the required hours and minutes and press **Update**.
- **Scan Status:** This panel shows the current scan status, including:
    - **No. of Records:** The total number of records stored in the Datalogger's memory since the last memory erase.
    - **Scan Status:** Displays whether the scanning is currently running or stopped.

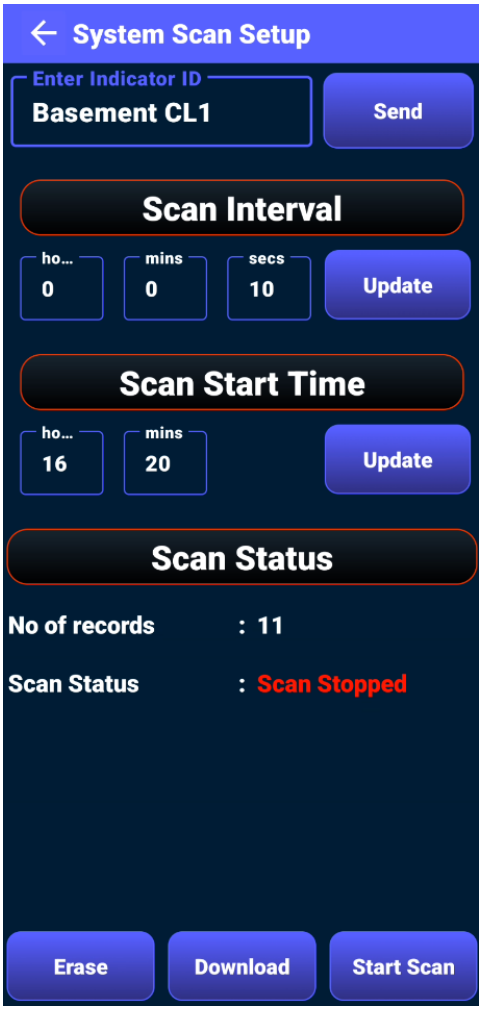


Figure 9-1 System Setup Screen

At the bottom of the screen, several functional buttons are available:

- **Start Scan:** Pressing this button will start the automatic data logging as per the configured interval and start time. Once started, the Scan Status will update to "Scanning" and will display in green.
- **Stop Scan:** During scanning, the **Start Scan** button changes to **Stop Scan**. Pressing it will halt the scanning operation, and the Scan Status will update to "Scan Stopped" in red.
- **Erase:** This button clears all records from the Datalogger's memory. It is recommended to erase memory periodically if the Scan Interval is very short, to prevent memory overflow.
- **Download:** This allows the user to download all stored readings into the phone's memory for further analysis.

Data logging continues to operate cyclically: if the Datalogger memory becomes full, the system will start overwriting the oldest records automatically to ensure continuous operation.

The readings stored are based on an average of multiple sampled readings. The number of readings to average can be set separately through the Reading Options menu accessed during manual reading operation.

10 DOWNLOAD DATA

Readings (data) stored in the Datalogger memory can be downloaded into the smartphone memory through the Download function in the System Setup screen. To initiate the download, press the Download button located at the bottom of the System Scan Setup screen.

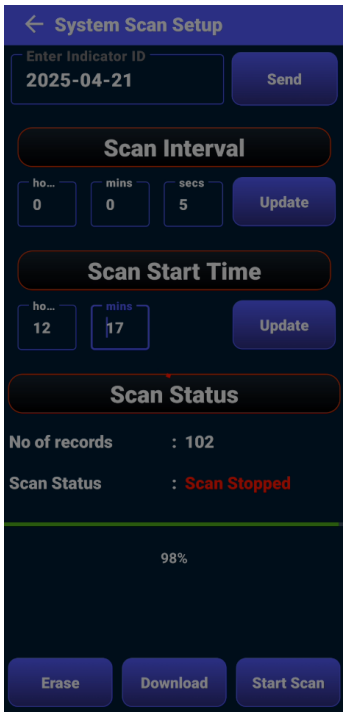
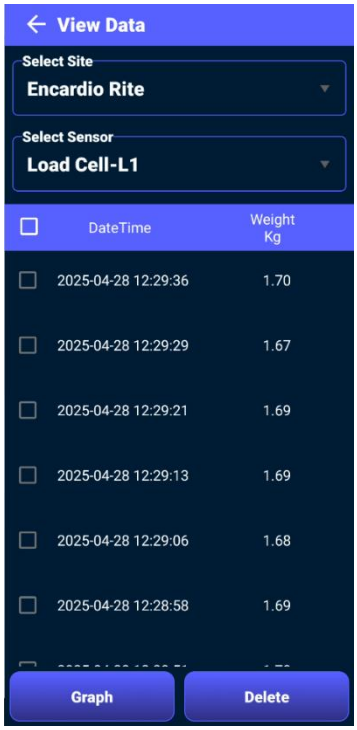


