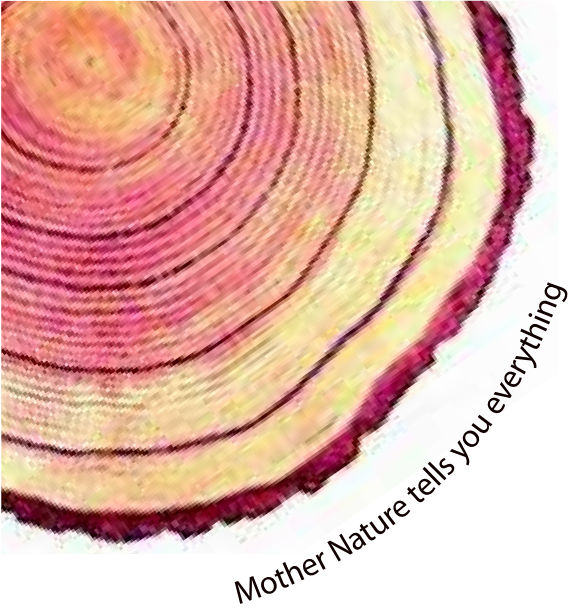

OPERATING MANUAL

LmNet Pro

LmNet Pro
Networked Data Logger
Model No.: 614-00

g-tek
better by performance

Manufacturers of :
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English/ 2025/ Rev.0.1

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3 INTRODUCTION

This manual is written to help the user to familiarize with the installation and operation of the LmNet. LmNet is designed for reliable and convenient recording of process parameters in production, Research and Quality control applications. This LmNet is capable of monitoring RTC, Temperature, 4 channels outputs at the scan rate of 1 second for each channel.

3.1 MANUAL LAYOUT

This manual is divided into several sections for quick and easy reference.

Table 1 Manual Layout

Section 1 Introduction	This gives outline of the manual, brief description about the LmNet, Optional features available and how to unpack it.
Section 2 Installation	This section gives the details of the led display and Electrical installation.
Section 3 Operation	This section gives the details of the front panel display and keyboard.
Section 4 LmNet Configuration	This section gives the details of various parameter that user can set using keyboard for proper monitoring requirement.
Section 5 Calibration	This section describes the calibration procedure for the LmNet.
Section 6 Troubleshooting Guide	This section describes about the most frequently asked questions and their solutions about LmNet.
Section 7 Parameter Setting	This section describes the method of setting various parameters/programming(configuartion) sequence.
Section 8 Accessories	This section describes the standard accessories for the LmNet.
Section 9 Specification	It describes the detailed specification of the LmNet.
Section 10 Ordering Code	It describes the details of order code and comparing it with the code on the LmNet, user can find out the installed options.

*Features and capabilities may vary depending upon the product purchased.

3.2 LMNET DESCRIPTION

- The LmNet comes with on board Temperature, 4 input channel, LAN port with 2 Inch bright led display as on customer color requirement. This led display allows user to continuously monitor the current reading with good readability and setting of configurations. This LmNet also has 5 multipurpose keys which enables user to easy programming/configure the unit. For the convenience of the user and to make it cost effective, universal inputs and re-transmission output are made as an optional feature.

3.3 Optional Features

Following optional features are available for this LmNet.

- Universal Input
- Re-Transmission Output
- Relay for Buzzer
- Internal Buzzer

It is possible that the LmNet you received may or may not be fitted with the optional features. Please refer to the product code to know about installed options in your LmNet

3.4 Unpacking and inspection of LmNet

G-Tek LmNet are dispatched in a recyclable, environment friendly package specially designed to give adequate protection during transit. If the outer box shows sign of damage, it should be opened immediately and the LmNet be examined. If there is evidence of damage, the instrument should not be operated, and the local representative contacted for instructions. Ensure that all accessories and documentation is removed from the box. If the LmNet is for immediate use, you can start installing it now as per following instructions. **Please preserve the original packing along with all internal packing for future transport requirements.**

Figure 1 Front View of LmNet

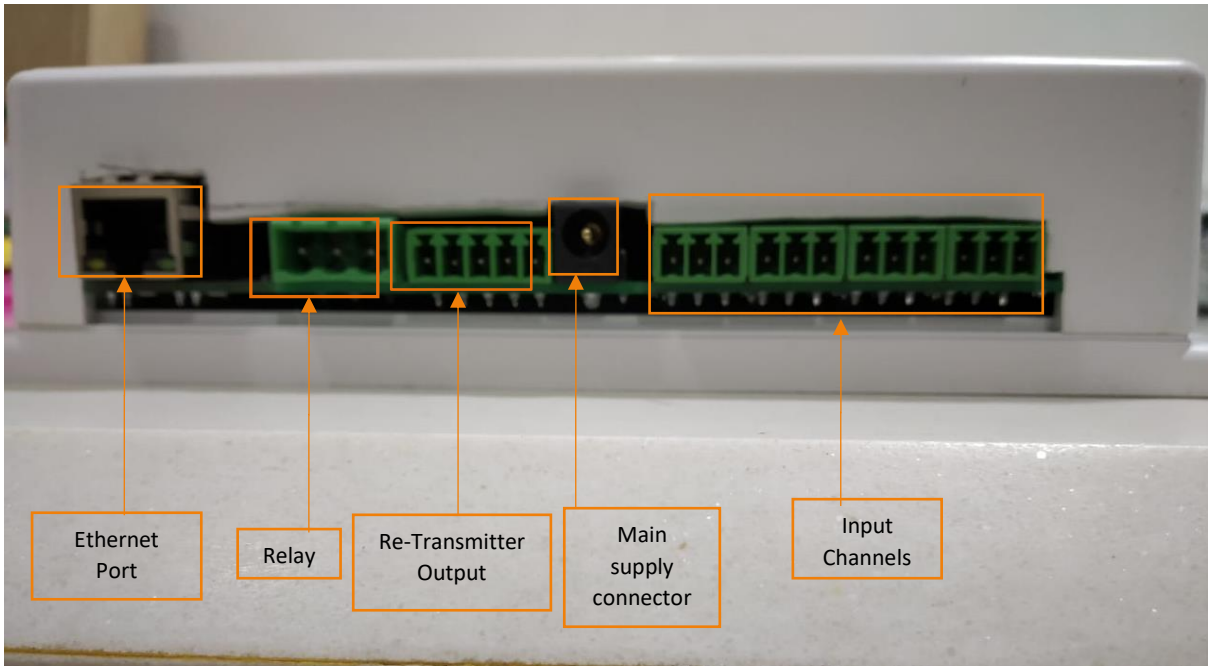


Figure 2 Bottom View of LmNet

4 INSTALLATION

For the installation just connect the LmNet with 15V-30V DC Input adaptor as shown in figure below. Connect LmNet with LAN cable to connect it with PC for communication using TCP/IP.

Figure 3 LmNet

Figure 4 Adaptor

Figure 5 LAN Cable and Ethernet Port

Figure 6 LmNet connection with Adaptor and LAN Cable

5 ELECTRICAL INSTALLATION

5.1 GENERAL INFORMATION

Warnings

To comply with Underwriter Laboratories (UL) and Canadian Standards Association (CSA) certification, route signal leads and power cables in earthed (grounded), flexible metal conduit. Connect proper Earth to the Earthing terminal of the LmNet.

- Instruments not fitted with the optional internal on/off switch and fuse must have a disconnecting device such as a switch or circuit breaker conforming to local safety standards fitted to the final installation. It must be fitted near the instrument within easy reach of the operator and must be marked clearly as the disconnection device for the instrument.
- Remove all power from supply, relay and any powered control circuits and high common mode voltages before accessing or making any connections.
- Use cable appropriate for the load currents. The terminals accept cables up to 14AWG (2.5mm1).
- The instrument and all inputs and outputs conform to Mains Power Input Insulation Category ll.
- All connections to secondary circuits must have basic insulation.
- After installation, there must be no access to live parts e.g., terminals.
- Terminals for external circuits are for use only with equipment with no accessible live parts.
- If the instrument is used in a manner not specified by the Company, the protection provided by the equipment may be impaired.
- All equipment connected to the instrument's terminals must comply with local safety standards (IEC 60950, EN601010-1).

NOTE:
To ensure maximum LmNet performance, proper wiring installation practices must be followed. Failure to do so can result in a range of problems, from loss of configuration to component failure, caused by transmitted or radiated electrical noise. Proper consideration must be given to local noise sources and appropriate suppression steps taken to minimize any potential problems. Among the most common sources of noise are: Relays, SCRs, valve solenoids, electric motors, power line disturbance, wire-to-wire coupling, electrostatic discharge (ESD) and radio-frequency interference (RFI).

To achieve the best results, the following notes should be considered:

1. Low level signal wiring such as that associated with thermocouples, RTDs and current loops should always be kept separate from power and control output wiring.

2. Signal input wiring should be twisted pairs/triplets etc. The conductors should be stranded rather than solid in construction. All signal wiring should use ground-shielded wires or be routed through grounded conduit to minimize the effects of RFI and ESD.

3. Special care should be taken when wiring to relay or solenoid coils, as large transients are produced when coils (or any other inductive loads like motors or arc welding equipment's etc.) are switched. This problem can be eliminated using suitable suppression devices across the coil. Coil transients can also be transmitted through the air, so the recorder itself should be mounted as far as possible from power control devices and/or wiring.

4. When line power is poorly regulated and / or subject to voltage surges or transients, consideration should be given to the use of a line conditioning/transient suppressing line power regulator. Process control motors, valves, relays, and heaters should not be connected to the same power lines that are used for instrumentation.

5. The connection of the LmNet to a proper safety earth ground is essential. Such a connection not only reduces the possibility of electric shock, but also provides the required return for the LmNet line power filters.

6. All local electrical codes of practice must be followed when installing any instrumentation.

Check for proper Earthing:

Proper Earthing is necessary for best performance of the LmNet. Follow the steps mentioned below to check whether the earthing given to the LmNet is proper or not:

- Find out the Phase line of connection with the help of "Tester with Neon Lamp." When Neon Lamp glows, it is an indication of the phase line.
- Once Phase is found, the other hole which is in line of phase is the Neutral line.
- The third hole which is apparently bigger in diameter is the Earthing line.
- Now take the voltmeter with appropriate measurement range (normally 750VAC or higher) and put the probes into PHASE and NEUTRAL line and take reading.
- The voltage across PHASE and EARTH, and NEUTRAL and EARTH.
- The voltage between Neutral and Earth Should not be more than 6V. If by any chance it is more than 30V, it is a serious fault on earth line. And must immediately be corrected.

Proper Earthing is essential for safety of the personnel and for the proper functioning of the equipment.

Note: If connecting the instrument in the panel, panel and LmNet both should be at the same earthing potential.

5.1.1 Wiring Diagram for LmNet

See the bottom panel of the LmNet, you will find all the connectors for wiring. As shown in the following figure.

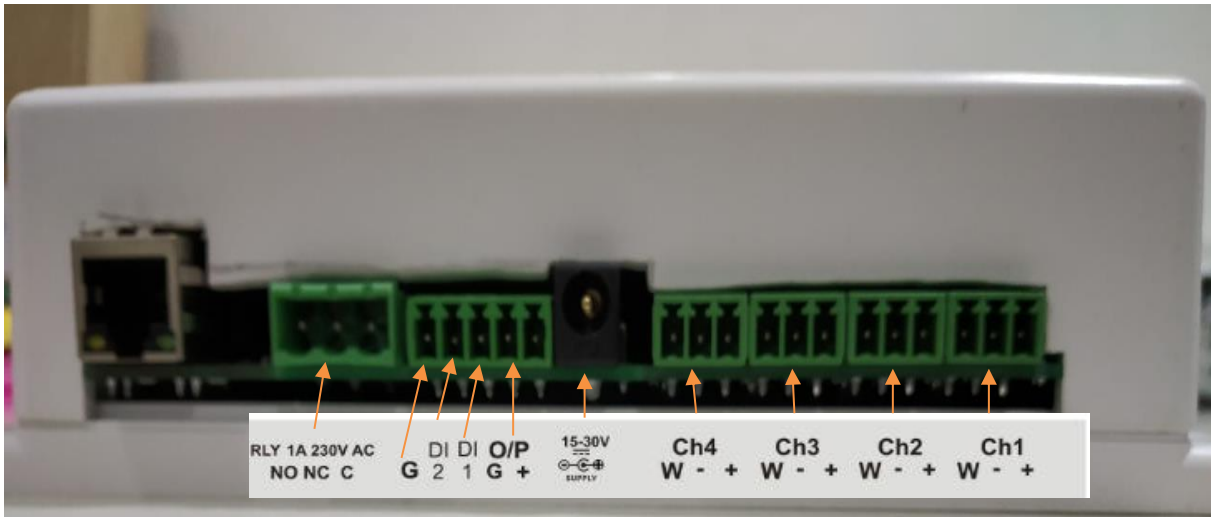


Figure 7 Wiring diagram for LmNet

5.1.2 Mains Supply Connection

The connection for Mains supply is shown in figure 8. As per figure one end of the adaptor connected to mains connector. Ensure that the end of adaptor is fully inserted into the mains connector and no loose/poor connection.

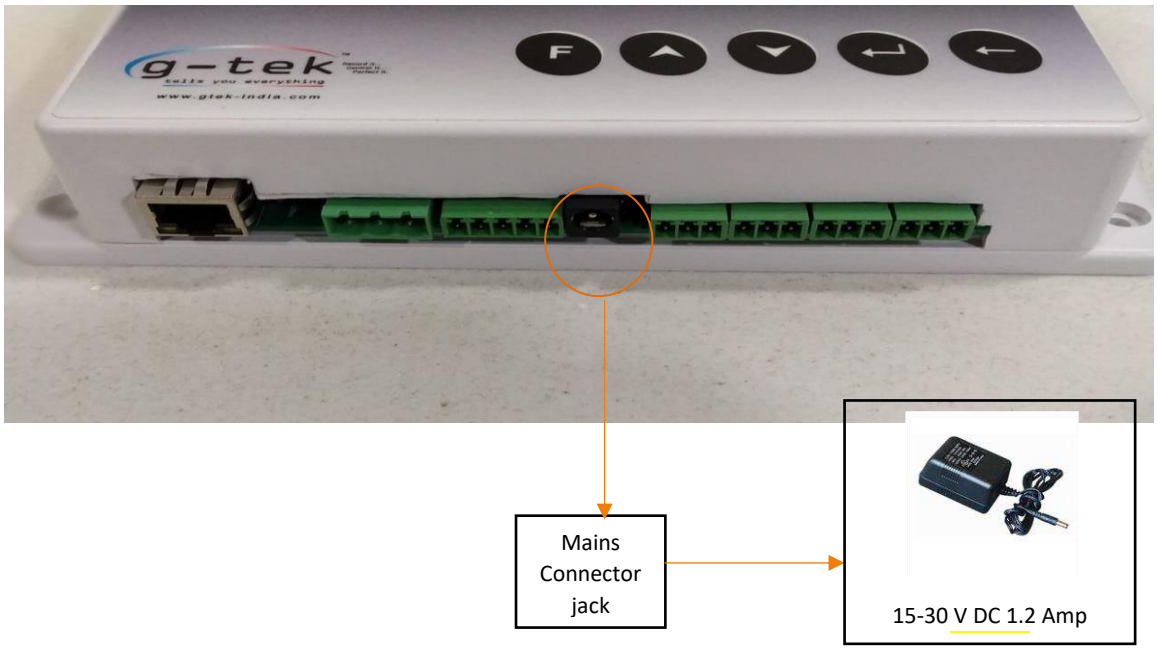


Figure 8 Main Supply Connection

5.1.3 Sensor Wiring

To ensure maximum LmNet performance, proper wiring installation practices must be followed. Failure to do so can result in a range of problems, from loss of configuration to component failure, caused by transmitted or radiated electrical noise. Proper consideration must be given to local noise sources and appropriate suppression steps taken to minimize any potential problems.

Among the most common sources of noise are: Relays, SCRs, valve solenoids, electric motors, power line disturbance, wire-to-wire coupling, electrostatic discharge (ESD) and radio-frequency interference (RFI).

1. To achieve the best results, the following notes should be considered: Low level signal wiring such as that associated with thermocouples, RTDs and current loops should always be kept separate from power and control output wiring.

2. Signal input wiring should be twisted pairs/triplets etc. and the conductors should be stranded rather than solid in construction. All signal wiring should use ground-shielded wires or be routed through grounded conduit. This minimizes the effects of RFI and ESD.

3. Special care should be taken when wiring to relay or solenoid coils, as large transients are produced when coils (or any other inductive devices) are switched. This problem can be eliminated using suitable suppression devices across the coil. Coil transients can also be transmitted through the air, so the recorder itself should be mounted as far as possible from power control devices and/or wiring.

4. When line power is poorly regulated and / or subject to voltage surges or transients, consideration should be given to the use of a line conditioning/transient suppressing line power regulator. Process control motors, valves, relays, and heaters should not be connected to the same power lines that are used for instrumentation.

5. The connection of the LmNet to a proper safety earth ground is essential. Such a connection not only reduces the possibility of electric shock, but also provides the required return for the LmNet line power filters.

6. All local electrical codes of practice must be followed when installing any instrumentation. For sensor wiring, all the sensor connectors are at the back side of the LmNet as shown in figure 9.

