

OPERATING MANUAL

LM-XS^{Pro}

LM-U^{Pro} Series Universal Data Logger Model No.: 6003-x1



Manufacturers of :

- Circular Chart Recorders
- Inkless Recorders
- Paperless Recorders
- Scanners & Data Loggers
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- Application Software
- WHO PQS Qualified Data Loggers
- Vaccine Series Data Loggers

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1 SAFETY AND THE ENVIRONMENT

1.1 ABOUT THIS DOCUMENT

- This instruction manual is an essential component of the product.
- Please read this documentation through carefully and pay attention to the safety instructions and warning notices to prevent injuries and damage to the product.
- Keep this document handy so that you can refer to it when necessary.

1.2 ENSURE SAFETY

- Operate the product properly, for its intended purpose and within the parameter specified in the technical data. Using it beyond the specified limit can cause the damage to the product and personnel also.
- Do not use the product if there are signs of damage to the housing.
- Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from G-Tek.

1.3 PROTECTING THE ENVIRONMENT

- Dispose of faulty rechargeable batteries/spent batteries in accordance with the local regulations or valid legal specifications.

At the end of its useful life, send the product to a separate collection for electric and electronics devices (observe local regulations) or return the product to G-Tek for disposal. (Dispose or recycle the LM-U Pro data logger in accordance with the WEEE 2012/19/EU guidelines or your local regulations. For the suitable recycling, the device may also be returned to the manufacturer.)

2 SPECIFICATIONS

2.1 UNPACKING THE LM-U PRO DATA LOGGER

- LM-U Pro data logger is 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 device be examined. If the device is found damaged, it should not be operated, and the local representative contacted for instructions.
- Ensure that all accessories and documentation is removed from the box.
- If the LM-U Pro data logger is for immediate use, you can start installing it as per Installation instructions.
- **Please preserve the original packaging along with all internal packing for future transport requirements.**