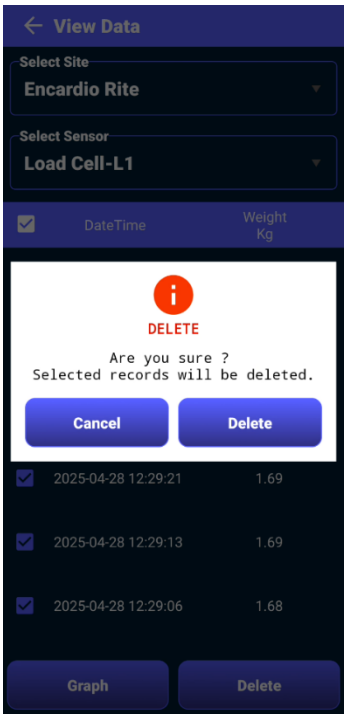
Figure 10-1 Downloading Data

Once the Download button is pressed, the system will start transferring all stored readings. A progress bar will appear, displaying the percentage completion of the download process. The download time depends on the number of records present in the Datalogger memory. For a large number of records, the download may take several minutes. Upon successful download, a confirmation message will pop up indicating the completion.

If the user wishes to clear the Datalogger's memory after downloading the data, they can press the Erase button. When Erase is pressed, the application prompts the user for confirmation. Clicking Yes will erase all stored readings and reset the "No. of Records" to zero. Clicking No will cancel the erase operation. Erasing the memory will not affect any other settings of the Datalogger.

11 VIEWING DATA





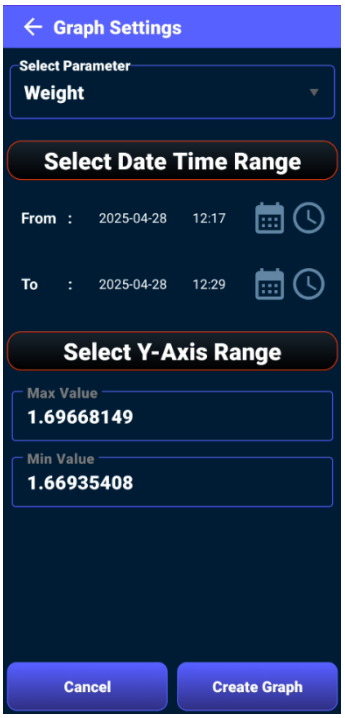


Figure 11-1 View Record **Figure 11-2 Delete Record** **Figure 11-3 Graph Options**

Reading logs can be viewed using the **View Data** option. To access it, select the desired Site and Sensor from the Home Screen and press the **View** button. This will open the View Data screen as shown in **Fig 11-1**.

The View Data screen presents stored readings in a tabular format. Each row displays the Date and Time of the reading along with the measured parameter value. To view data for a specific Site and Sensor, select them from the respective dropdown menus at the top of the screen.

11.1 Viewing Data in Table

The readings are displayed in a table organized by DateTime and Parameter Value. This provides a quick overview of all recorded sensor data. If required, specific readings can be selected by ticking the checkbox next to each entry.

If a reading needs to be deleted, select the desired entries and press the **Delete** button. A confirmation dialog will appear, as shown in **Fig 11-2**. Press **Delete** to permanently remove the selected readings or **Cancel** to abort.

11.2 Viewing Data on Graph

To plot data on a graph, press the **Graph** button from the View Data screen. This will open the Graph Settings screen as shown in **Fig 11-3**.
In the Graph Settings screen:

- Select the parameter to be plotted from the **Select Parameter** dropdown.
- Choose the date and time range for the data to be graphed by setting the **From** and **To** fields.
- Optionally, set the Y-Axis range manually by specifying the maximum and minimum values.

After selecting the desired options, press the **Create Graph** button to plot the data.