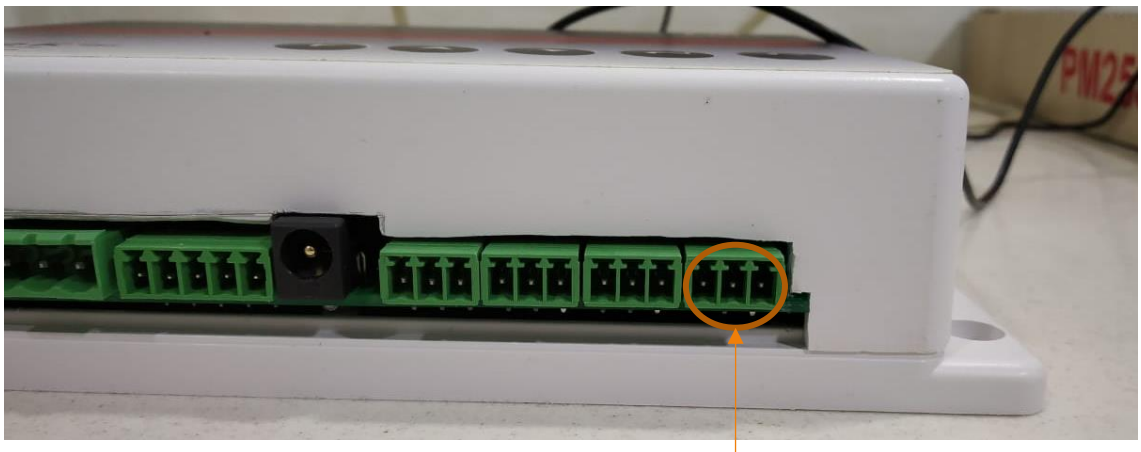


Figure 9 Sensor Wiring

The LmNet can be connected and configured to operate with a variety of signal sources as thermocouple, RTDs, dc current, dc voltage etc. The sensor wiring for different sensors is shown as under:

5.1.4 Sensor Wiring – RTD 3 wire input

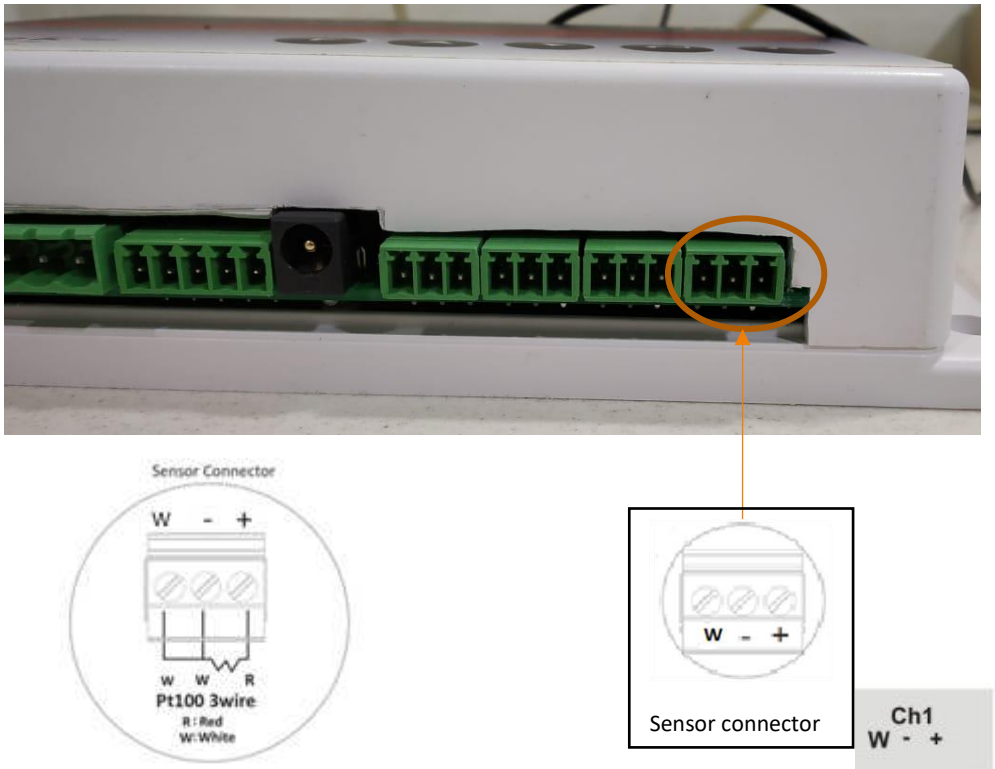


Figure 10 Sensor Wiring - RTD 3 Wire input

The connection for 3-wire RTD sensor is shown in figure-10. Normally RTD sensor with 3 wires has two similar color wire and other one different color. connect two similar color wires at '-' and 'W'.

Connect the remaining dissimilar color wire at'+'. Similarly connect for all other channels.

5.1.5 Sensor Wiring - RTD 2 wire input

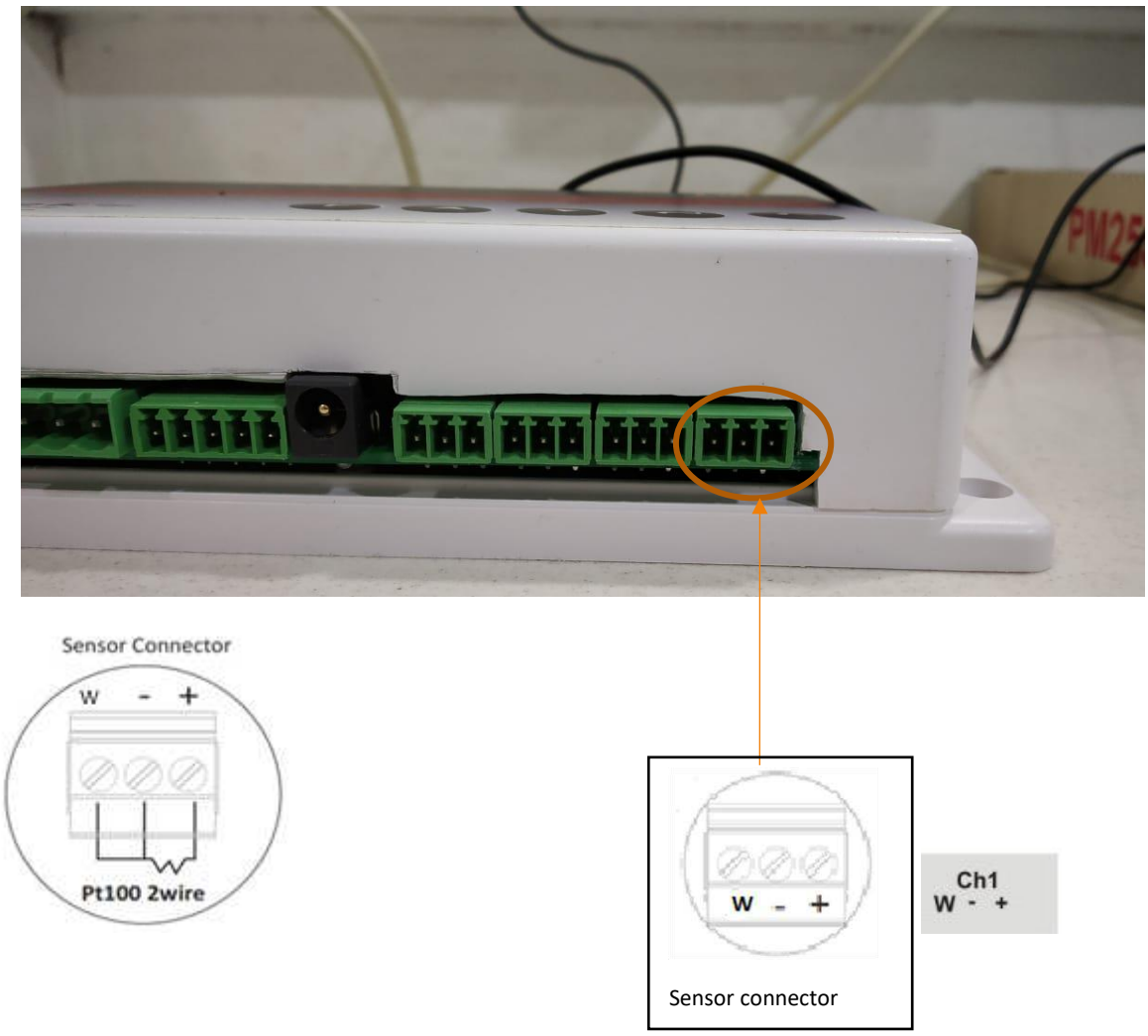


Figure 11 Sensor Wiring - RTD 2 Wire Input

For 2 wire RTD sensor connect 2-wires of the sensor at '+' &'-' and put an external short link between '-' and 'W' as shown in figure-11. Similarly connect for all other channels.

Notes:

1. When wiring RTDs, lead length and diameter must be chosen such that lead length are equal and that each lead exhibits no more than 10 Ohms resistance between the LmNet and the RTD.
2. For Input connections, high quality, low resistance contacts must be used which are suitable for dry operations.

5.1.6 Sensor Wiring – Thermocouple Input

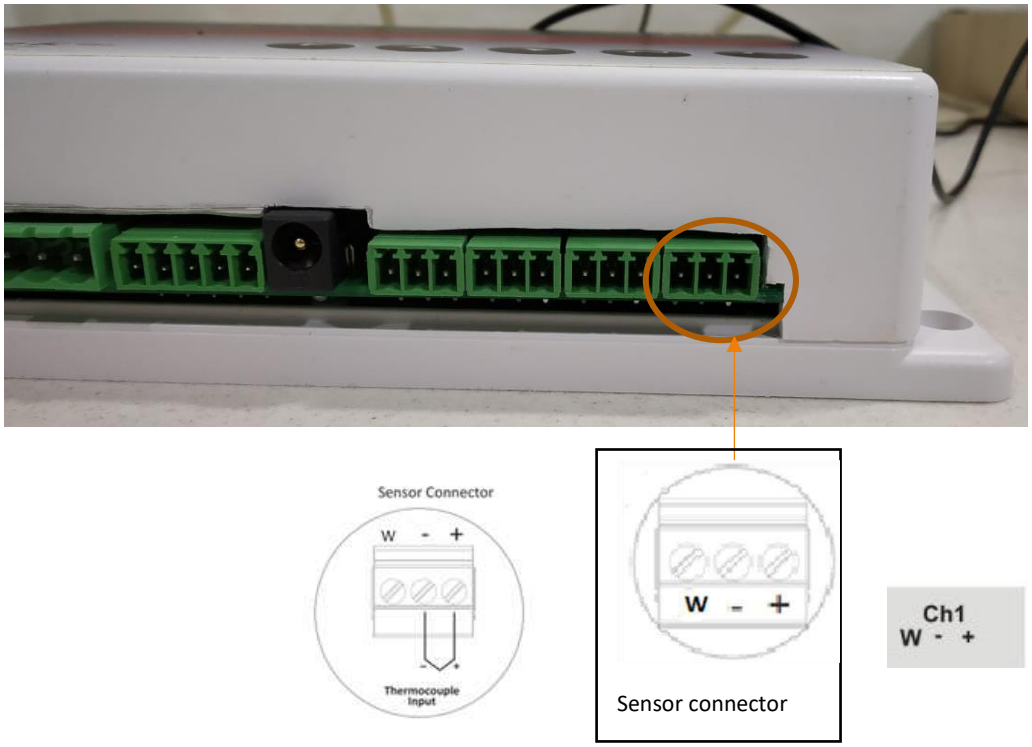


Figure 12 Sensor Wiring - Thermocouple Input

Connect the 2-wires of Thermocouple sensor at'+' &'-' of sensor connector as shown in figure-12.

5.1.7 Sensor Wiring – mVolt Input

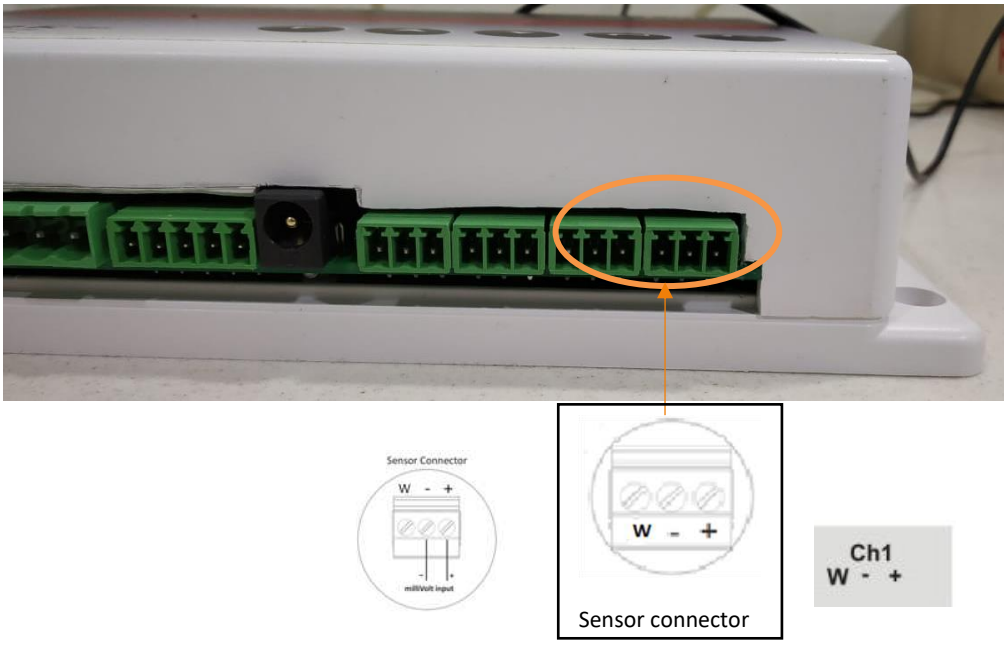


Figure 13 Sensor Wiring – m Volt Input

The Sensor connection for mV input is shown in figure-14. Connect the'+' and '- 'of the sensor to '+' and '-' respectively of sensor connector as shown in Figure-13. Similarly connect for all other channels.

5.1.8 Sensor Wiring - 4-20 mAmp / 0-20 mAmp Input

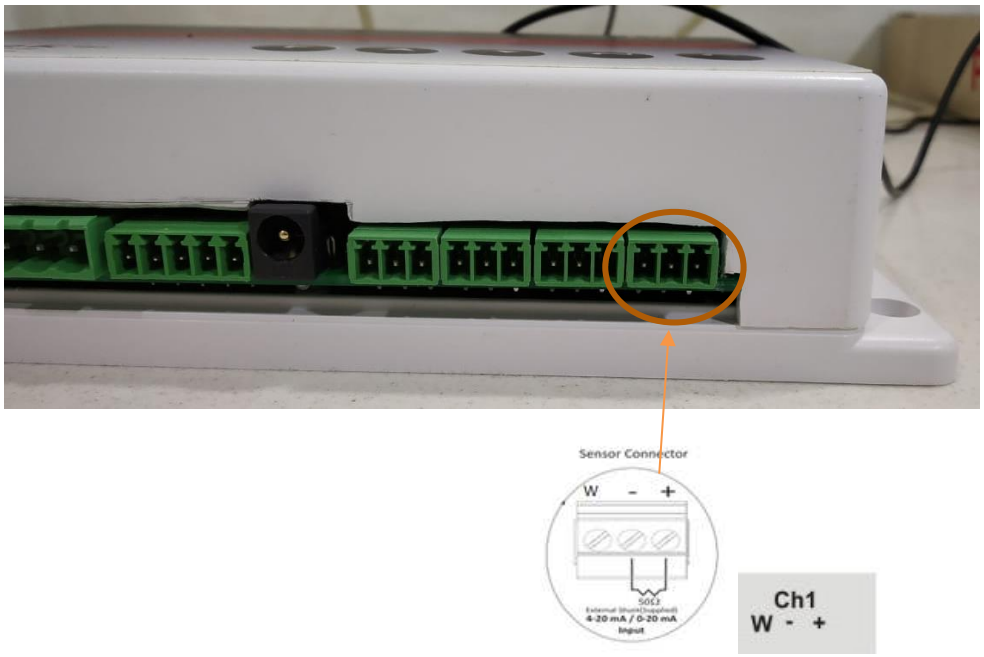


Figure 14 Sensor Wiring 4-20 mAmp. / 0-20 mAmp. Input

5.1.9 Re-Transmitter

Re-Transmitter output Op1 gives +15 Volt Connecting LmNet and other instrument in series with Transmitter and External Power Supply as per figure 15.

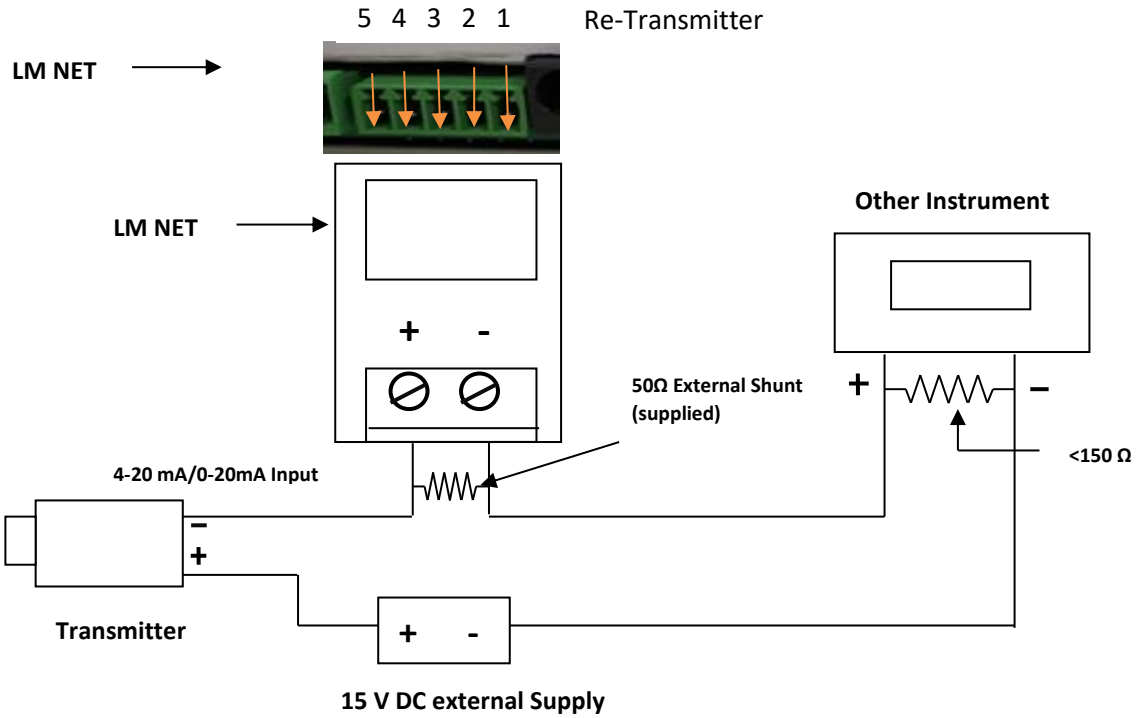


Figure 15 Connecting LmNet and other instrument with transmitter and External Power Supply

Connecting LmNet with Transmitter and Internal Power Supply: -

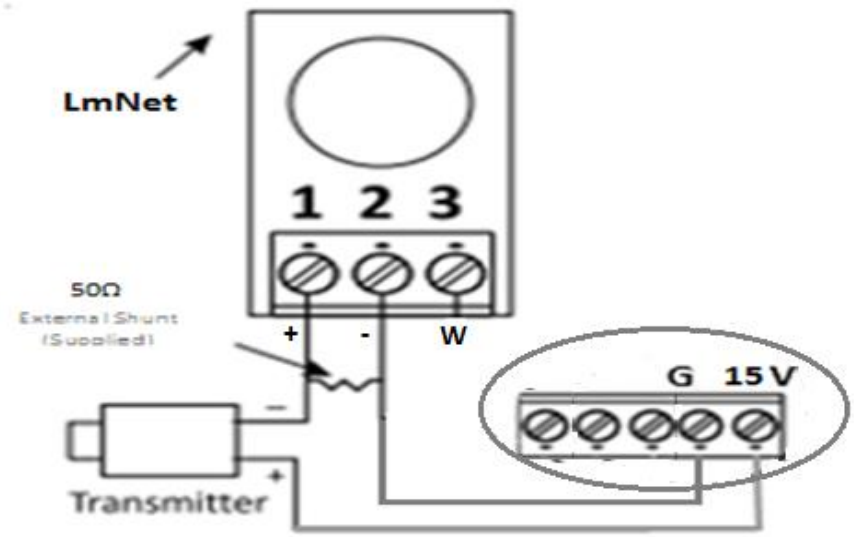


Figure 16 Connecting LmNet with Transmitter and Internal Power Supply

The connection for 4-20 mAmp. / 0-20 mAmp. Input is shown in figure-16. For LmNet the shunt of 50 Ohms is externally supplied. If you want to connect more than one instrument in series, than LmNet should be placed in such a way that not more than 150 Ohms of load resistance is added in the loop after LmNet as shown in Figure 16. Connection of LmNet with Transmitter and External Power Supply is as Shown in figure 16.