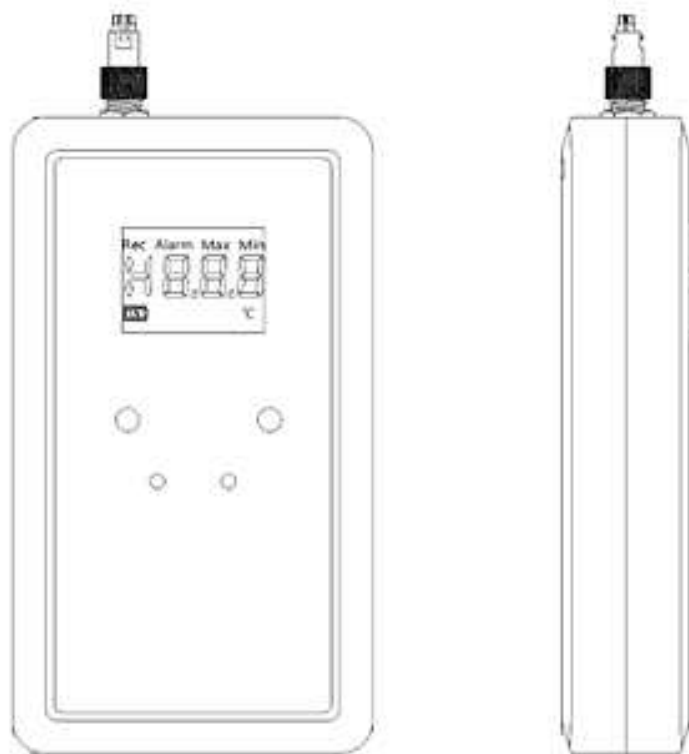


Figure 1 Front View of LM-U Pro data logger

2.2 MECHANICAL DIMENSIONS OF THE LM-U PRO DATA LOGGER

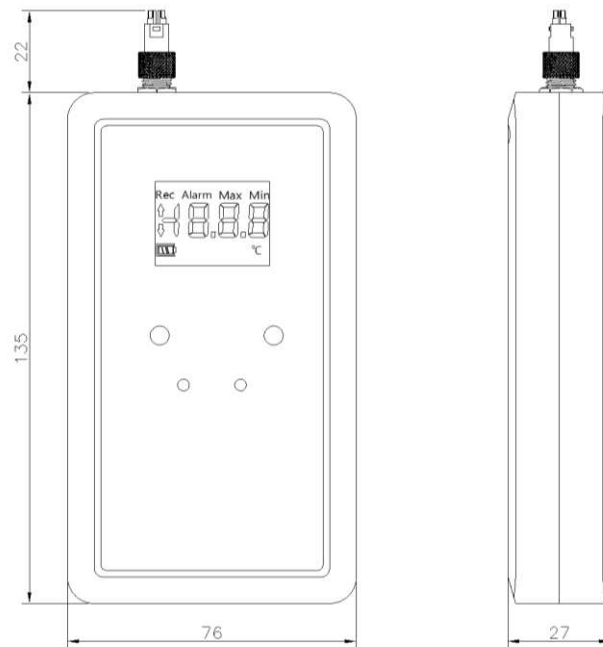


Figure 2 Mechanical Dimensions of the LM-U Pro data logger

2.2 USE

- The LM-U Pro data loggers (with an External Sensor) are used to save and read out individual external sensor reading a measurement series. They have been specifically designed for monitoring the storage and transportation of product subject to cold chain requirements.
- User can fully configure parameters like – Start delay, alarm high/low limit, sensor type, temperature unit, store interval etc. User can also set the information like, username and job description.
- Acceleration readings are monitored throughout the duration of the measurement program and saved when the set limit value is exceeded.
- Data logger programming and measurement report output are implemented via CSV, PDF files, LMView software needs to be installed.
- Data loggers come with individual NABL traceable calibration certificate.

2.3 TECHNICAL DATA

Table 1 Specification

Model No	LM-U Pro Data logger
Display and Operator Panels	
Display Type	3.5 Character LCD Display with Min, Max, Battery Status, Alarm Hi-Low and Current Temperature
Display Dimension	33 x 30 mm; TN Reflective
Display Resolution	0.1 / 1.0
Display ON/Auto off	Programmable(configurable) from PC Application
Status Indicator	HB LED for Device working STR LED for Batch Start / Stop
Panel Keys	Front panel KB consisting of 2 keys
Min / Max	Min Data Display / Max Data Display / Current Data with respect to Current Measurement
Display Blinking	on Alarm high - low Condition
Reading Types	Actual with Min Max. ON Display and PC
Analog Input Details	
No of Inputs	1
Sensor Input Type	Types J, K, R, S, T
RTD	PT-100; DIN43760, $\alpha=0.00385$
Vdc	0-1V
mA	4-20mA; 0-20mA (Internal Shunt Resistance of 50 Ω 0.1%)
Accuracy	$\pm 0.25\%$ FSD ± 1 digit
Linearization	Polynomial Based Software Linearization
Resolution	0.1/1.0
CJC Error	$\pm 0.5^{\circ}\text{C}$ for 0-50 $^{\circ}\text{C}$
Sensor Type and Range	Refer to the Table 2
Batch Storage / Data Memory Details	
Start / Stop	Immediate
Batch Stop	Intermediate Any time / Memory Full / At Specific Time
Store Interval	5 seconds to 18 hours
Delayed Start	Absolute / Relative up to 45 days
Tagging	Yes. On long press of a Key for 4 seconds with an indication on display
Batch Stop required to Download	No
Data Storage	Yes
Memory	32000 Data Records