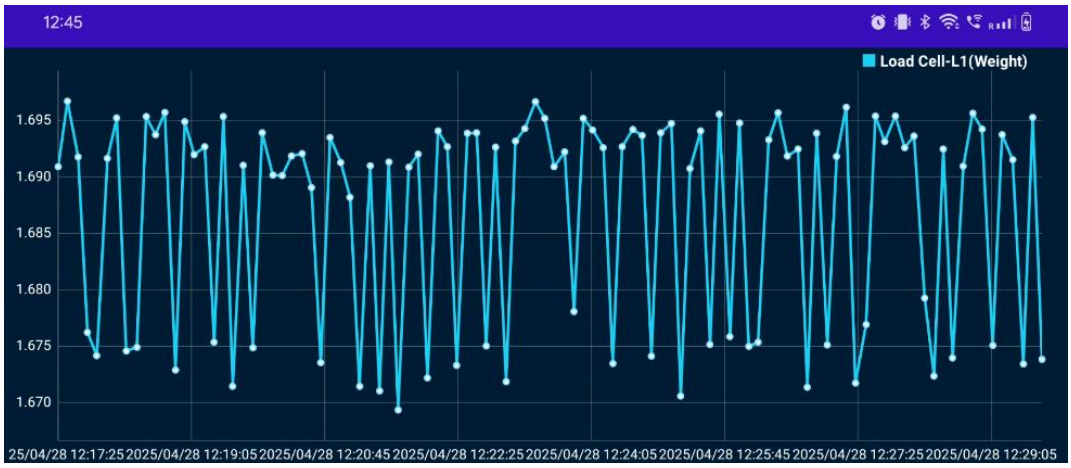


Figure 11-4 Graph View

On the graph screen, users can zoom in, zoom out, and pan the graph using the buttons provided at the bottom. Additionally, since the phone has a touch screen, users can also pinch to zoom and swipe to move the graph using their fingertips for easy navigation and detailed analysis.

12 DATABASE MANAGER

Stored records can be extracted and managed using the **Database Manager**. To access the Database Manager, press the **Database** button from the Side Menu. This will open the Database Manager screen as shown in **Fig 12-1**.

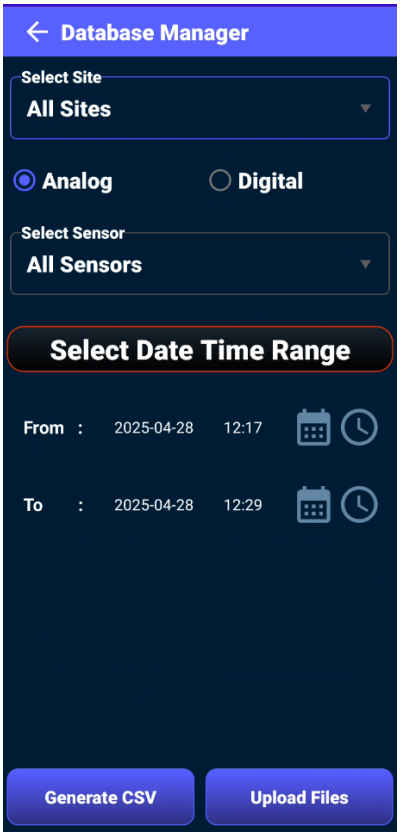


Figure 12-1 Database Manager Screen

In the Database Manager:

- Select the desired Site and Sensor from the dropdown menus. Optionally, "All Sites" and "All Sensors" can be selected to include complete records.
- Choose whether to view Analog or Digital sensor records.
- Select the desired **Date and Time Range** by setting the From and To fields.

After setting the filter criteria, two main actions are available:

- **Generate CSV:** Pressing this button extracts the selected records from the phone's database and generates a CSV file containing the filtered readings.
- **Upload Files:** This option uploads the generated CSV files to a configured FTP server or remote storage as per user setup.

The Database Manager enables quick filtering and extraction of large datasets across multiple Sites and Sensors for reporting or archival purposes.

12.1 Sensor Files Storage

The generated CSV files are stored in the smartphone's internal memory or SD card under the following path:

/Internal Storage/Documents/Csv

Use the phone's File Manager application to explore the memory. Navigate to the specified path to access all exported sensor data files.

Figure 12-2 Data File Storage Path

All generated files are organized under this folder, allowing users to easily transfer, back up, or further process the data externally.