5.1.10 Relay (NC, C, NO)

RELAY 46-12-2CE Coil 960Ω 2A connection provided for connecting buzzer in the industry, to indicate temperature vary above or below the set temperature as shown in figure 17.

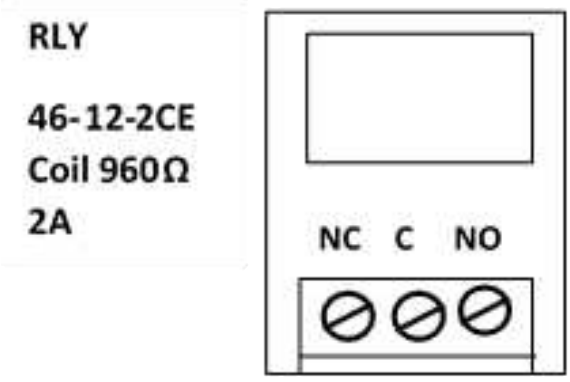


Figure 17 Relay

5.1.11 Ethernet Wiring with LmNet

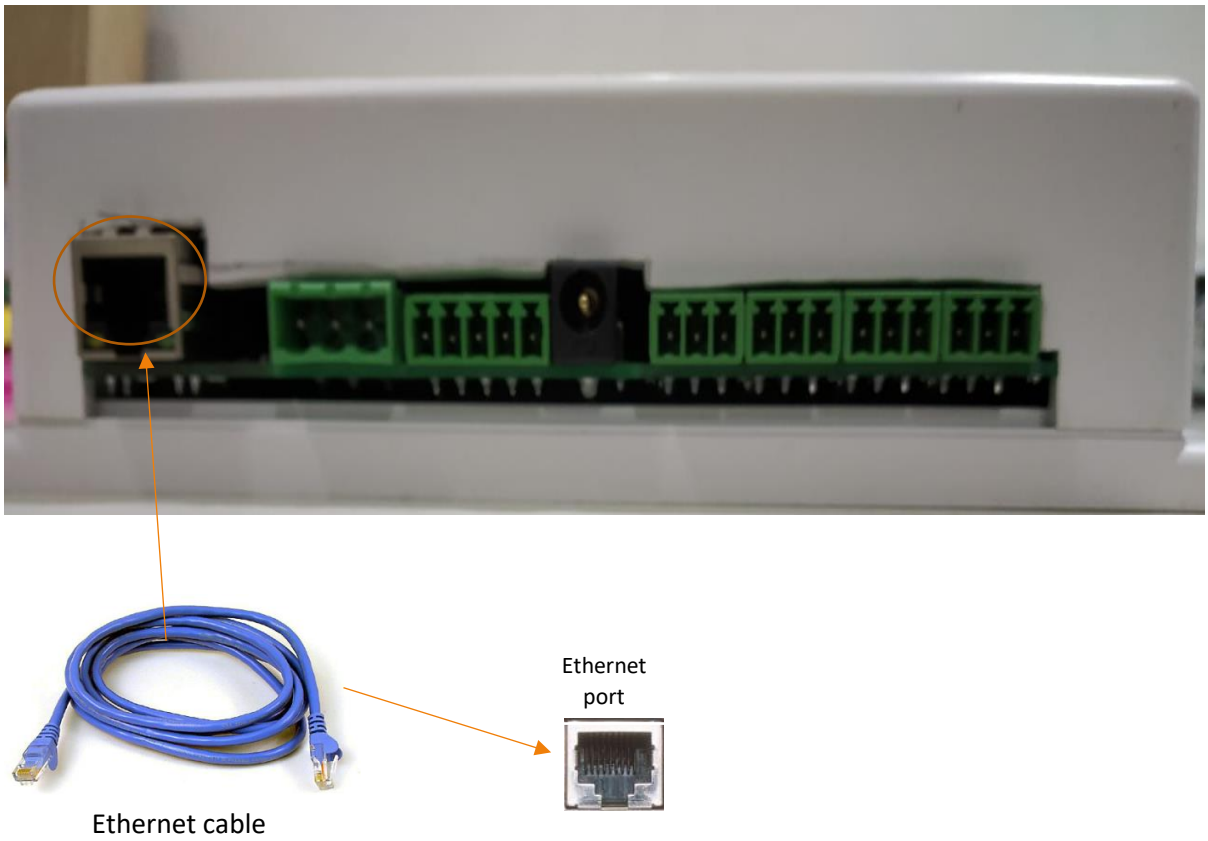


Figure 18 Ethernet Wiring with LmNet

Connect one end of Ethernet cable to the Ethernet port of the LmNet as shown in figure-18. And another end for communicate using TCP/IP.

6 OPERATION

After the proper wiring is done, power on the LmNet. The display will show “G-Tek Corporation”. Following this, the parameter values of RTC, Temperature & RH, channel 1 to 4 displayed on LED display one by one in sequence. To start the storage, user must start the batch on the LmNet. If the batch is previously running and is not stopped, then after power up the batch will continue to run, and storage will resume. User can reconfigure the parameters here by going into programming(configuration) menu (Refer Programming section).

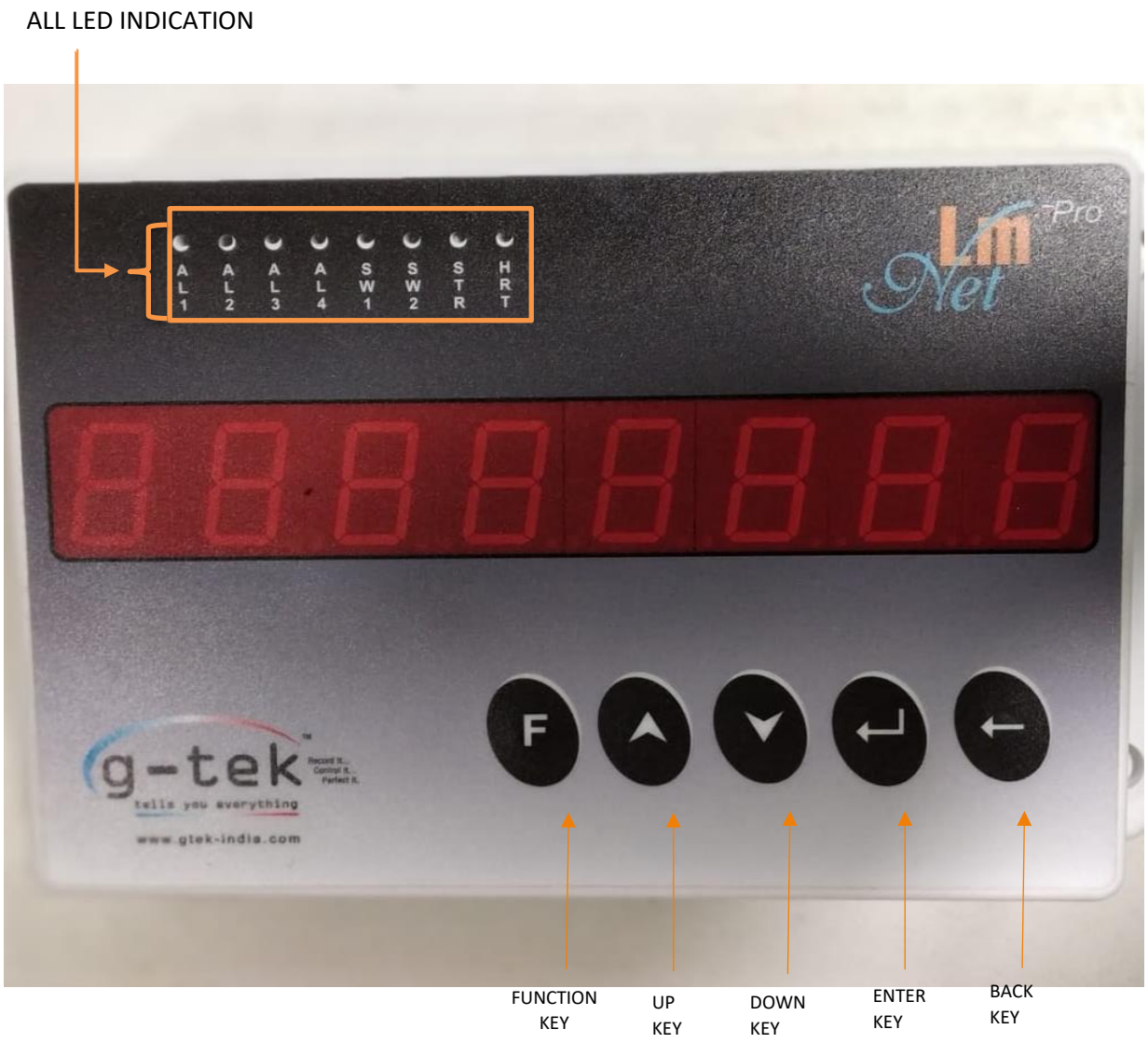


Figure 19 key function

KEYS:

There are five multifunction keys are available on the front panel of the LmNet to configure the different parameters. The functions of these keys are described as under:

This key is used to enter the main menu sequence as well as come out from the main menu.

This key is used to increment the digits or go to the next parameter.

This key is used to decrement the digits or go back to the previous parameter.

This key is used to save the parameter values, to enter a menu/submenu.

Using BACK key user can go back to the previous/out of function menu

ALL LED INDICATION:

AL1, AL2, AL3, AL4: These LEDs provided on display unit for Alarm High indication of their respective channel number. If the input value goes out of range, then display will start blinking. But AL1, AL2, AL3, AL4 LEDs will be activated with Alarm/Relay only with respect to Alarm ON time and Alarm Off time (Please refer section7.3.5).

To set the Relay on time, follow the procedure shown in figure- 32 by pressing the appropriate buttons given in the front panel of the LmNet.

Storage (STR): This LED shows Batch start indication, which means the device has started collecting data**.** It will blink every 1 sec if the batch is started.

Heartbeat (HRT): This LED shows Device Status. It will blink every 1 sec.

SW1, SW2: This LED shows Digital input/output status.

7 CONFIGURATION

Usage of Keys:

To enter in the function menu for modification or to come out from the function menu/submenu.

Up Key is used to increment the parameter value. It is also used to go to the next parameter/sub-menu.

Down Key is used to decrement the parameter value. It is also used to go back to the last parameter/sub-menu.

To store the parameter value and use to enter in the function for modification.

To Return from the Sub-Menu.

Alarm off acknowledgement condition keys.

7.1 AUTHENTICATION PASSWORD

If device is with password enabled option, then it will allow the access of menu function only and only if password will match and pass authentication. Basically, device will ask for 4-character password and each will be 0 to 9.
Each time to access menu, authentication is necessary. The procedure for authentication and to enter password, follow the below mentioned procedure by pressing the appropriate buttons given on the front panel of the LmNet.

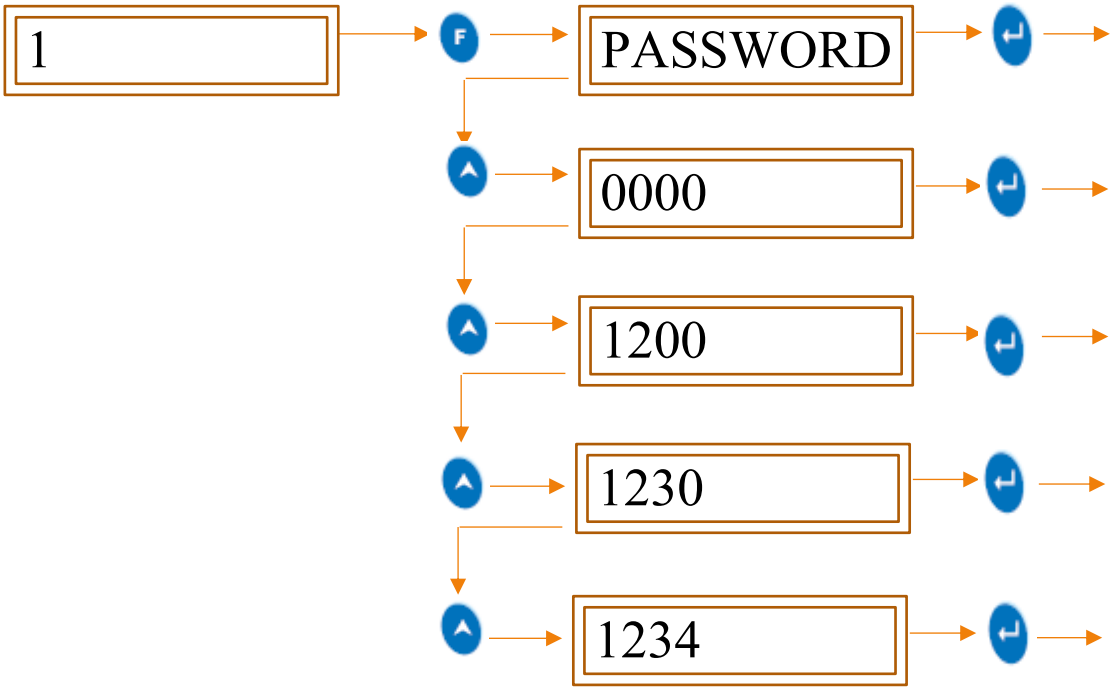


Figure 20 Password entry Procedure

Note: UP key is used to increment number and DOWN key is used to shift cursor right by one position.

7.2 CONFIGURABLE ITEM

Table 2 Configurable Items

Sensor Types	1) RTD (Pt-100) 2) TC - J 3) TC - K 4) TC - C 5) TC - R 6) TC - S 7) TC- T 8) TC- B 9) TC- E 10) TC- N 11) 4-20mAmp 12) 0-20mAmp 13) -1000.0 to + 1000.0mV & 0.0 to +1000.0mV 14) -5000.0 to + 5000.0mV & 0.0 to +5000.0mV
Batch Start/Stop	Only after starting the batch the data storage will start.
Memory setting	1) Roll Over: - Memory roll over for store the data also after memory full and this storage will be start from the beginning of memory location. 2) Stop on full: - Memory stop on full for stop the data storage after memory full.
Clear memory	Delete the stored data and clear memory for next batch.
Channels to scan	The parameter value for all channel, digital inputs and digital outputs will be display with rolling action. Also scan channel with Freeze action.
Set Date and Time	Set internal real time clock of LmNet
Store Interval	Interval of data storage in internal memory.
Range Low	The minimum value shown on display when process inputs like 0-1 Volt, 0-20 mAmp & 4 - 2O mAmp are at 0V, 0 mAmp & 4 mAmp, respectively.
Span	The difference between maximum & minimum value used for process inputs.
Offset	A small correction may be required when actual sensor is connected to the LmNet. This is a mathematical value which is directly added to the reading.
Multiplier	A value to remove any scale error. This is a mathematical value which is directly multiplied to the reading. Displayed reading = (reading x multiplier) + offset
Resolution	Measure the accuracy of the output value
Alarm set point High	The upper limit of value, after which alarm is generated
Alarm set point Low	The lower limit of value, after which alarm is generated
Communication Parameters:	
Device Address	Address of LmNet for communication with computer
Saving Configuration	Saving Batch & channel parameters

The LmNet can be Configured using front panel Keyboard. User can enter the configuration. The following figure shows the main menu sequence:

