

# METSyS NEC 220 Logger



## Operating Instructions

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## Order Reference

## Order No.

**METSyS NEC 220 Logger 4ph (US)**

**P-14.600.2**

**METSyS NEC 220 Logger 3ph (EU)**

**P-14.600.1**

**METSyS NEC 220 Logger 4ph (EU)**

**P-14.600.3**

**5V Power Adaptor**

**P-00.050.6**

Thank you for buying this product.  
For safety reasons and optimum use of this instrument  
read through the operating instructions very carefully.

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# 1. SAFETY

The following symbols appear on the products:



Attention! Refer to Manual



Do not apply around or remove from HAZARDOUS LIVE conductors without additional protective means. "Additional protective means" can be de-energizing the circuit or wearing protective clothing suitable for high voltage work.



Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler for disposal.





**Read all instructions completely before using this product.**

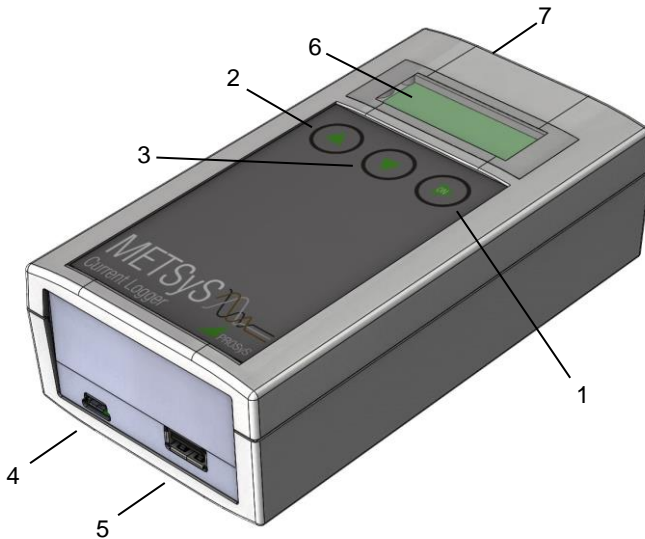
**To avoid electric shock:**

- Use caution during installation and use of this product; high voltages and currents may be present in circuit under test.
- Comply with local and national safety codes.
- This product must be used only by qualified personnel practising applicable safety precautions.
- Wear personal protective equipment as required.
- Do not use product if damaged.
- Always connect electronics unit to display device before installing the flexible measuring head.
- Never connect or disconnect the external power supply while the measurement head is installed on a conductor.
- Never connect or disconnect USB memory stick while the measurement head is installed on a conductor.
- If the probe is used in a manner not specified by the manufacturer the protection provided by the equipment may be impaired.

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## 2. INTRODUCTION

The data logger provides automated non-intrusive acquisition of three-phase plus neutral AC current measurements, with data storage in non-volatile internal memory. The data can be easily transferred to a computer via a USB memory stick for later analysis.



**Figure 1: Main Instrument Features**

1. On/Enter button
2. Up button
3. Down Button
4. Charging Socket (USB micro-B)
5. Memory Stick Socket (USB A)
6. Display
7. Probe Socket (10-pin)

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### 3. SPECIFICATIONS

Measuring range	up to 4000A AC
Accuracy (45-65Hz)	$\pm 1\%$ of reading $\pm 1A$
Position sensitivity	$\pm 2.5\%$ of reading
Power supply	Internal 6900mAh Lithium-Ion battery
Battery life	100 hours typical
Battery charger	5V 1A micro USB B charger
Charging time	up to 12 hours from fully discharged

#### Data Acquisition

Resolution (ADC sampling)	22.5 bits
Sampling frequency	8 kHz (133 samples/cycle at 60 Hz)
Averaging time for min/max values	8-cycles
Input frequency range	40 Hz – 2 kHz
Wiring configuration	Current only: 3-phase or 3-phase+neutral
Log intervals (user selectable)	10s, 30s, 1, 2, 5, 10, 15, 30, 60 mins
Log durations (user selectable)	1, 3, 8, 24, 48, 72 hours or unlimited
Internal memory size	2 GB (up to 66 million readings)

The logger stores up to ten logs and has enough memory to store ten 1-year logs with 10s sampling. However, to keep file sizes (and transfer and processing times) reasonable, it is recommended that a logging interval of no less than 15 minutes is used for logs that will run for 30 days or longer. (In general, choose an interval that limits the total number readings in each log to less than 40000).