Memory Type	Flash, Non-volatile, Data Retention up to 100 years
Download Batch	Intermediate after any time the batch started/After the Batch is stopped.
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
Power Requirement	
Supply Voltage (Battery Operated)	3 V, 3500 mAh, 2 X AA (1.5V) battery; User Replaceable
Battery Life	Up to 1 year battery operating life with shelf life of 1 year (if data is stored at 15 minutes interval and display OFF mode). The battery indicator on the display provides information on the remaining lifetime.
Battery Reverse Polarity	Protected
General	
Restore Calibration	User can revert to original factory calibration any time
Reusability	Yes
Online Feature	Power saver mode when USB connected, Online Batch with Current Data Display using LMView software
Communication	
Connectivity	Micro USB data cable (USB 2.0 Type- A ports Compatible)
Data Download Time	Approx. 5 minutes for 32000 data records
Standards	
EMI-EMC	EN 61326 Class A
Pollution Degree	II
Installation Category	I
Vibration	2g Peak (10Hz-150Hz)
Shock	IEC 61010-1
IP Rating	IP 30
Overall Dimension	
Dimension L x W x D (mm)	135 (L) x 76 (W) x 27 (D)
Mounting	Wall Mounting Bracket

*Feature depends on the options ordered; Specifications are subjected to change without notice.

Table 2 Sensor Types with their respective ranges

Sensor	Range
RTD (Pt-100)	-100 to 600 °C
4-20mA	± 1999
0-20mA	± 1999
0-1V	± 1999
J type TC	0 to +400 °C
K type TC	0 to +1200 °C
R type TC	0 to +1700 °C
S type TC	0 to +1700 °C
T type TC	-100 to +400 °C

3 PRODUCT DESCRIPTION

3.1 STATUS LEDs

Table 3 LED Indication

Indicator	Description
STR	Data Recording has started. At this time, the HBT LED will be off.
HBT	Data Recording is Off, and device is On. At this time STR LED will be off.

3.2 DISPLAY (LCD)

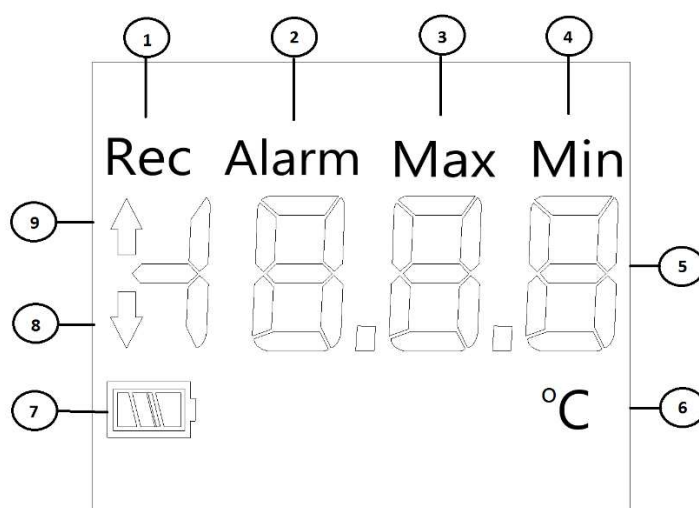


Figure 3 LCD Display Format

- 1) Measurement program running.
- 2) Alarm set limit value(s) exceeded.
- 3) Highest saved reading
- 4) Lowest saved reading
- 5) Current Reading
- 6) Unit.
- 7) Battery capacity: sufficient ; part empty ; low ; Empty .
- 8) Lower limit value exceeded
- 9) Upper limit value exceeded

Note: For Technical reasons, the display intensity of liquid crystal display becomes lower at temperatures below 0°C. This has no influence on the measuring accuracy. For technical Reasons, the battery performance decreases at lower temperatures. We Recommend the use of fully charged batteries to avoid a reset of the instrument at low temperatures.

3.3 KEY FUNCTIONS

Commissioning

The data loggers are delivered with batteries in removed condition. Insert the batteries to start the data logger as directed in quick reference manual. Once battery inserted, Status of “HBT” LED starts flickering every 0.5 sec and display will come up.