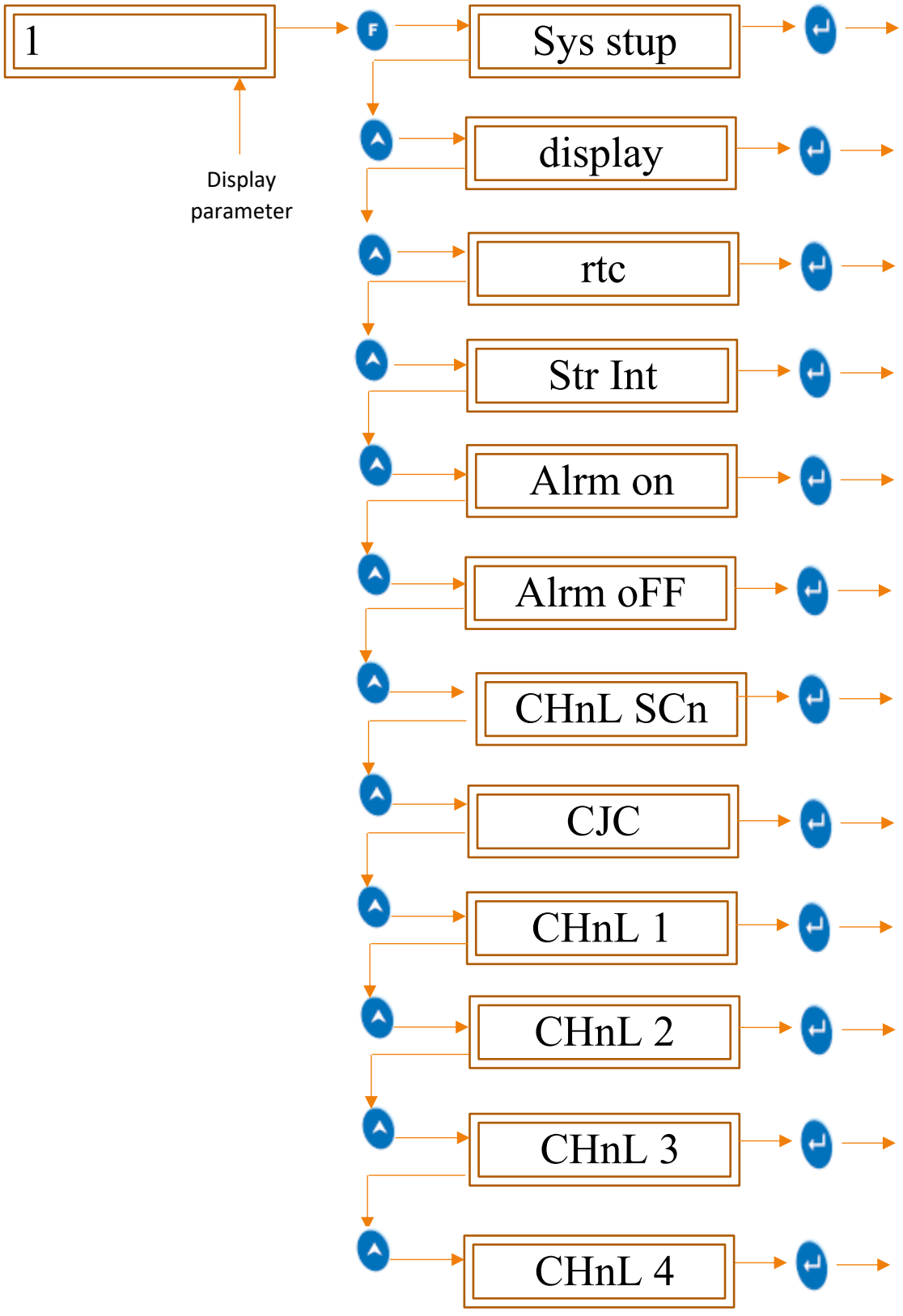


Figure 21 Main menu display

7.3 FUNCTIONS

7.3.1 System Setup

In the system setup menu, we can start new batch, stop running batch, set device address, also can set which way to use memory and clear memory.

To set this parameter then follow the below mentioned procedure by pressing the appropriate buttons given on the front panel of the LmNet.

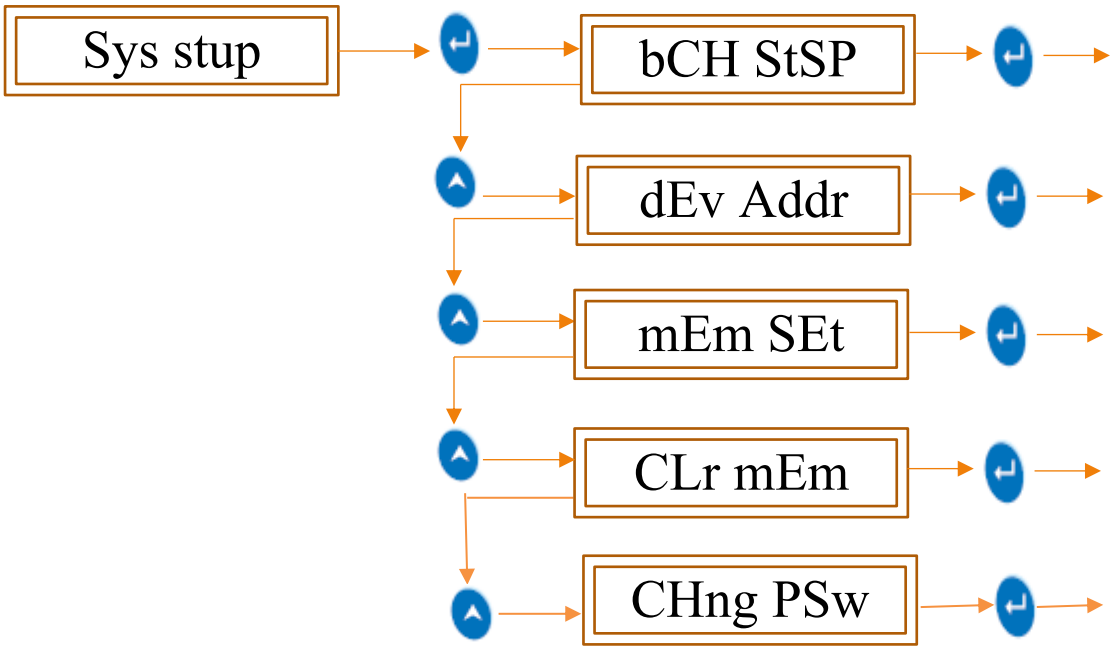


Figure 22 System Setup

7.3.1.1 Batch status (Start/Stop)

Use to start new batch and stop running batch as shown in figure-23.

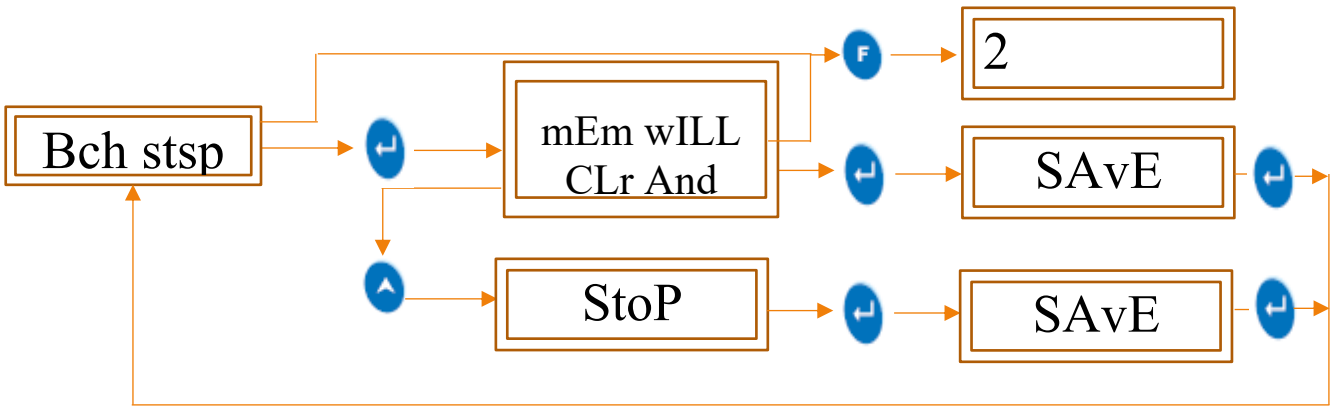


Figure 23 Batch Status

7.3.1.2 Device Address

Address of the devices that can be connected to the MODBUS is from 0-255. 240 devices maximum can be connected for communication on MODBUS, rest have been used for future development.

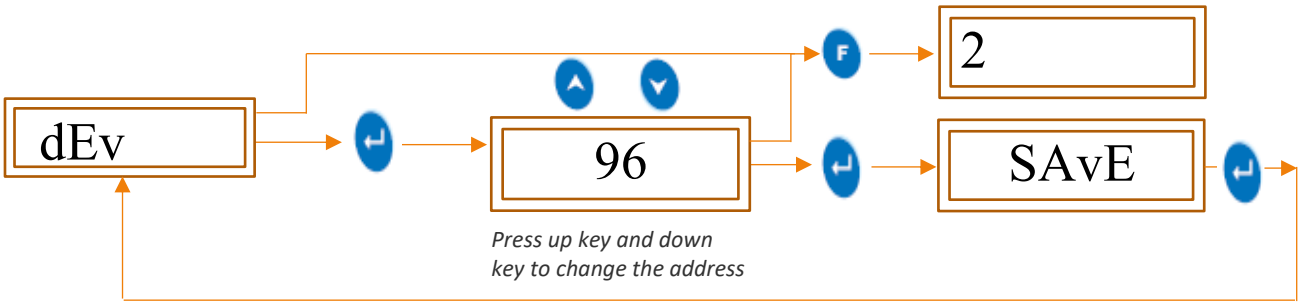


Figure 24 Device Address

Note: -

To increase the digit value

To decrease the digit value

To come out from functions/ sub menu

7.3.1.3 Memory Setting (roll over/ stop on full)

To set Roll Over/ stop on full in memory setting of the devices then follow the procedure shown in figure-25 by pressing the appropriate buttons given on the FRONT panel of the LmNet.

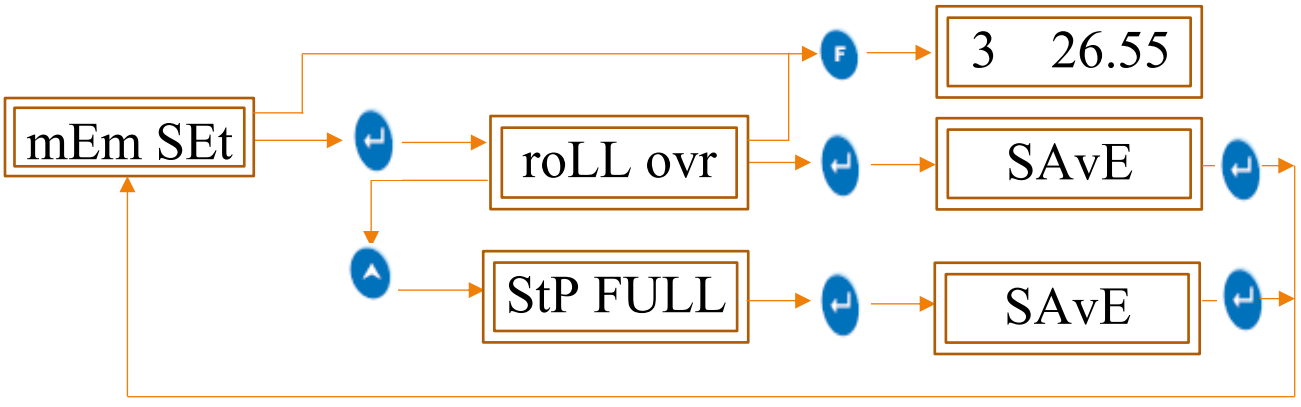


Figure 25 Memory Setting

7.3.1.4 Clear Memory

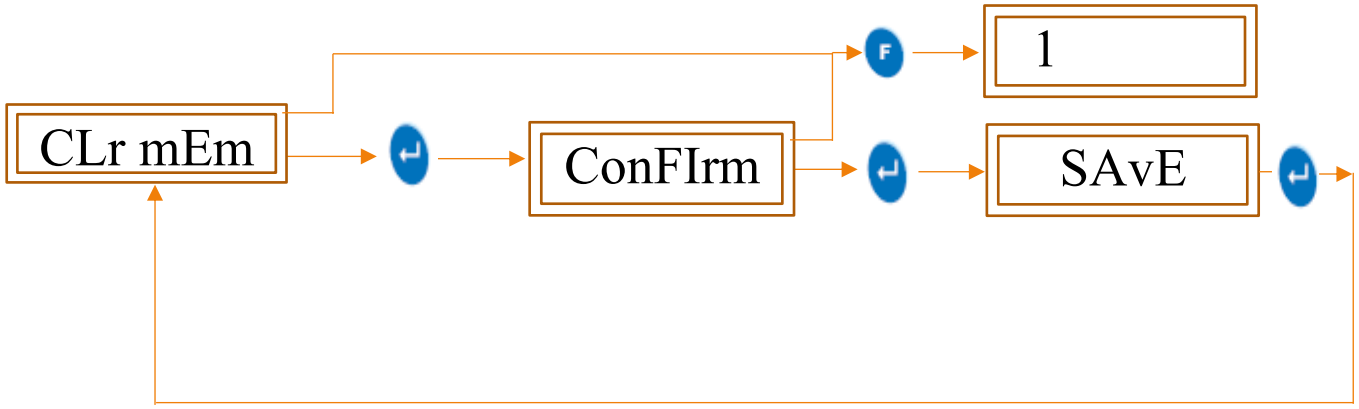
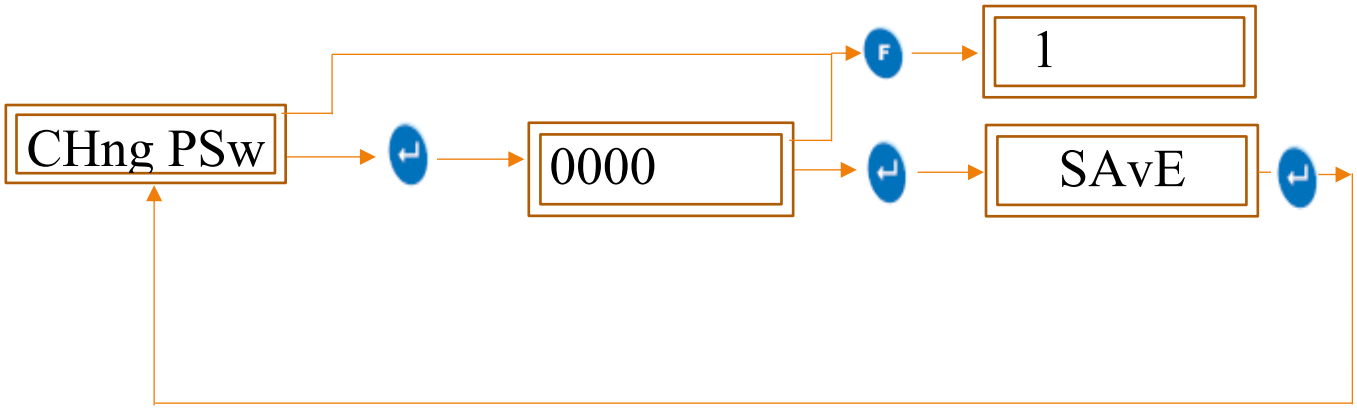


Figure 26 Clear Memory

7.3.1.5 Change Password

User can set its own password to enter in menu from using change password feature. If password option enabled by user to enter in menu, then user can change password from here. If password option not enabled by user, then this function is not used.



7.3.2 Display Setting

To watch the current data of different sensor, channels, digital inputs, and digital outputs on led display then we must follow the procedure shown in figure-27. By using the display setting we can set the fix panel to watch continuously or we can set the group of panels to watch on led display which shows data on led display one by one with time gap.

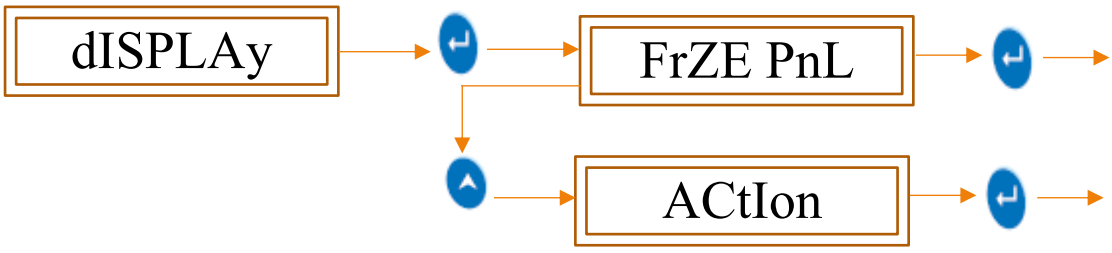


Figure 27 Display Setting

7.3.2.1 Freeze panel

Use to select the panel and as on selected display action it will be display continuously or in rolling manner. To set freeze panel, follow the procedure shown in figure-28.

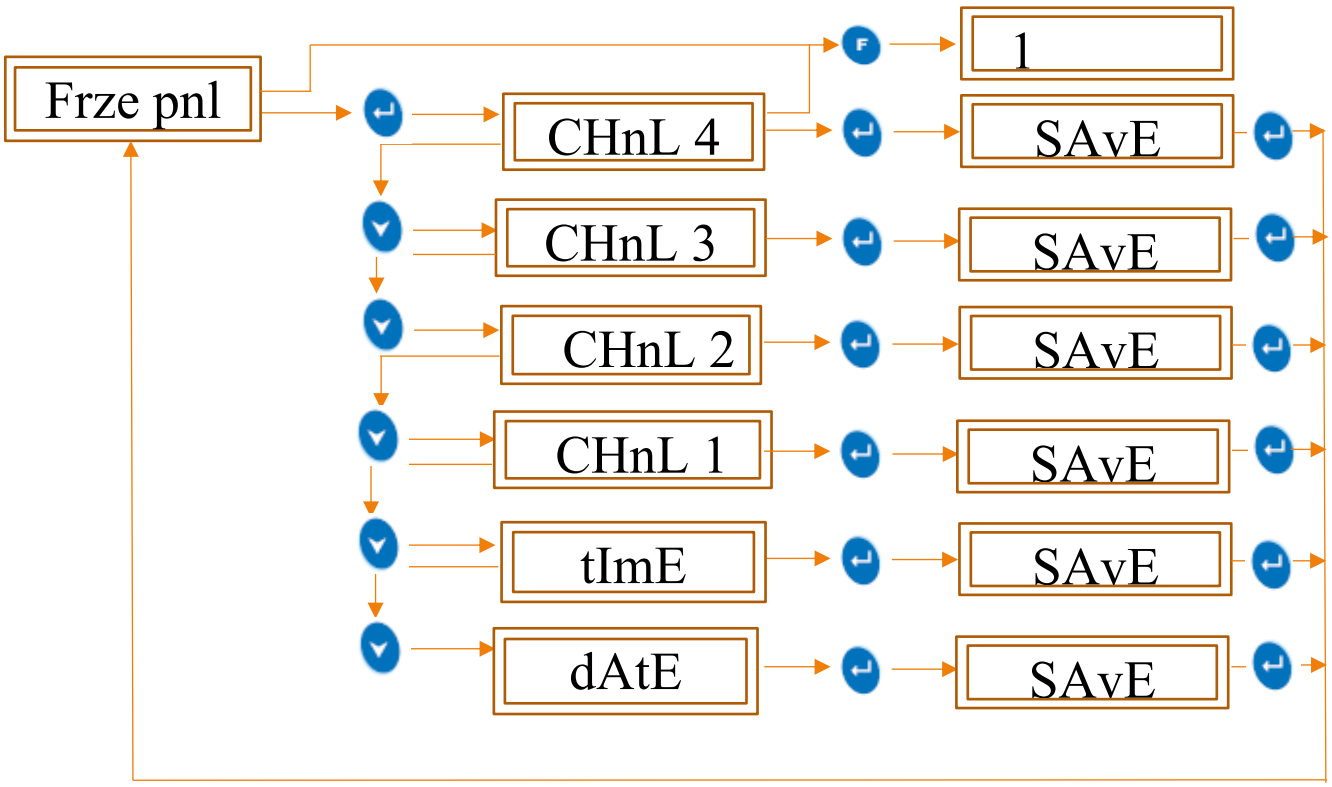


Figure 28 Freeze Panel

7.3.2.2 Action

By using the Action menu for display setting of LmNet we can set the display continuously freeze or rolling to watch the current data from sensors up to selected panel.