13 DATA FILE FORMAT

The Sensor data files generated through the Database Manager for transferring readings to other software platforms follow a standardized format. All data is stored as ASCII text (7-bit). Variables are separated using commas (,), making them directly compatible with spreadsheet software like Microsoft Excel™.

Text fields are enclosed within double quotes ("") while numeric fields are written directly. Numeric values may have a leading plus (+) sign, but negative values always have an explicit minus (-) sign.

An example data structure is shown below:

"Site Name","Model ID","Sensor Name","Serial Number","Date/Time","Measured Parameter"

"Encardio Rite","ELC-30S","Load Cell-L1","123456","2025-04-28 12:17:25",1.69

"Encardio Rite","ELC-30S","Load Cell-L1","123456","2025-04-28 12:17:32",1.70

"Encardio Rite","ELC-30S","Load Cell-L1","123456","2025-04-28 12:17:40",1.69

...
Each record is stored on a new line and terminated with a carriage return and line feed (CR+LF) character sequence.

The standard format includes:

- **Site Name:** Name of the site where the sensor is located.
- **Model ID:** Model identifier for the sensor.
- **Sensor Name:** Specific sensor label.
- **Serial Number:** Unique ID of the sensor.
- **Date/Time:** Timestamp of the reading.
- **Measured Parameter:** Actual reading recorded.

This file format ensures smooth import into any spreadsheet or database software for reporting and graphical analysis.

Special Notes
If a temperature sensor is absent in the hardware setup, a default value (e.g., -99°C) may be recorded under the temperature column to maintain the format's integrity. This helps prevent errors during automatic file import processes. In practice, users can configure external software to ignore -99°C as an invalid or missing reading.

This CSV format is compatible with Encardio-rite's web-based data monitoring software (WDMS) and other third-party platforms requiring organized, tabular sensor data.

14 DATABASE IMPORT/EXPORT

The EDI-55 application provides an easy way to back up and restore the database using the Import/Export feature. This helps users safeguard their site, sensor, and reading data, or migrate it to another device.

Accessing the Import/Export Page

To open the Import/Export page, press the **Database** button from the Side Menu. This brings up the screen as shown in **Fig 14-1**.

Figure 14-1 Import/Export Page

When accessing the Database Manager for the first time, the application will request permission to access the device storage.

- Press **OK** to open the mobile settings page and grant file access permission.
- Press **Cancel** to deny permission.

Without granting permission, database import/export operations will not work.

Exporting the Database

- In the Enter File Name field, input a desired name for the exported database file. The file name can be up to 40 characters long.
- Press the Export button to save the current database.
- The exported database file (.db) will be stored in the designated folder on the phone's memory.
- This exported file can be used later for restoring the database or transferring it to a different device.

Importing the Database

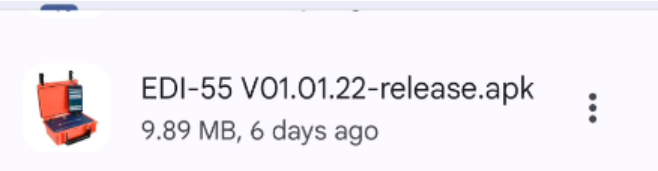
- To import a previously saved database, press inside the Choose File Path field.
- Navigate and select the desired .db file from the phone's storage.
- Press the **Import** button to load the selected database into the application.

After successful import, the application will refresh its internal database with the newly imported data.

This functionality ensures that users can maintain backups, restore configurations, or deploy a standardized database across multiple devices with minimal effort.

15 INSTALLING AND UNINSTALLING THE APP

The EDI-55 application can be installed and uninstalled on Android smartphones that meet the system requirements specified earlier. Devices running Android version 12 or above are fully supported.



15.1 Installing the Application

To install the EDI-55 application, first transfer the APK file (EDI-55_vxx.apk) provided by Encardio Rite to the smartphone. This can be done by connecting the smartphone to a Desktop PC or Laptop via USB cable and copying the file to internal storage or an SD card. Alternatively, the APK file can be shared through email or a secured download link.

Once the file is available on the smartphone, locate it using the File Manager and tap on it to start the installation. If prompted, the user must enable permissions to install apps from "Unknown Sources." On Android 12 and above, permission must be granted specifically for the File Manager app when installing third-party APKs. After granting permission, the installation wizard will guide the user to complete the installation. Press **Install**, and once completed, select **Done** or **Open** to launch the application.