Min/Max & Tag Key

- Press this key and if the display is in OFF mode, it will start immediately, and display will start showing “Min”, “Max”, and current data
- Keep the key pressed for about 4 seconds while display is showing Min and Max values, the data logger will register (log) the data (**TAG**) at that instance of time if batch is running
 - Display will Show “**tAg**”
- Continue to press the key for more than 8 seconds, and if batch is running, batch will stop, and display will show “**StP**”. This will also stop recording further data.

Display Sensor Type

- Press this key and if the display is in OFF mode, it will start immediately, and display will show current **Sensor Type** in device.
- After showing sensor type display will be OFF and if display in ON mode then it will start showing readings.
- Following table show display string for different sensor type.

Table 4 Display strings for various sensor types

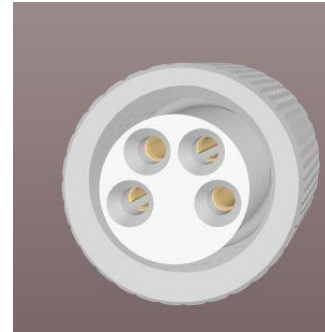
Sensor Type	Display String
RTD (Pt-100)	rtd
4-20mA	4MA
0-20mA	0MA
0-1V	U1v
J type TC	tcJ
K type TC	tck
R type TC	tcr
S type TC	tcS
T type TC	tct

3.4 SENSOR CONNECTIONS

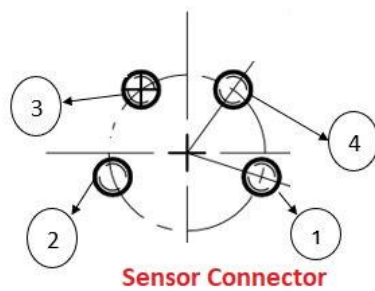
- Sensor input can be connected with device sensor connector by referring the figure 3 and Table 5.



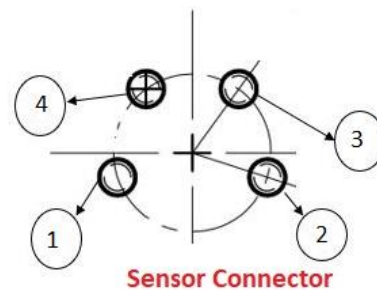
Male Connector



Female Connector



Sequence on Male connector



Sequence on Female connector

Figure 4 Sensor Connector Diagram

Table 5 Sensor Connection Table

Sensor Input	1	2	3	4
RTD	Red (+)	White (-)	White (Common)	White (Common)
Volt	(+)	(-)	Not connected	Not connected
mV	(+)	(-)	Not connected	Not connected
0-20 / 4-20 mA	(+)	(-)	Not connected	Not connected

Note :

1. Verify 1 to 1 connectivity for sensor properly. Colour code for sensor cable may be different.
2. For sensor type – RTD , Volt and mV keep DIP switch in OFF position.
3. In case of 0-20/4-20 mA sensor, keep DIP switch to ON position to get 50 Ω shunt resistance in sensor circuit.

3.5 IMPORTANT INFORMATION AND GLOSSARY OF TERMS

The terms used in batch configuration of the data logger are explained below. For details, please refer to the software help file.