To set display action follow the mention procedure shown in figure-29.

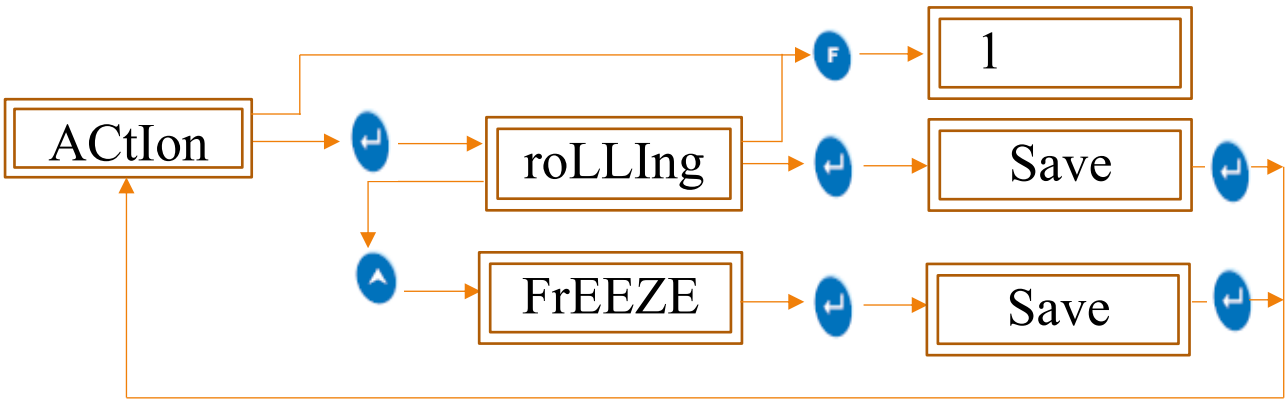


Figure 29 Action (Display)

7.3.3 RTC

RTC enables us to use a real-time clock and calendar in LmNet device. It features that keeps track of the current time even when the device is turned off. The real-time clock is driven by a special battery that is not connected to the normal power supply. It serves needs of real time data for LmNet.

By using RTC parameter we can set the Date, Month, Year, Hour, Minute, second for LmNet device by Following the below mentioned procedure with pressing the appropriate buttons given on the front panel of the LmNet.

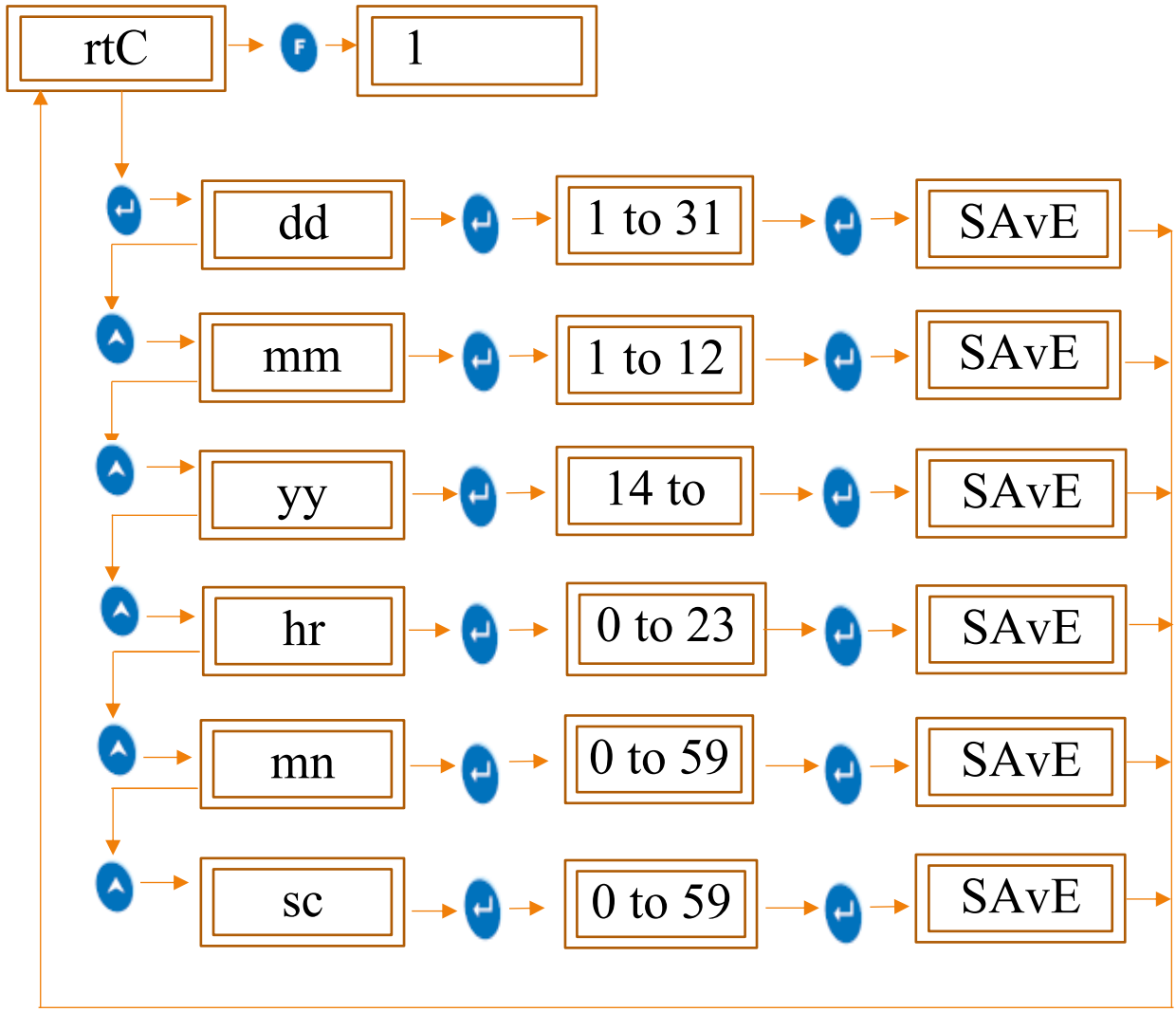


Figure 30 RTC settings

7.3.4 Store Interval

Store interval is the parameter which is used to store the reading data from sensor to the memory of LmNet after a fixed interval time while batch is running. Store interval can set in seconds and minutes combination on LmNet device by following the below mentioned procedure with pressing the appropriate buttons given on the front panel of the LmNet.

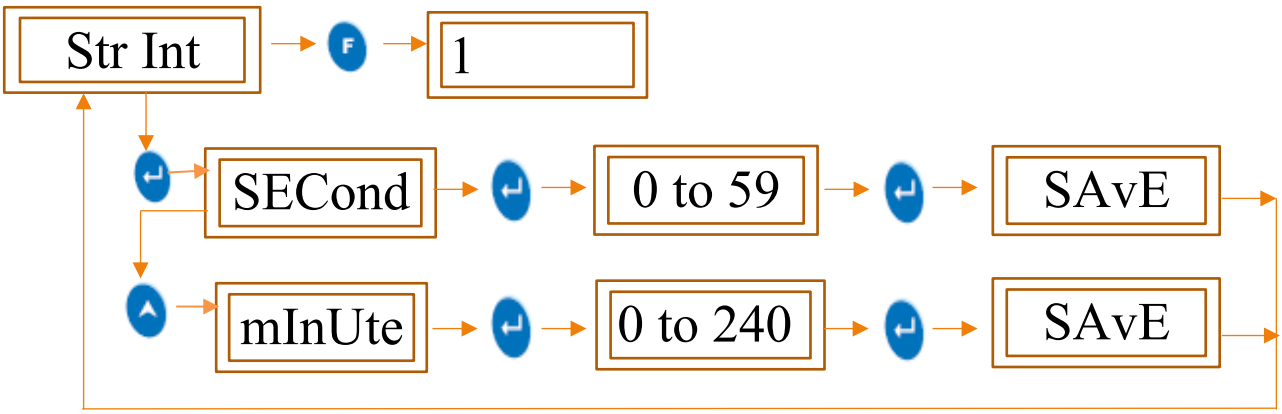


Figure 31 Store Interval

7.3.5 Alarm On time

Alarm On time is user settable parameter in seconds and minutes, which will allow the sensors to settle in terms output readings. For example, if output to be expected to stable in 10 minutes and 50 seconds than device will generate continuous alarm condition after this time.

To set the Relay on time, follow the procedure shown in figure- 32 by pressing the appropriate buttons given in the front panel of the LmNet.

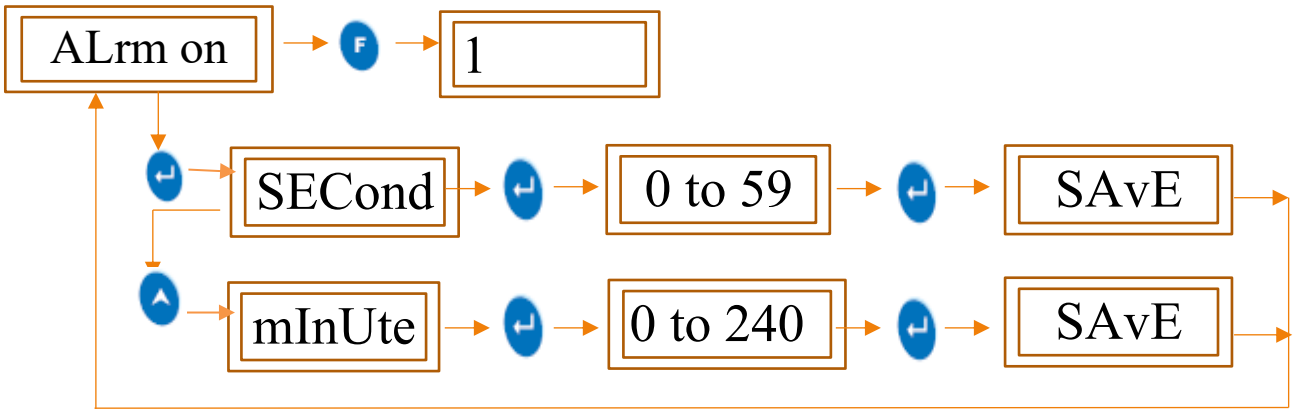


Figure 32 Relay ON time

7.3.6 Alarm Off time

Alarm Off time is user settable parameter in seconds and minutes, which will temporary off buzzer and relay as input by user. However, it will off after pressing of key patterns as shown in figure to stop buzzer and relay.

To set the Alarm off time, follow the procedure shown in figure- 33 by pressing the appropriate buttons given in the front panel of the LmNet.

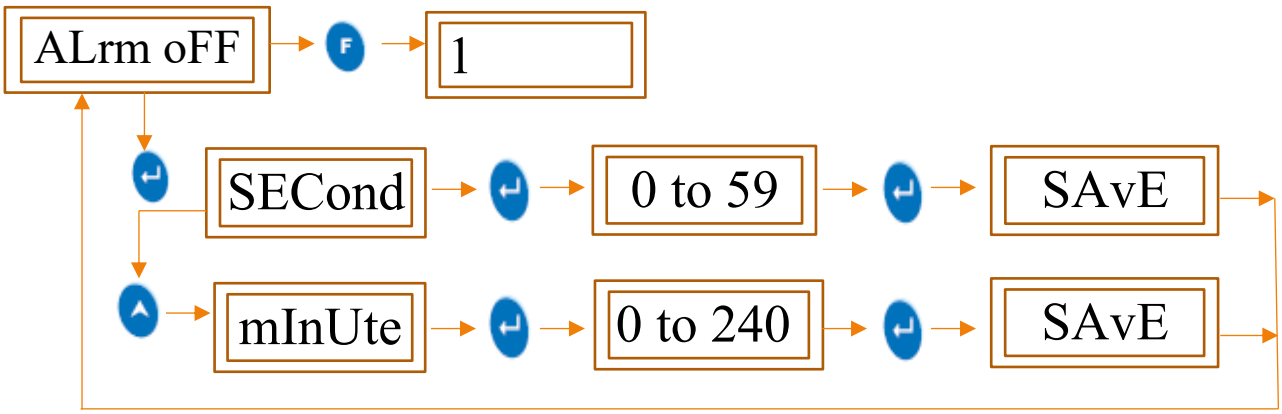


Figure 33 Relay OFF time

7.3.7 Channel Scan

This functionality will allow to skip the output data from four channels, it will not scan that channel even if sensor is connected on channel connector and will give output “Nan” on display. After entering to any channel, user have option “ON” or “SKIP” channel using up-down key.

To set the channel skip, follow the procedure shown in figure- 34 by pressing the appropriate buttons given in the front panel of the LmNet.

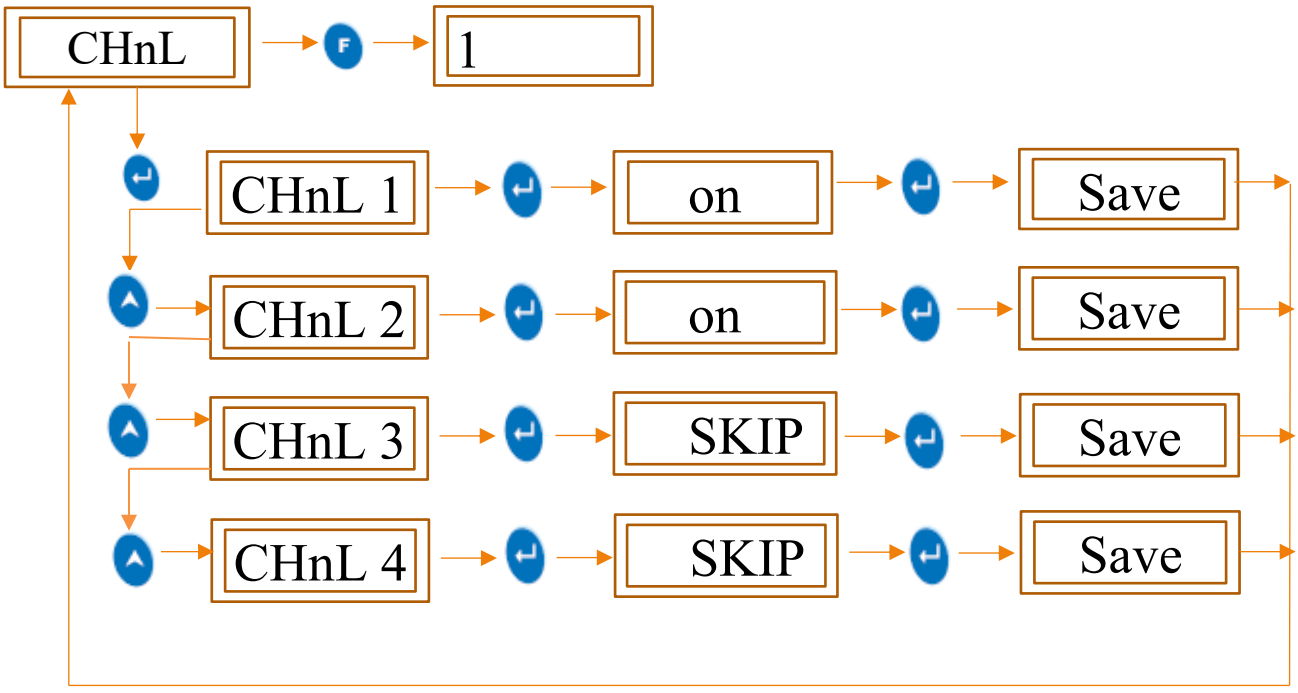


Figure 34 Channel Skip

7.3.8 Room Temperature

7.3.8.1 Offset

A small correction may be required when actual sensor is connected to the device. To set offset for temperature reading, a mathematical value is directly added to the reading coming on led display with the reference value which we consider as an accurate value coming on other display device or machine.

7.3.8.2 Multiplier

Sometime a major correction, may be required for temperature when actual sensor is connected to the device. A mathematical value expects zero is directly multiplied to the reading coming on led display to get the specific output on same led display and to store it during batch running.

To set Offset/ Multiplier for temperature follow the procedure shown in figure-35 by pressing the appropriate buttons given on the front panel of the LmNet.

7.3.8.3 Alarm Set Point High

In this parameter we must set the value to alert us whenever device reading goes higher than the set value, and that value should be set from -200 to 1000 °C

To set the Alarm Set point High for a channel then follow the procedure shown in figure- 35 by pressing the appropriate buttons given in the front panel of the LmNet.