It is recommended to always use the latest version of the application provided by Encardio Rite for optimal performance.

15.2 Uninstalling the Application

Before installing a new version or if the app becomes corrupted, it is advisable to uninstall the existing EDI-55 application. To do so, open **Settings** on the smartphone, navigate to **Apps** > **Manage Apps**, and locate the EDI-55 application. Tap on it, then go to **Storage** and press **Clear Data** to remove any existing configuration or sensor data.

After clearing the data, return to the app info screen and press **Uninstall**. Confirm the action when prompted. The application will then be removed completely from the smartphone, allowing the user to install a fresh copy if needed.

Important: Always back up your sensor databases by using the Database Export feature before uninstalling to prevent any data loss.

16 PUSH BUTTON AND STATUS LED INDICATOR

The EDI-55 Indicator is equipped with a Push Button and a Status LED Indicator designed to help users easily understand the device's operating state without needing to check the mobile app.

Push Button Function

The push button on the panel controls the Bluetooth Modem's power state. Pressing the push button once will toggle the modem between ON and OFF.

Additionally, if the Bluetooth connection remains idle (i.e., not connected to the phone) for more than 2minutes, the modem automatically turns OFF to save battery.

LED Indicator System

The LED Indicator provides real-time visual feedback about the system's status through different blink patterns. A built-in system intelligently manages the LED's ON/OFF timing based on what the device is doing.

How the LED Blink Patterns Work

Each blink pattern has three parts:

- ON Time: How long the LED stays ON
- Short OFF Time: Small delay between multiple short blinks
- Long OFF Time: Longer delay before repeating the pattern

By adjusting these timings, users can easily recognize different statuses.

State	Pattern Type	User Meaning
BLE Searching	Short ON, Short OFF	Device is ready and searching for a phone
BLE Connected	Short ON, Long OFF	Bluetooth is connected and active
Scan Started	Long ON, Long OFF	Device is scanning sensors
Read Started	Medium ON, Medium OFF	Reading data from the sensor(s)
Battery Charging	Short ON, Long OFF (Pulse)	Battery is charging
Battery Very Low	Triple Short ON, Long OFF	Battery is critically low - needs charging
Error	Continuous ON	fault detected (contact support)

What you will see

- **Quick, repeating blinks:** Device is actively searching for a Bluetooth connection.
- **Slow, occasional blinks**: Device is connected and ready.
- **Steady ON for longer time:** Device is performing a sensor scan.
- **Regular pulse:** Device is charging.
- **Rapid triple blinks:** Battery is very low and needs charging urgently.
- **Solid ON (no blinking):** — please contact technical support.

These indicators make it easy for users and technicians to quickly understand the device's behaviour without guessing.

17 TROUBLESHOOTING

This section provides quick troubleshooting steps for common problems that may occur while operating the EDI-55 system.

17.1 Unable to Connect via Bluetooth

If the smartphone is unable to connect to the EDI-55 Indicator over Bluetooth, check the following:

- Ensure that the phone's Bluetooth is turned ON.
- Make sure the EDI-55 Indicator is powered ON.
- Confirm that the Indicator is within Bluetooth communication range.
- Verify that the Indicator is already paired with the phone. If not, pair it first.
- Check if the Indicator's battery is sufficiently charged.
- If connection issues persist, unpair the Indicator from the phone, re-pair it, and then attempt connection again.

17.2 Unable to Connect to the Sensor

If the EDI-55 is unable to communicate with the sensor:

- Check that the sensor connector is properly plugged in.
- Inspect the sensor connector for any visible damage.
- Examine the Indicator's cable for cuts, breaks, or loose connections.
- Ensure that the Indicator's battery is charged.

18 ENVIRONMENTAL RESPONSIBILITY DECLARATION

Encardio Rite Group ("**Encardio**") is committed to ensuring full compliance with environmental responsibilities under all applicable Indian environmental statutes, collectively referred to herein as the **"Law(s)"**. This declaration is applicable to all products manufactured and marketed by Encardio.