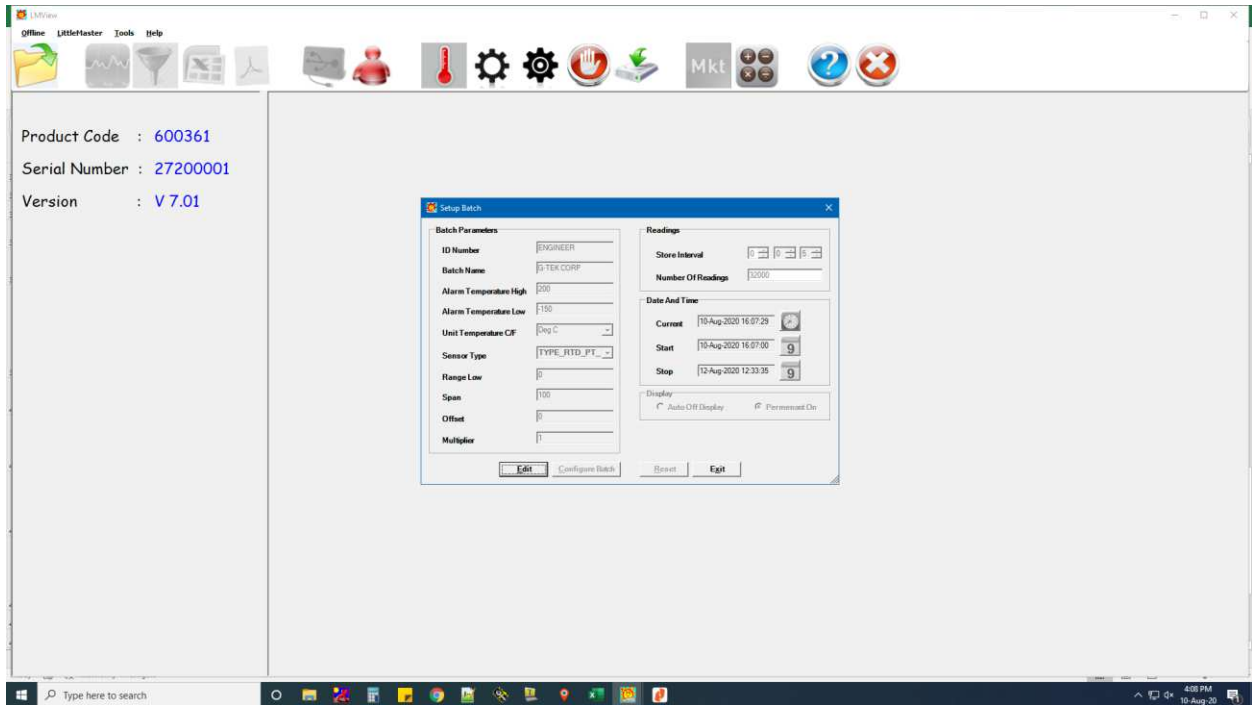


Figure 5 Batch Configuration of the Data logger

1. **ID Name:** User should assign an appropriate ID Name of maximum 10 alphanumeric characters.
2. **Batch Name:** User should assign an appropriate batch name of maximum 10 alphanumeric characters.
3. **Alarm High/ Low limit:** The set point values for the individual alarm high/low trigger.
4. **Unit of Temperature:** The unit for temperature is °C.
5. **Sensor Type:** User can select the required sensor input (refer the table 4) from the options.
6. **Range Low:** It is used for selecting the minimum output value that should be displayed on the LED display measured by the sensor.
7. **Span:** It is the total range of values that a user wants to measure. It indicates the total interval in which all the output values will be displayed.
8. **Offset:** Offset is the amount of deviation that occurs in the output due to calibration errors of the sensor. If not required, the default value should be kept (zero).

- 9. 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 should be set. The value of multiplier is 1.0 by default.
- 10. Store Interval:** It is the interval between two successive logging of data. It can be set between 5 seconds(minimum) to 18 hours(maximum).
- 11. No. of Readings:** This shows no. of data that will be recorded for the given batch configuration. This number is calculated based on Batch start, stop time and store interval. Maximum no. of readings is 32000.
- 12. Current Date and Time:** It shows current date and time of the data logger. Click on the “clock” button to sync the current date and time of the device with PC time as per selected time zone.
- 13. Start Time:** It is the time at which Batch will start in the device. User can preset the batch start time by selecting the date and time as per required batch start delay. The first data is stored at the batch start time.
- 14. Stop Time:** It is the time at which the data logging will be stopped in the device. User can set the stop time, if required otherwise it will be calculated based on the start time and store interval as per maximum number of readings.
- 15. Display Options:**
 - a) Display Auto Off (default) - This option is normally selected to save battery life of the data logger
 - b) Display Permanent On - This option will reduce the battery life of the data logger

4 USING THE PRODUCT

4.1 CONFIGURING THE DATA LOGGER

- Connect the data logger to PC via the Micro USB data cable.
- Click on LMView Software. For Further Process details, refer **LMView** help Manual.