7.3.8.4 Alarm Set Point Low

In this parameter we must set the value to alert us whenever device reading goes lower than the set value, and that value should be set from -200 to 1000 °C

To set the Alarm Set point low for a channel then follow the procedure shown in figure- 35 by pressing the appropriate buttons given in the front panel of the LmNet.

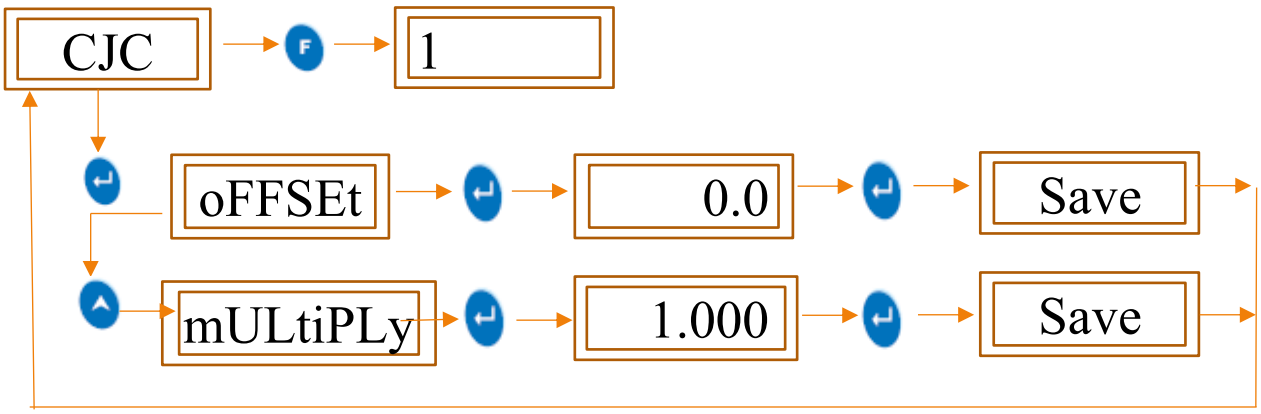


Figure 35 Room Temperature

7.3.9 Channel 1

There are 4 input channels available for the user to configure and use. Thus, user can select any of the channel and can set the below mentioned parameters for it. There are 8 various parameters in each channel, but each channel has its different parameter values according to its use decided by user. Those parameters of every channel discussed below in detail.

To set this parameter then follow the procedure shown in figure-36 by pressing appropriate key of LmNet.

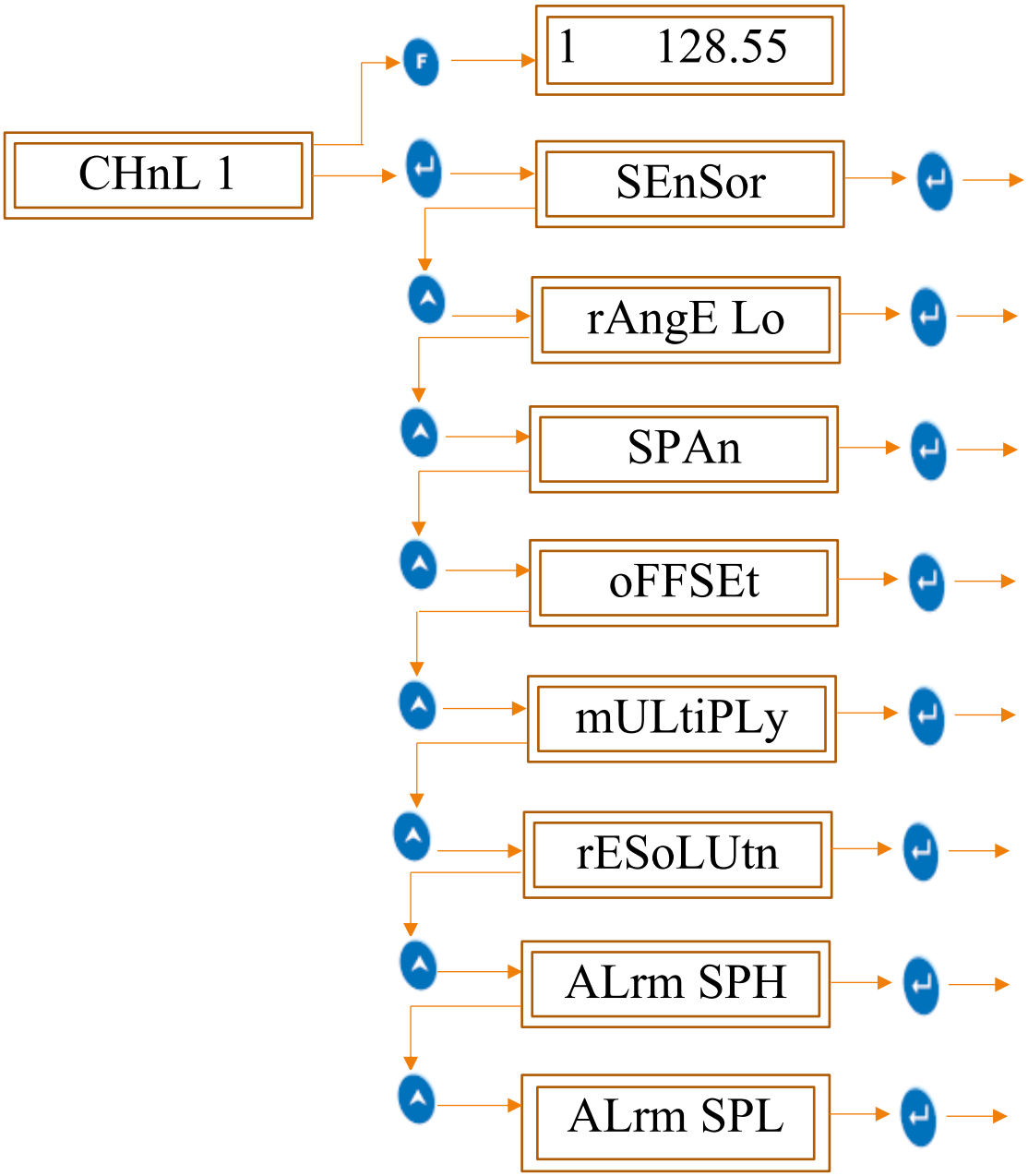


Figure 36 Channel Configuration

7.3.9.1 Sensor

Three types of sensor inputs are being accepted by the LmNet.

7.3.9.1.1 RTD

It is Resistance Temperature Sensor. The sensor name is PT100.

A platinum resistance temperature detector (RTD) is a device with a typical resistance of 100 Ω at 0°C. It consists of a thin film of platinum on a plastic film. Its resistance varies with temperature and it can typically measure temperatures up to 750 °C. The relationship between resistance and temperature is relatively linear as shown below for a sample 100 Ω RTD.

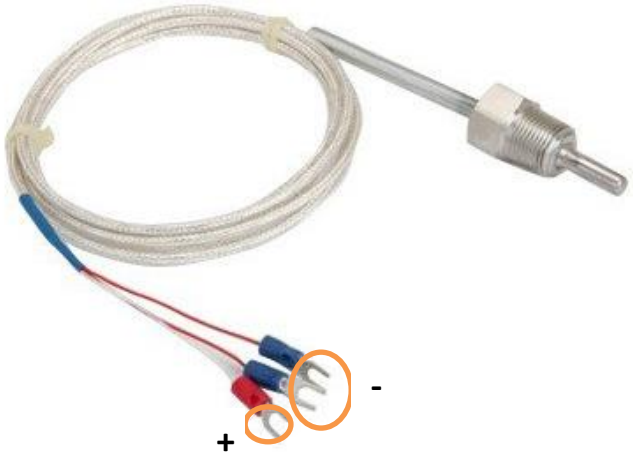


Figure 37 RTD Sensor

7.3.9.1.2 Thermocouple

There are total 9 types of thermocouple inputs the LmNet accepts as listed under.

- TC-J
  It is made up of iron (+ve electrode) & constantan (-ve electrode).
  It operates over the temperature range of (-200) to (1200) °C temperature.
  Its sensitivity is 50 uV/°C.

- TC-K
  It is made up of chromel (+ve electrode) & alumel (-ve electrode).
  It operates over the temperature range of (-200) to (1372) °C temperature.
  Its sensitivity is 41 uV/°C.

- TC-C
  It is made up of tungsten (+ve electrode) & rhenium (-ve electrode).
  It operates over the temperature range of (0) to (2300) °C temperature.
  Its sensitivity is 46 uV/°C.

- TC-R
  It is made up of plutonium (+ve electrode) & rhodium (-ve electrode).
  It operates over the temperature range of (0) to (1750) °C temperature.
  Its sensitivity is 36 uV/°C.

- TC-S

  It is made up of plutonium & rhodium (+ve electrode) & platinum (-ve electrode).
  It operates over the temperature range of (100) to (1750) °C temperature.
  Its sensitivity is 43 uV/°C.
  Mainly used for calibration for melting point of gold.

- TC-T

  It is made up of copper (+ve electrode) & constantan (-ve electrode).
  It operates over the temperature range of (-200) to (400) °C temperature.
  Its sensitivity is 32 uV/°C.
  Mostly used in vacuum furnaces.

- TC-B

  It is made up of platinum (+ve electrode) & rhodium (-ve electrode).
  It operates over the temperature range of (200) to (1800) °C temperature.
  Its sensitivity is 52 uV/°C.

- TC-E

  It is made up of chromel (+ve electrode) & constantan (-ve electrode).
  It operates over the temperature range of (-100) to (1000) °C temperature.
  Also used for measuring low temperature, cryogenics (-110) to (140) °C.
  Its sensitivity is 68 uV/°C.

- TC-N

  It is made up of nicrosil (+ve electrode) & nisil (-ve electrode).
  It operates over the temperature range of (-200) to (1300) °C temperature.
  Its sensitivity is 39 uV/°C.

7.3.9.1.3 Process Inputs

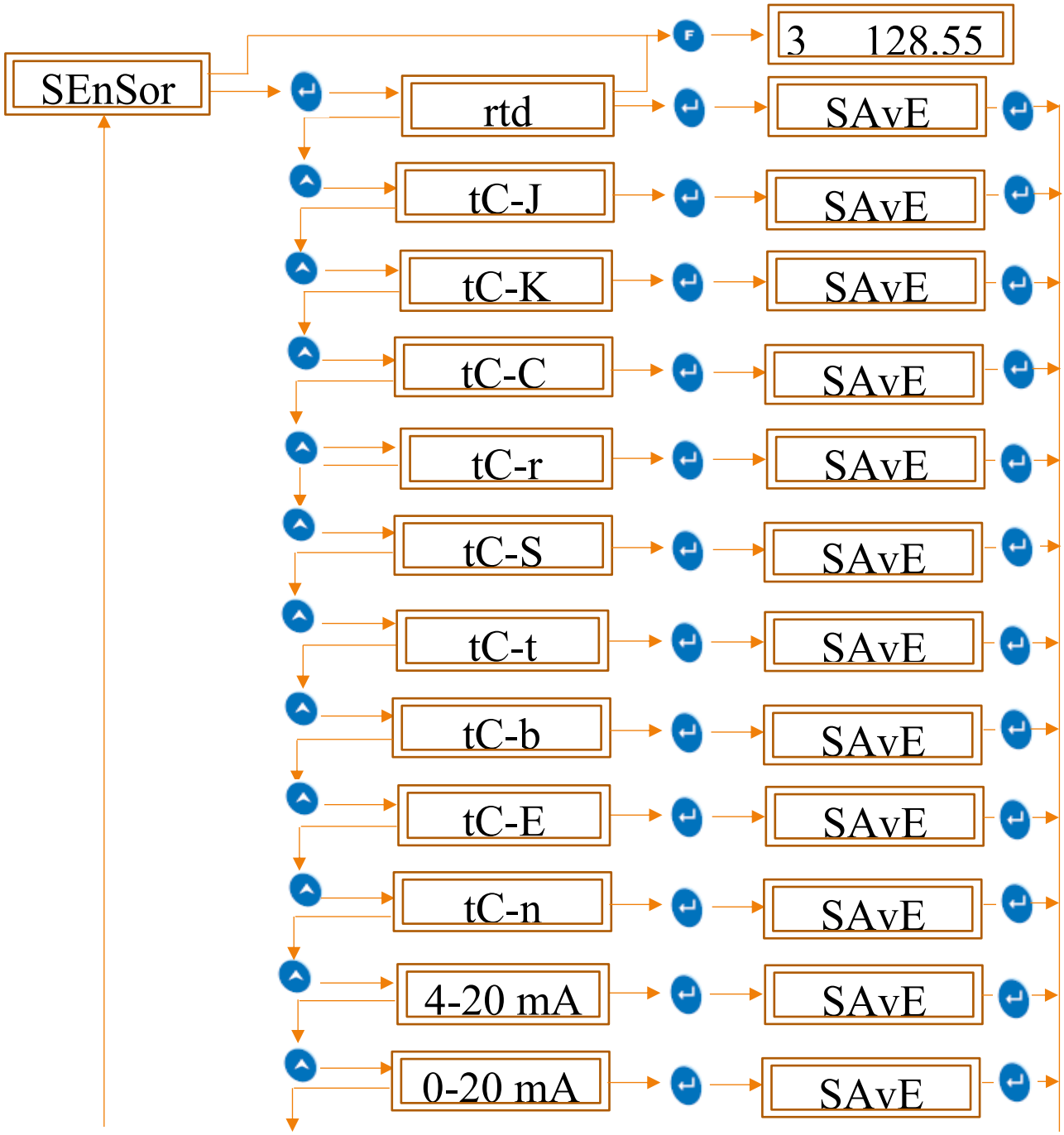
There are total of 6 types of process inputs the recorder accepts

- 4-20 mA
- 0-20 mA
- Unipolar 1 Volt
- Bipolar 1 Volt
- Unipolar 5 Volt
- Bipolar 5 Volt

One of the examples of these process input is the Vibration sensor. The 4-162 vibration sensor is a compact, well-protected industrial accelerometer, giving a process output of 4-20mA proportional to various vibration ranges in terms of velocity RMS.
The 4-162 is intended for use as a direct input of vibration levels into many kinds of control and data acquisition systems, however it can be used with a trip amplifier or suitable display as a standalone unit.
Unipolar voltages include only one positive voltage for logic 1. That is unipolar 1 volt, 5 volt & 10 volt gives 1 volt, 5 volts & 10-volt output respectively for logic 1 and 0 volt for logic 0.

Whereas bipolar voltages give output in form of positive and negative voltages. Bipolar 1 volt, 5 volt gives output +1-volt, +5 volt for logic 1 respectively and gives -1-volt, -5 volt for logic 0, respectively.

To select sensor as RTD/ Thermocouple/ Process inputs then follow the below mentioned procedure by pressing the appropriate buttons given on the top panel of the LmNet.



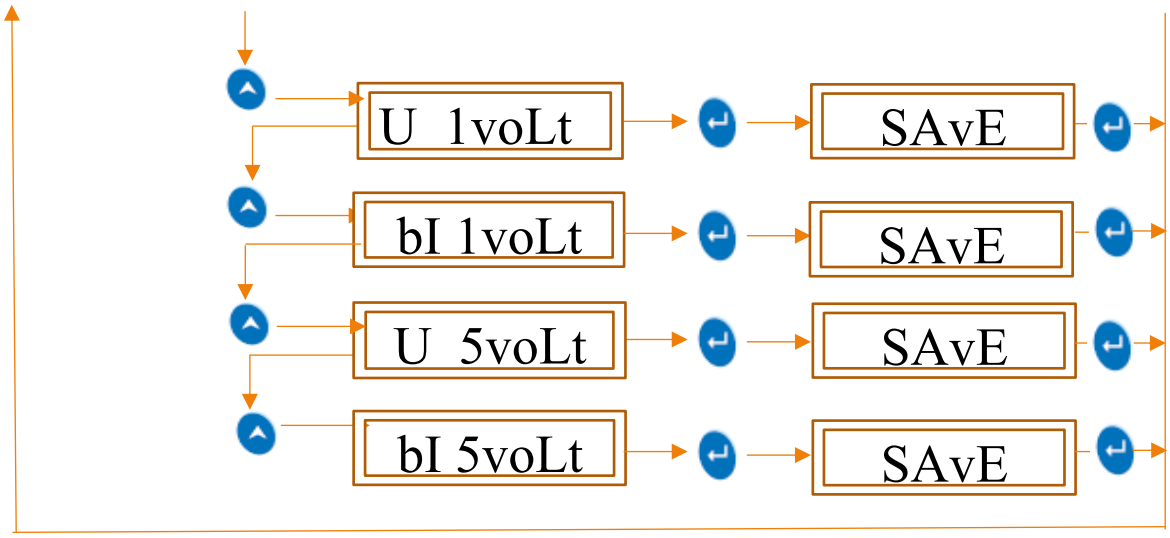


Figure 38 Sensor Selection

7.3.9.2 Range Low

This feature is used for selecting the minimum value of the display that should be displayed on the led display or is measured by the sensor.

For example:

If the user wants to measure the percentage of pressure of gases in the pressure valve, then then user needs to display the output in range of 0 to 100 %. So, here the range low must be set as 0 by the user.

Now, for the above case if the user wants to just measure the percentage of pressure if gone above 50% that is 50-100% then in this case the user must set the value of range low as 50.

User can set the range low values anywhere between -3276.8 to 3276.7.

To set the Range Low for a channel then follow the procedure shown in figure- 39 by pressing the appropriate buttons given in the front panel of the LmNet.

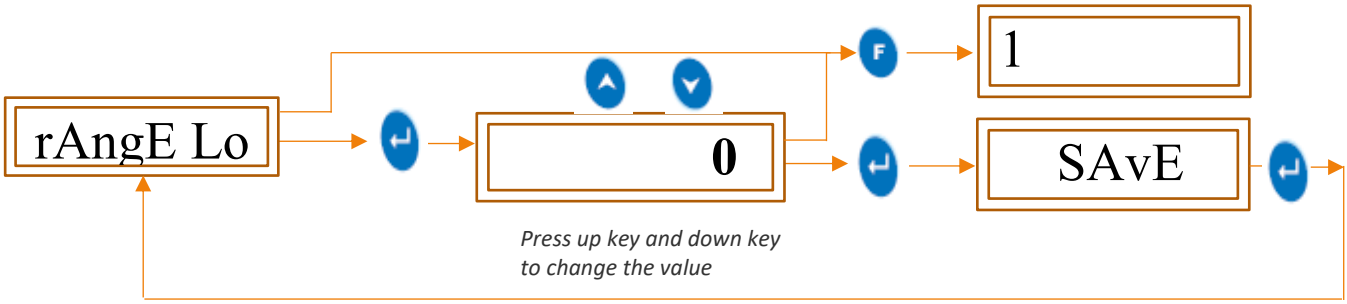


Figure 39 Range Low selection

7.3.9.3 Span

Span is the total range of values that a user wants to measure.