1. **Scope:** This declaration binds and guides every stakeholder involved in the product's lifecycle including individuals, institutions, organizations, or entities hereinafter referred to collectively as the **"User(s)"**.
2. **Waste Segregation and Handling:** All Users are required to manage the product and any waste generated from its use in accordance with the law, including proper segregation of waste at the source into biodegradable, recyclable, and hazardous categories; authorized disposal of all end-of-life products, electronic components, batteries, and packaging materials only through government-authorized collection, recycling, or refurbishing systems; and ensuring that products bearing the crossed-out wheeled bin symbol are not mixed with general household or municipal waste streams.
3. **E-Waste Disposal and Battery Waste Management:** All electronic and electrical equipment and components manufactured or sold by Encardio must be disposed of only through authorized recycling or refurbishing facilities as per applicable law, ensuring no harm to human health or the environment; users shall ensure that all used items are returned to designated collection points and shall also maintain proper documentation and adhere to return, reporting, or record-keeping obligations; products nearing end-of-life must not be discarded along with general household waste, as improper disposal of e-waste may lead to toxic chemical release and pollution.
4. **Plastic Waste Management:** Users must not discard plastic components or packaging into unsorted municipal waste; instead, they should separate and hand over such plastic waste to authorized waste processors and ensure that no banned plastic items, as notified under law, are used or circulated.
5. **Industrial and Hazardous Waste:** If the User operates any facility where industrial, hazardous, or biomedical waste may arise due to the installation, maintenance, or testing of the product, all necessary consents and permits must be obtained and renewed from competent authorities; adequate protective measures must be taken to ensure no harm is caused to the environment or human health; and such waste must be stored, treated, and disposed of in accordance with the law.
6. **Pollution Control:** Users operating manufacturing, repair, or testing premises must not emit air or water pollutants beyond prescribed limits, must operate only after securing applicable consents under the law, and must maintain environmental records and submit reports as required
7. **Record Keeping and Reporting:** All Users associated with Encardio must maintain comprehensive records of production, sales, collection, and disposal in accordance with applicable Law(s) and submit timely reports to regulatory authorities.
8. **Contact and Support:** Encardio urges all Users to act responsibly and support sustainable environmental practices by adhering to this declaration and the Law. For safe disposal and further compliance assistance, Users are encouraged to contact their local municipal waste authorities, or authorized recyclers. Non-compliance with the above obligations may constitute a violation of Indian environmental laws and attract penalties under the relevant Law(s). Users can contact Encardio at:

Contact Number: +91 522 2661039-42

Website**:** https://www.encardio.com/

19 WARRANTY

The Company warrants its products against defective workmanship or material for a period of 12 months from date of receipt or 13 months from date of dispatch from the factory, whichever is earlier. The warranty is however void in case the product shows evidence of being tampered with or shows evidence of damage due to excessive heat, moisture, corrosion, vibration or improper use, application, specifications or other operating conditions not in control of Encardio-Rite. The warranty is limited to free repair/replacement of the product/parts with manufacturing defects only and does not cover products/parts worn out due to normal wear and tear or damaged due to mishandling or improper installation. This includes fuses and batteries

If any of the products does not function or functions improperly, it should be returned freight prepaid to the factory for our evaluation. In case it is found defective, it will be replaced/repaired free of cost.

A range of technical/scientific instruments are manufactured by Encardio-rite, the improper use of which is potentially dangerous. Only qualified personnel should install or use the instruments. Installation personnel must have a background of good installation practices as intricacies involved in installation are such that even if a single essential but apparently minor requirement is ignored or overlooked, the most reliable of instruments will be rendered useless.

The warranty is limited to as stated herein. Encardio Rite is not responsible for any consequential damages experienced by the user. There are no other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and of fitness for a particular purpose. Encardio Rite is not responsible for any direct, indirect, incidental, special or consequential damage or loss caused to other equipment or people that the purchaser may experience as a result of installation or use of the product. The buyer's sole remedy for any breach of this agreement or any warranty by Encardio Rite shall not exceed the purchase price paid by the purchaser to Encardio Rite. Under no circumstances will Encardio Rite reimburse the claimant for loss incurred in removing and/or reinstalling equipment.

A lot of effort has been made and precaution for accuracy taken in preparing instruction manuals and software. However best of instruction manuals and software cannot provide for each and every condition in field that may affect performance of the product. Encardio Rite neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damage or loss that results from use of Encardio Rite products in accordance with the information contained in the manuals or software.

Products described in Encardio Rite's catalogs are subject to modification and improvement as dictated by subsequent developments. Encardio Rite reserves the right to modify, change or improve products, to discontinue them or to add new ones without notice.