4.2 MEASUREMENT PROCEDURE

Starting Measurement

Depending on the Configuration of the data logger, the measurement program is started via LMView Application batch configuration.

- Start Time: the measurement starts automatically once the configured time has been reached.
- The logger switches to REC mode, the STR status LED flashes. LED flash bright as per store interval.

Tag time Marks

While the measurement program is running (Rec Mode), user can log special event with time stamp by pressing MIN/MAX & TAG key for more than 4 seconds. Display will show “tAg”. Each TAG is considered as one record. User can place as many TAGS as he wants.

- Press Min/Max & Tag key for > 4 seconds.
 - Display Shows “tAg”.

Note: Total number of records will reduce according to number of tag events.

Ending Measurement

Depending on configuration of the data logger, the measurement program is ended via one of the following criteria:

- Press and hold “**Min/Max & Tag**” key for more than 8 seconds, “**STP**” message will be seen on the display for 3 seconds and recording will be stopped.
- The measurement stops automatically once the configured time has been reached.
- The maximum number of stored readings has reached .
- By connecting the device with the LMView application, using “Stop” option.

Once the measurement stops, “REC” message disappears from the device display, “RUN” LED turns Off and “STP” LED starts flashing.

4.3. READING OUT DATA

Displaying a measurement data report

- Connect the data logger to Windows PC via the Micro USB data cable. The current temperature reading as per the selected sensor will be seen as shown in the figure 6.

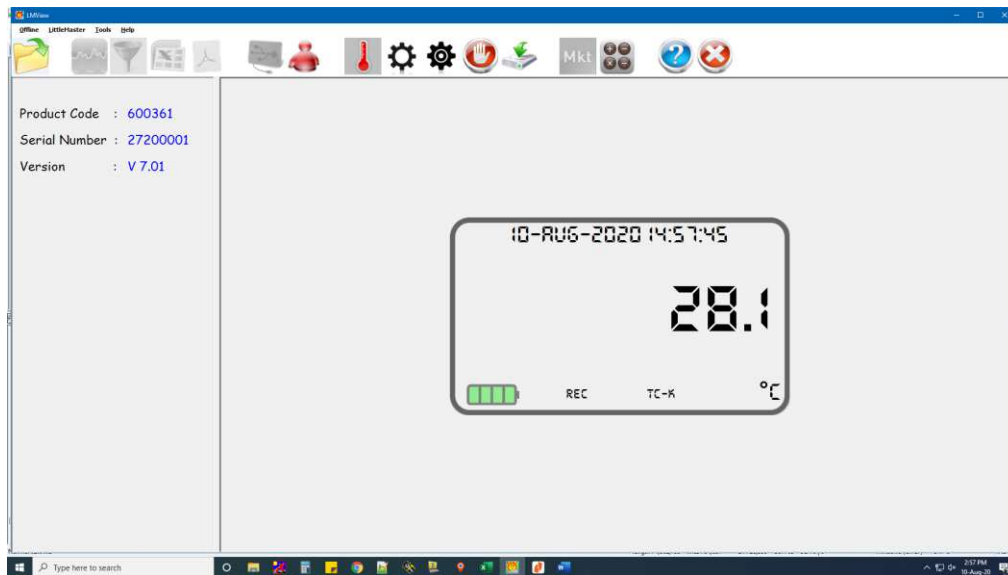


Figure 6 Current Temperature Reading of the LM-U Pro Data logger

- Open LMView Application to carry out analysis for process readings. Please refer to the software help file for detailed operation.