Span value indicates the total interval of which all the output values will be displayed.

For example:

If the user wants to measure the percentage of pressure of gases in the pressure valve, then then user needs to display the output in range of 0 to 100 %. So, here the span must be set as 100 by the user. Span = (100-0).

Now, for the above case if the user wants to just measure the percentage of pressure if gone above 50% that is 50-100% then in this case the user must set the value of span as 50. Span = (100-50).

User can set the Span value anywhere between -3276.8 to 3276.7.

To set the Span for a channel then follow the procedure shown in figure- 40 by pressing the appropriate buttons given in the front panel of the LmNet.

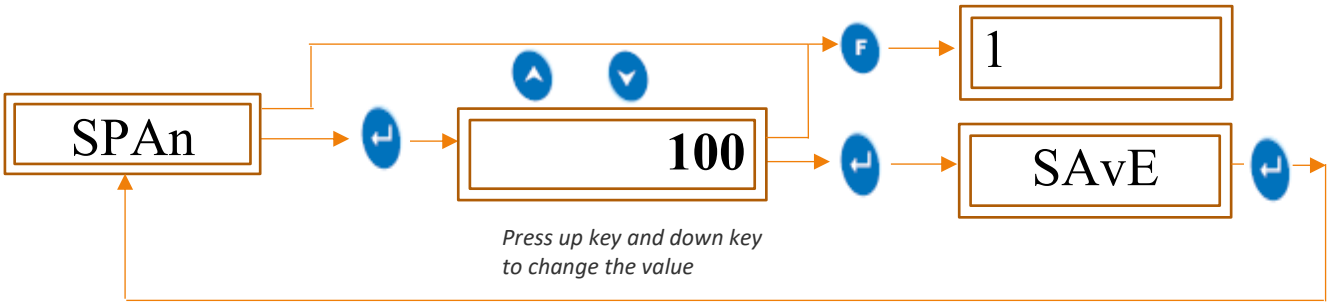


Figure 40 Span Selection

7.3.9.4 Offset

Offset is the amount of deviation that occurs in the output due to calibration errors of the sensor.

Thus, if there are deviations in the output compared to the expected output, offset value should be set appropriately to null the effect of deviation.

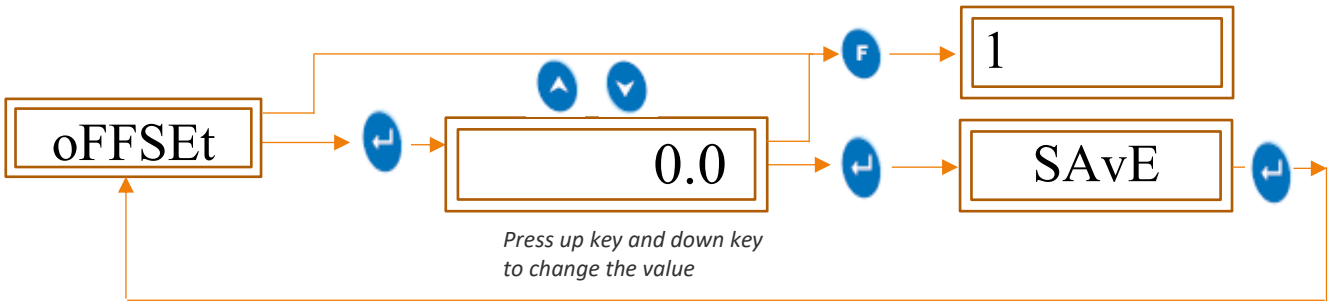


Figure 41 Offset Selection

7.3.9.5 Multiplier

Multiplier is a function given for the user flexibility. If the user wants to observe the output in the range other than the actual output range, multiplier value must be set.

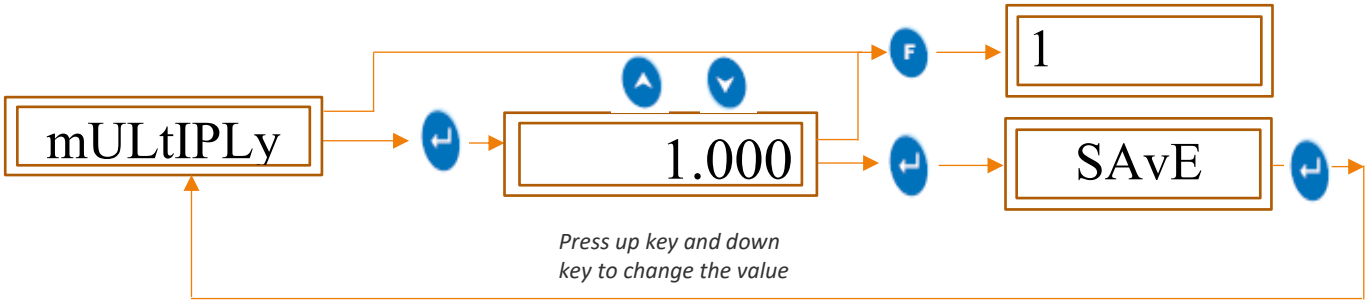


Figure 42 Multiplier Selection

7.3.9.6 Resolution Decimal Place

This is the measure of the accuracy of the output value. It is the measure of number of digits that user wants to include in the output display.

For example:

If the output is 2.301 then according to user, he can set the display output.
If Resolution is kept 0 then output is 2
If Resolution is kept 0.1 then output is 2.3
If Resolution is kept 0.01 then output is 2.30
If Resolution is kept 0.001 then output is 2.301
If Resolution is kept 0.0001 then output is 2.3012

To set the Resolution Decimal Place for a channel then follow the procedure shown in figure- 45 by pressing the appropriate buttons given in the front panel of the LmNet.

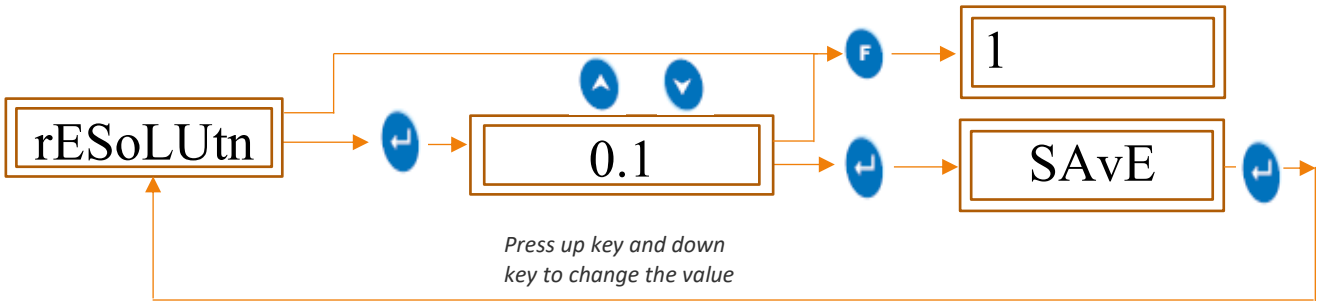


Figure 43 Resolution Decimal Place

7.3.9.7 Alarm Set Point High

In this parameter we must set the value to alert us whenever device reading goes higher than the set value, and that value should be set from -3276.8 to 3276.7

To set the Alarm Set point High for a channel then follow the procedure shown in figure- 44 by pressing the appropriate buttons given in the front panel of the LmNet.

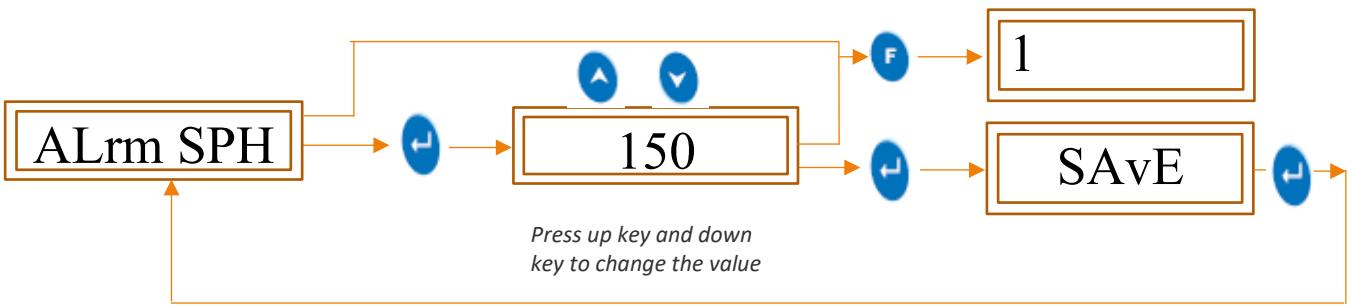


Figure 44 Alarm Set point High

7.3.9.8 Alarm Set Point Low

In this parameter we must set the value to alert us whenever device reading goes low than the set value, and that value should be set from -3276.8 to 3276.7

To set the Alarm Set point low for a channel then follow the procedure shown in figure- 45 by pressing the appropriate buttons given in the front panel of the LmNet.

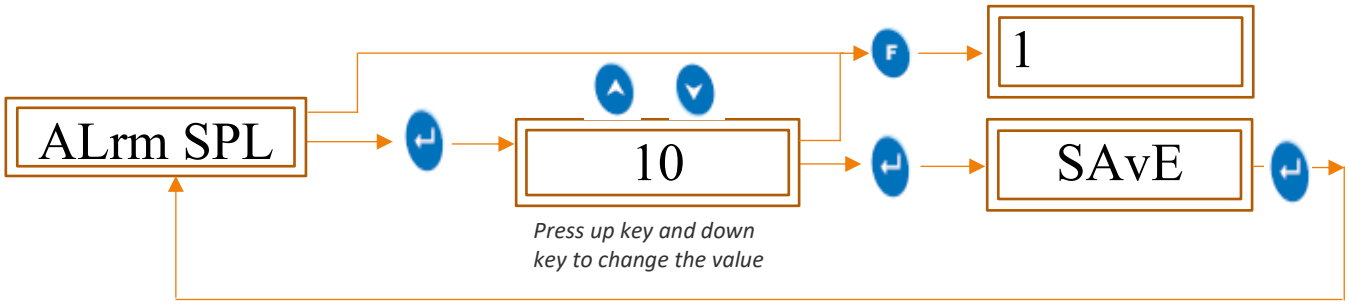


Figure 45 Alarm Set Point Low

Above function Alarm set point high and Alarm set point low set the range, If the value increase and decrease from high and low range respectively then internal buzzer provided will set also the relay activate the Industrial buzzer make sound till value will not come back within range.

7.3.10 Channel 2

Same as Describe in Type of Functions **7.3.9 CHANNEL 1**

7.3.11 Channel 3

Same as Describe in Type of Functions **7.3.9 CHANNEL 1**

7.3.12 Channel 4

Same as Describe in Type of Functions **7.3.9 CHANNEL 1**

7.3.13 IP Reset

We can reset IP address by pressing down key at power up for 5 seconds and then release it. At power up, if we press down key for 5 seconds, IP address of device will be reset at default IP address as per Table 3. Then after we can set our IP Address by opening web page.

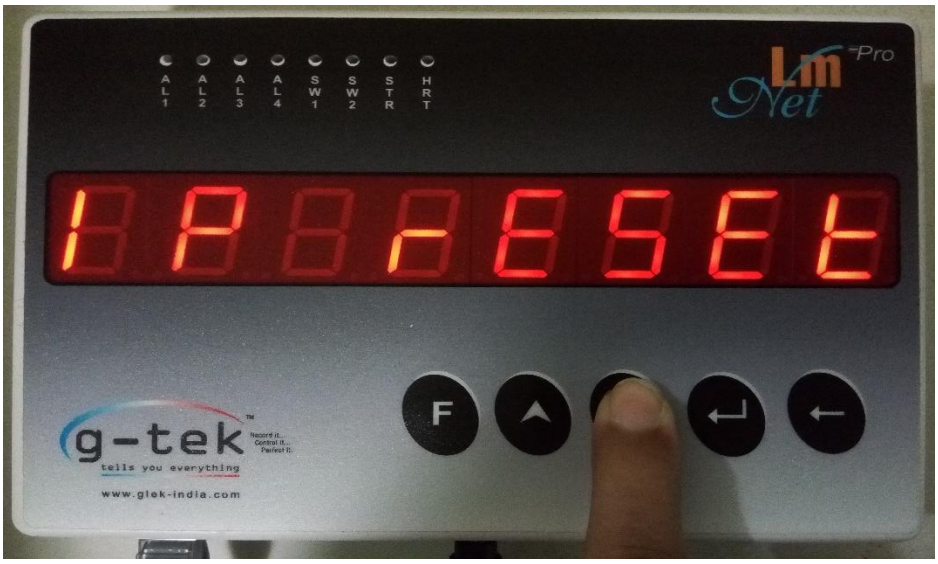


Figure 46 IP Reset

8 NETWORK

8.1 NETWORK CONFIGURATION

- Default Device network information:

Table 3 Device Network Information

1	IP address	192.168.1.30
2	Default Gateway	192.168.1.1
3	Subnet Mask	255.255.255.0
4	Port no	502
5	Device Address	96

- Follow the below steps to configure LmNet device with application.

1. Connect device and PC using Ethernet cable.
2. Open control panel and click on Network and Sharing Center.
3. Click on change adaptor settings.