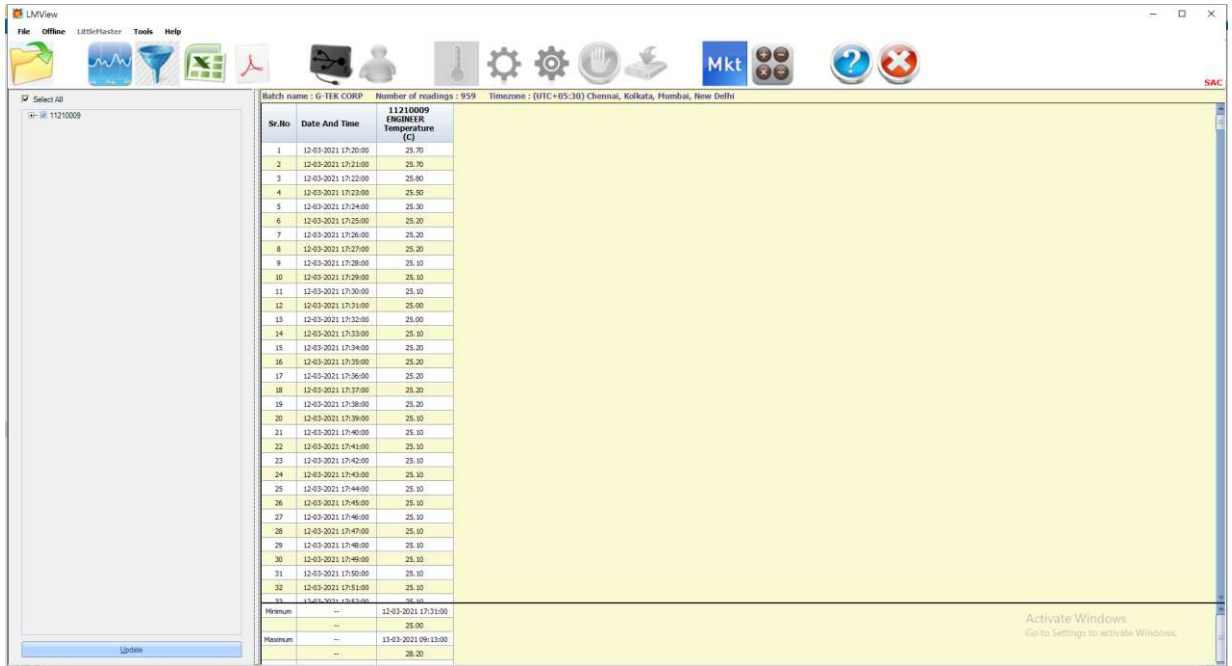
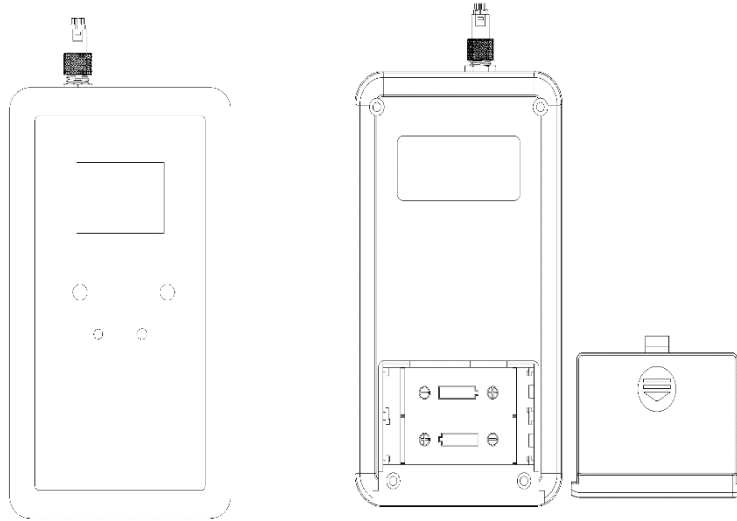