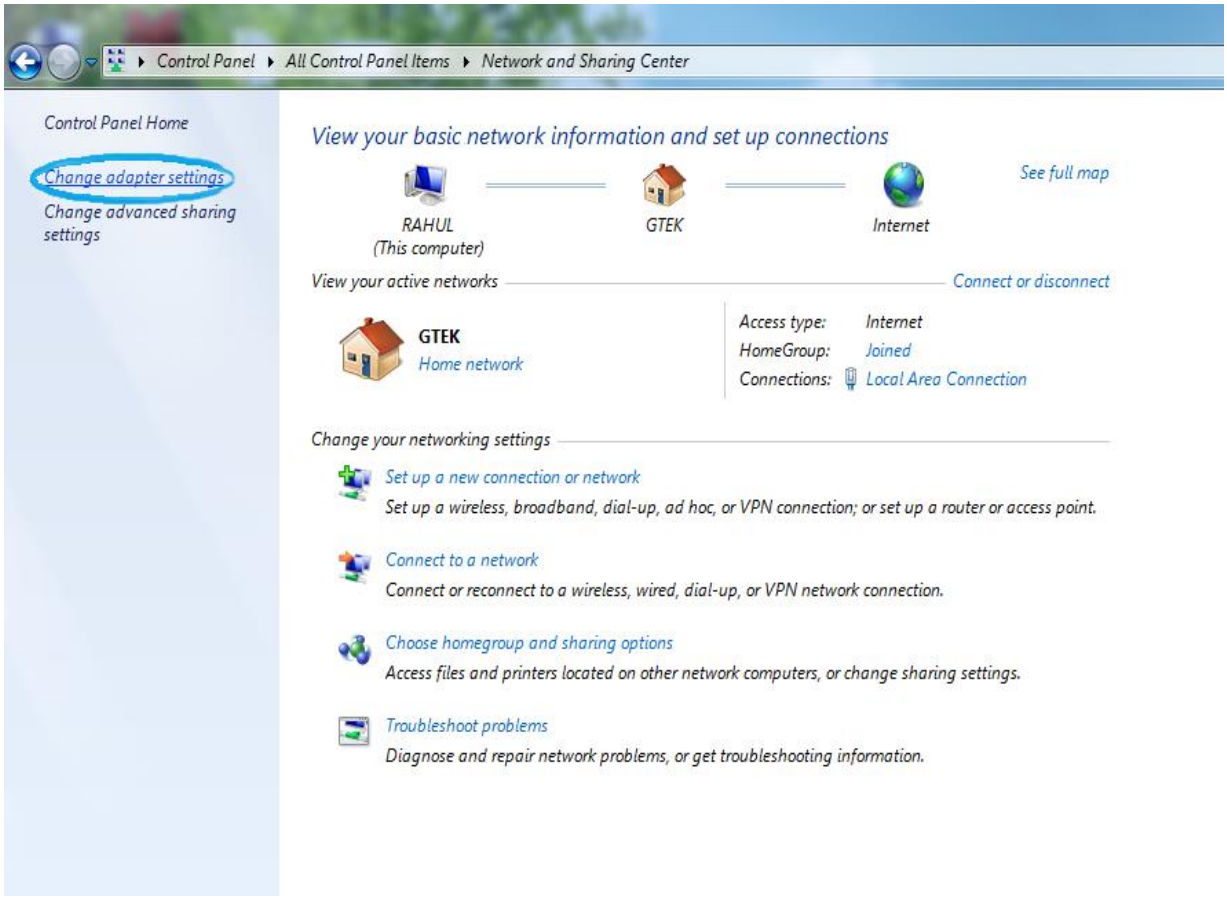


Figure 47 Network Sharing Center

4. Right click on Local Area Connection and go into property.

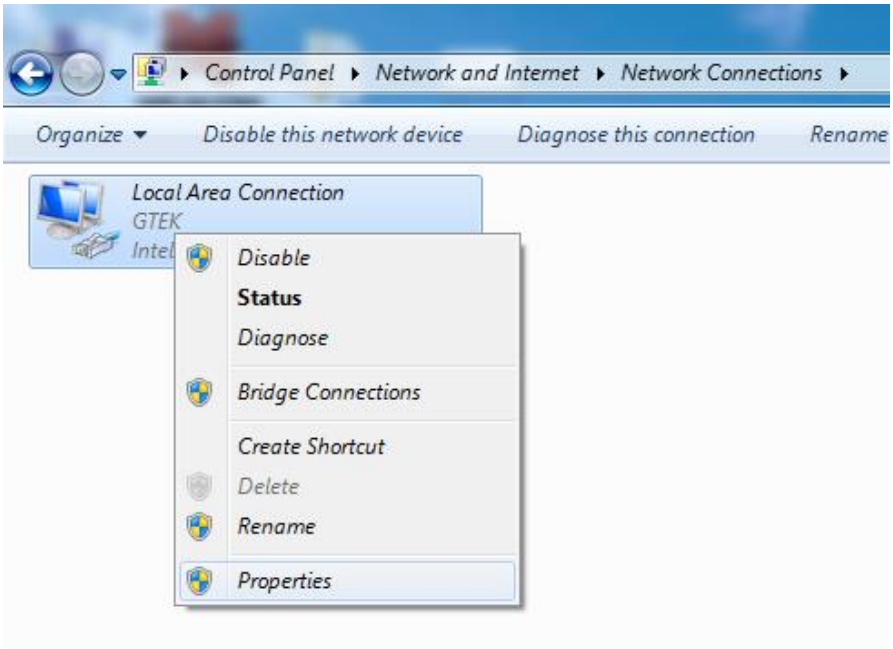


Figure 48 Local Area Connection

5. Open Property of Internet Protocol Version 4(TCP/IPv4).

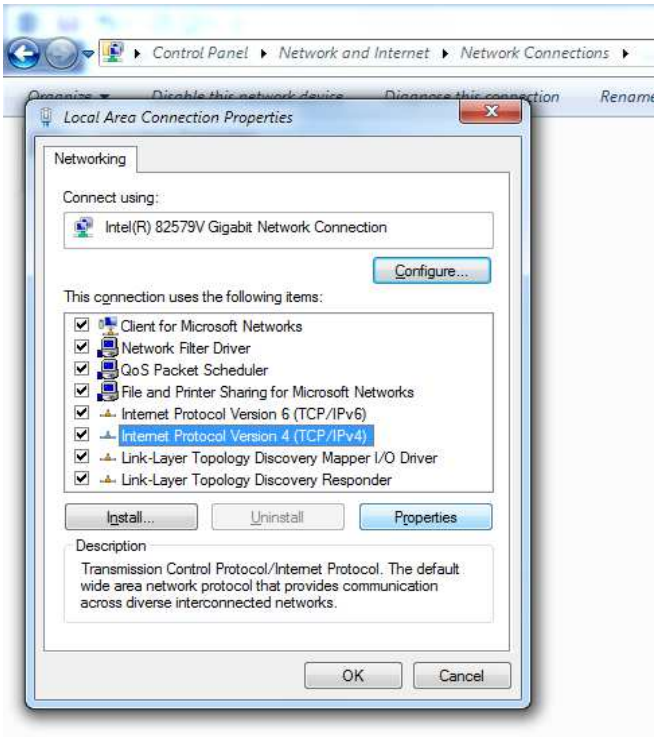


Figure 49 Internet Protocol Version 4(TCP/IPv4)

6. Make internet configuration as per below given in image.

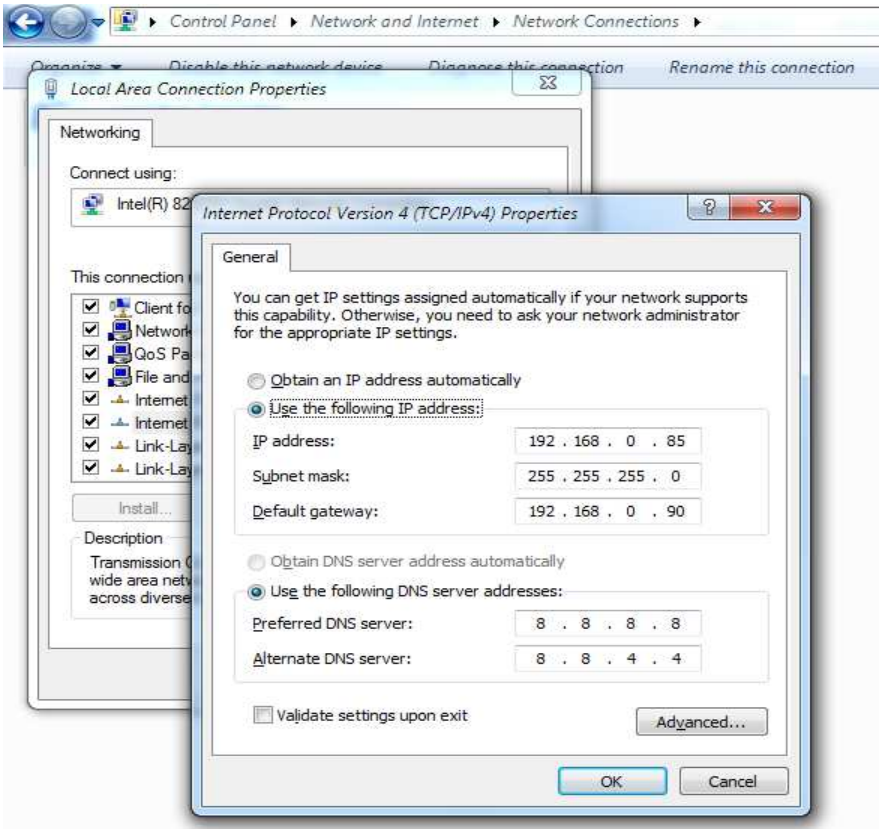


Figure 50 IP Setting

7. If you want to run the device in your LAN connection than follow the below steps.

8. Click on network configuration and login with default username: admin and password: admin.

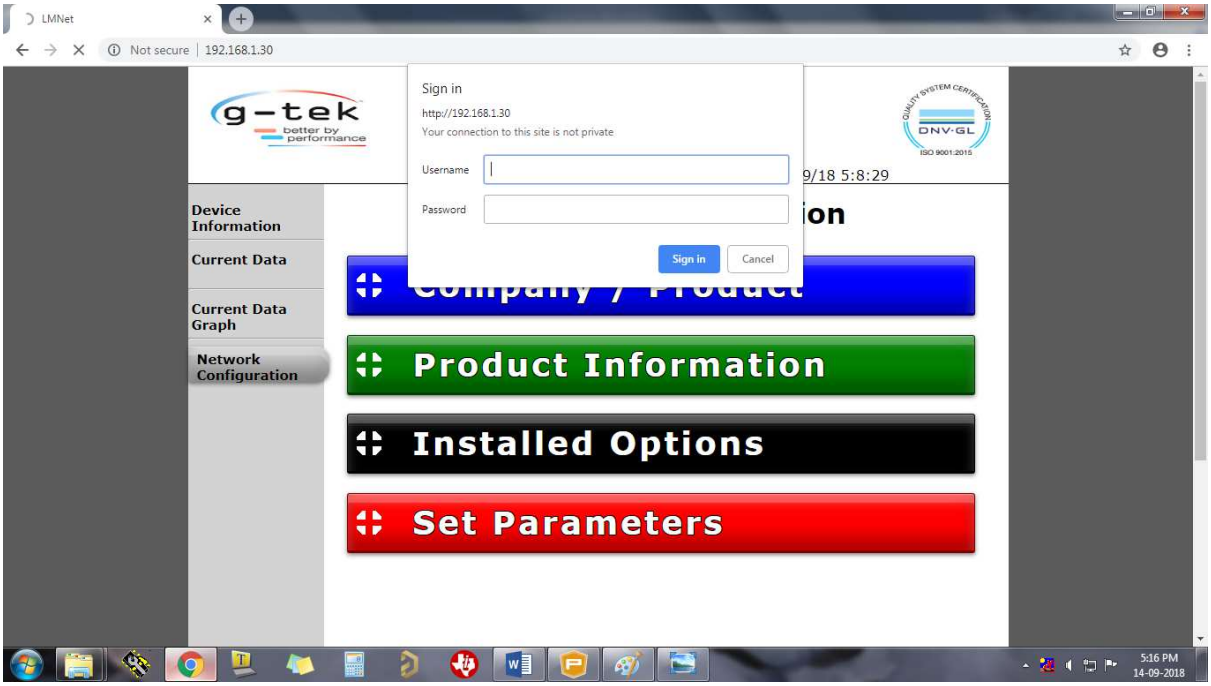


Figure 51 Network Configuration

9. Unmark DHCP button and make Network information as per your LAN configuration.

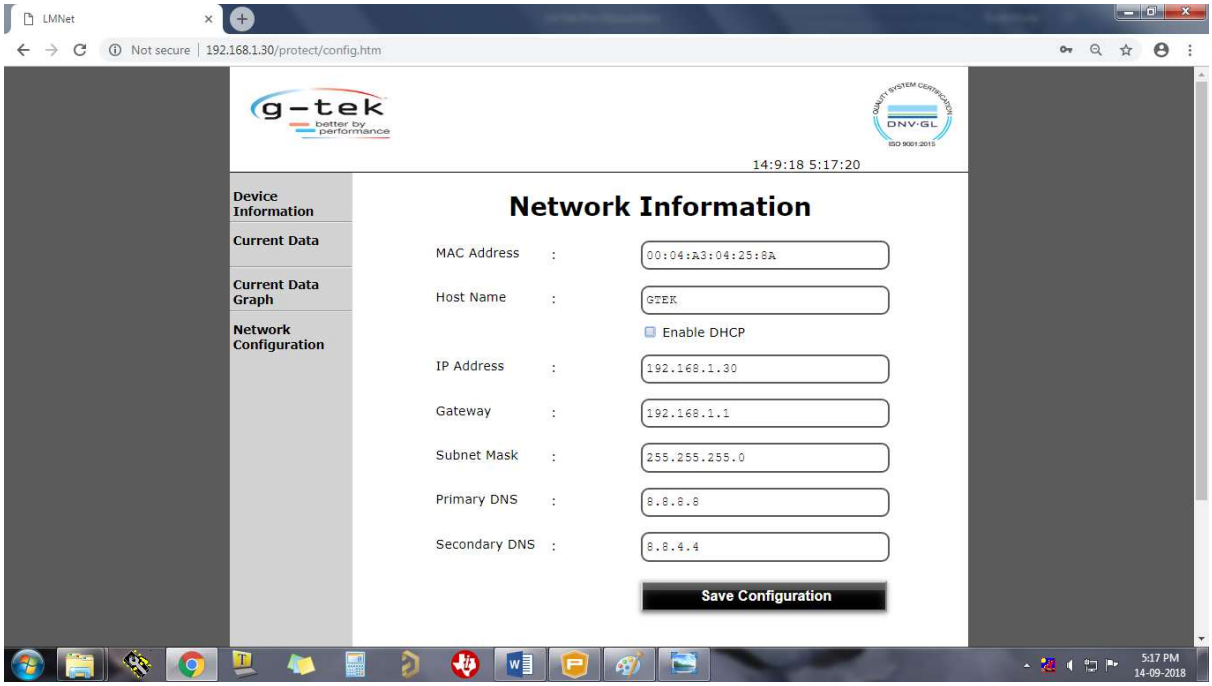


Figure 52 Network Information

10. Reconnect application using changed IP address.

9 TROUBLESHOOTING GUIDE

9.1 OPERATION TROUBLESHOOTING

9.1.1 How to turn on the LmNet?

- First, connect the 15 Volt 1.2 Amp DC Adaptor with the LmNet. Connect the adaptor to 230V plug and ON the switch for that plug. After pressing that switch on, red led will be turn on which is indicated by “PWR” on the front panel of LmNet and the LmNet will get turn on.

Figure 53 Power on indication on LmNet

9.1.2 What to do if user wants to communicate recorder using TCP/IP?

- For using LmNet communication in TCP/IP mode, connect the one end of Ethernet cable to the Ethernet port given at the bottom side of the LmNet and the other side of the cable to the PC’s or MODBUS’s Ethernet port. Then, Configure TCP/IP communication. Refer section 3.4 for figure of Ethernet port and Ethernet cable.

9.1.3 How to connect the sensor to be used with the LmNet?

- To connect any of the mentioned sensor as an input, there is a slot available at bottom side of LmNet. Every sensor has its positive and negative wires. Connect those wires respectively to the slots correspondingly in the LmNet (refer Sensor wiring section).

- Only, in case of RTD (2 wire/3 wire/4 wire), connect the negative wire of sensor also to the W terminal of the LmNet. In all other sensor cases keep the ground slot of the LmNet unconnected (open).

9.1.4 Can we connect more than 1 sensor at a time with the LmNet?

- Yes, there are 4 channels available at bottom of LmNet. So, user can connect at most 4 sensors to the LmNet and can use for measurements. As shown in the above figure, there are 4 slots of the same type in the LmNet, so all 4 sensors are to be connected as discussed above.

9.1.5 What is procedure if user forgets password?

- No, there is no such procedure to reset password, in this situation contact factory immediately.

10 STANDARD ACCESSORIES

10.1 15 V DC @ 1.2 AMP ADAPTOR

Figure 54 15 VDC 1.2 Amp Adaptor

Input Voltage: 100-240 V AC 0.35 Amp.

Operating Frequency: 50 to 60Hz.

Output voltage: 15V DC 1.2 Amp

10.2 ETHERNET CABLE

Figure 55 Ethernet RJ45 Cable

11 SPECIFICATION

The Specifications of LmNet are:

Table 4 Specification of LmNet

Model No	**LmNet Pro Networked Data Logger**
Display and Operator Panels:	
Display Type	8 digits ultra-bright, LED numeric / semi-alphabetic display
Display LED Color	Red
Display Height	0.8" High
Status Indicator	Channel number and corresponding parameter values, prompts and messages displayed for ease of setup and programming.
Panel Keys	Front panel KB consisting of 5 keys for programming and configuration setting.
Analog Input Details:	
No of Inputs	Maximum of 4
TC	Types J, K, C, R, S, T, B, E, N
RTD	PT 100
V dc	0-1V, ± 1V, 0-5V, ± 5V, 0-10V, ±10V
mA	4-20mA; 0-20mA (External Shunt Resistance of 50 Ω 0.1%)
Sensor Type and Range	Refer to the Table5
Accuracy:	
Accuracy	± 0.5% FSR
Linearization Error	±0.3˚C Max
Resolution	User Settable Up to 0.0001
CJC Accuracy	±0.5˚C at 25˚C
Step Response	<1 sec (10-90%)
Scan Rate	Each Channel Scanned Every 0.5 Sec
Protection:	
Input Impedance RTD/TC up to 100mV	> 20 M Ohm
Input Impedance Volt	> 20 M Ohm
Input Impedance mA	50Ω Shunt External
CMRR	>120 dB@ 50, 60 Hz at 13 Samples per Second
NMRR	>60 dB@ 50, 60 Hz at 13 Samples per Second
Maximum Common Mode Voltage	60V AC
Isolation Channel – GND	1.5 KV, 1 Minute
Input Protection	30 V AC/DC Max
Batch Storage/ Data Memory Details:	
Start/Stop	Key Press / Remote Start
Store Interval	0 To 240 min in Step of 1 Sec
Memory Setting	Roll Over / Stop on Full User Selectable

Memory Size	32000 Data Sets
Relay Output: *	
Contact Rating	1A; 230V AC resistive
Contact	Potential Free; 1 Form C (NO / NC)
Alarm Type	Common to all channels
Power Requirement:	
Supply Voltage	15 – 30 V DC, 1 A (DC Adapter Operated)
Power	15W Max with Maximum Configuration
Fuse Type	None
Transmitter Power Supply:	
Voltage	12 – 15 V DC
Max load current	30 mA
Short circuit protection	Yes
Isolation	NA
General:	
Termination	Non-Interchangeable, Removable Plugs, Individual for Each Channel
Data Storage	Non-Volatile Flash Memory for Parameter Storage
Password	Yes (User Settable)
Environmental:	
Temperature	(Operation) 5˚C to 45˚C (Limiting) 0˚C to 50˚C (Storage)-20˚C to 60˚C
Humidity	(Operation) 10 to 80 % RH Non-Condensing (Storage) 5 to 90 % RH Non-Condensing
Altitude	<2000 meter
Safety:	
Safety/EMI-EMC	IEC 61010-1/ EN 61326 Class B
Pollution Degree	II
Installation Category	II
Vibration	2g Peak (10Hz-150Hz)
Shock	IEC 61010-1
TCP/IP:	
Ethernet	10 /100 Base T (IEEE 802.3)
Connector	RJ45
Protocols Supported	MODBUS TCP/IP; HTTP; DHCP
Communication Activity LED	Yes
Isolation (Terminal – GND)	1 KV, 1 minute
Overall Dimensions:	
Dimensions L x W x D (mm) approx.	206 x 126 x 45

Features depends on the options ordered; Specifications are subject to change without notice.

Table 5 Accuracy and Range Table for various sensor inputs

Sensor Accuracy at 25 ˚C						
Sensor Type	***Standard***	***Range (˚C)***	***Error***	***Error% Input***	***Error% Range***	***Error Temperature Coefficient ppm/C***
RTD Type						
Pt 100	IEC751	-200 To +850	0.01˚C	0.04%	0.04%	30ppm
T/C Type						
J	IEC584.1	-200TO +1200	0.02˚C	0.05%	0.06%	25ppm
K	IEC584.1	-200 To +1300	0.04˚C	0.05%	0.06%	25ppm
C	Hoskins	0 To +2300	0.12 ˚C	0.05%	0.06%	25ppm
R	IEC584.1	0 To +1750	0.04˚C	0.05%	0.06%	25ppm
S	IEC584.1	100 To +1750	0.04˚C	0.05%	0.06%	25ppm
T	IEC584.1	-100 To +400	0.02˚C	0.05%	0.06%	25ppm
B	IEC584.1	200 To +1800	0.03˚C	0.05%	0.06%	25ppm
E	IEC584.1	-100 To +1000	0.03˚C	0.05%	0.06%	25ppm
N	IEC584.1	-250 To +1300	0.04˚C	0.05%	0.06%	25ppm

12 ORDERING CODE

LmNet order code is as below: -

Table 6 LmNet Order Code

Series		Relay		PC Interface		-	Memory Size		Sensor Type	
6	LmNet with 4 Universal I/P	0	None	4	TCP/IP		0	32000	0	Universal
		1	1 Output							