Figure 7 Downloaded data Summary

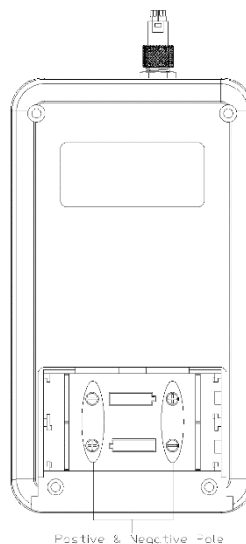
5 MAINTAINING THE PRODUCT

5.1. CHANGING THE BATTERIES

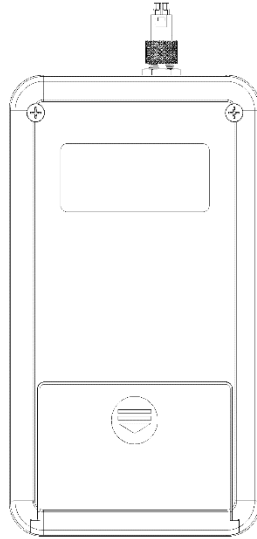
- Read out Store data.
- Open the battery compartment on the back of the data logger.



- Take the spent batteries out of the battery compartment.
- Insert new batteries (see technical data for type required) into the instrument so that the positive & Negative pole is visible. Suggested Battery – Energizer Ultimate Lithium AA cell.



- Place the battery compartment cover after battery replacement.



- The Data logger “Display ON”. Both LEDs are Flashing for <10 Sec.
- Reconfigure the data logger, see the section Configuring the data logger.
- Battery replacement stops a measurement that is currently running. However, stored measurement data are preserved.
- When new battery is inserted, the min/max value for the current data will be calculated from that time onwards and batch recording is resumed.

Note: It is advisable to reconfigure the data logger after changing the battery.

5.2 BATTERY DISPOSAL

- Dispose or recycle the battery in accordance with your local regulations.
- Do not expose the Data Logger to extreme temperatures as it may lead to the destruction of the battery and may cause injuries.

“Warning, Battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire.”

5.3 CLEANING THE INSTRUMENT

- If the housing of instrument gets dirty, clean it with damp cloth.
- Ensure that no liquid enters the inside of the housing
- Do not use any aggressive cleaning agents or solvents!

6 TIPS AND ASSISTANCE

Frequently Asked Questions (FAQ)

Table 6 FAQ

Question	Possible Cause/ Solution
LCD Display is blank.	<ul style="list-style-type: none"> • Please check whether the LCD display is Auto off in batch Configuration. • Batteries are low or dry.
Display show “ovr”	<ul style="list-style-type: none"> • If Sensor input is more than specified range which is given in Table 1, display can show “ovr” (Over the range). • Sensor is not inserted. • Wrong Sensor type selection during batch configuration. • Sensor wire broken.
Display show “udr”	<ul style="list-style-type: none"> • If Sensor input is less than specified range which is given in Table 1, display can show “udr” (Under the range). • Sensor is not inserted. • Wrong Sensor type select during batch configuration. • Sensor wire broken.
Device does not Connect in Application.	<ul style="list-style-type: none"> • Micro USB data Cable not working.
What change is required for 4- 20 / 0-20 mA sensor input?	<ul style="list-style-type: none"> • For 4-20mA, 0-20mA sensor input, make DIP switch near sensor connector in “ON” position to get internal resistance 50 Ω. • If another sensor type is selected, then DIP switch must be in “OFF” position.

7 ORDER CODE

Table 7 Order Code

Data Logger		Sensor Type		Pressure Rang		Communication Type		-	Software Type		Memory Type	
6	6X Pro	0	Universal Input	0	No Pressure	3	USB		6	LMView Non Secure	1	Memory
									7	LMView Secure		