#### Enclosure

Material	ABS
Dimensions	195 (l) x 101 (w) x 44 (d) mm



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## **Interfaces**

USB-A	File transfer via flash drive
USB-mini	Power, 5Vdc
BLE (Bluetooth Low Energy)	Android App / iOS App

## **Probe**

Probe conductor diameter	100mm (4 inches), double insulated
Probe diameter	6mm (0.24 inches)
Degree of Protection	IP67

## **General Characteristics**

Operating temp.	0°C to +60°C (32°F to +140°F)
Operating temp. charging battery	0°C to +45°C (32°F to +113°F)
Storage temp.	0°C to +45°C (32°F to +113°F)
Storage above this temperature may damage the rechargeable battery and shorten battery life.	
Operating humidity	15% to 85% (non-condensing)
Recommended Calibration period	2 years

ROHS and WEEE compliant

Rated for continuous use

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## 4. OPERATION

### 4.1 BATTERY



Do not attempt to remove or replace the internal rechargeable battery.

**Never operate the unit without the cover fitted.**

Before using the unit for the first time, the battery should be fully charged.

To charge the battery, proceed as follows:

1. Navigate through the menus to the **Shutdown** option using The **Up/Down** buttons. Press the **On/Enter** button to shut down (if necessary, stop logging first to make sure that the **Shutdown** menu is available).
2. Recharge the battery by connecting a mains-powered standard USB charger to the micro-B socket (3).
3. While charging, the unit will show the charging symbol on the main display ⚡
4. When fully charged, the unit will show the symbol 🔋 on the main display (only while the charger is connected).

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## 4.2 INSTALLING CURRENT PROBES



Read safety section of instructions before operating this product.



Follow local and national guidelines for installation.



**The flexible current probe is not for use on conductors with a potential of over 1000V.**

Wrap the flexible probe around the conductor to be tested, close coupling. Energise the circuit under test. Locate the coupling away from nearby conductors.



**Always use appropriate equipment for personal protection. Do not use the flexible current probe to measure bare conductors unless wearing protective clothing suitable for high voltage work.**

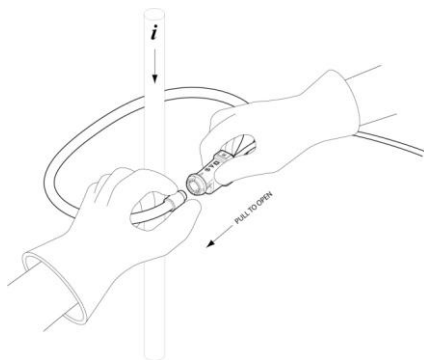


Figure 2: Installing Flexible Probes

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## 5. USER INTERFACE

### 5.1 TURNING THE UNIT ON AND OFF

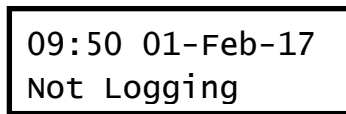
If the display is blank, activate the unit by pressing the **On/Enter** button. If the unit fails to respond (or shuts down again after a few seconds) the internal battery is depleted – charge the battery by connecting an external USB charger.

While the unit is operating, the LCD backlight will turn off automatically if no buttons are pressed for 30 seconds. The display itself will turn off if no buttons are pressed for 120 seconds, and, if not logging, the unit will completely shut down automatically after 4 minutes of inactivity.


The unit can also be turned off manually via the **Shutdown** menu (if not logging).

### 5.2 NAVIGATING THE MENUS

The instrument has a 2-line LCD display. The main display (when not logging) is shown in Figure 3.



**Figure 3: Main Display (not logging)**

If Bluetooth is enabled, the Bluetooth icon,  is shown at the bottom-right of the main display (see section 5.8)

The menus are controlled by the three soft buttons below the display. The function of these buttons varies depending upon the menu or screen displayed.

Button 1 ▲ **Up**:

- Move up through the menus or increment the field currently highlighted by the cursor (e.g. in date or time editing)
- 'Y' – confirm the displayed action (e.g. in response to the question 'Are You Sure?')

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Button 2 ▼ **Down**:

- Move down through the menus or decrement the field currently highlighted by the cursor (e.g. in date or time editing)
- 'N' – cancel the displayed action (e.g. in response to the question 'Are You Sure?')

Button 3 ► **On/Enter**:

- When the right triangle (►) is shown on the screen take the currently displayed action or edit/change the currently displayed setting (moves on to the next character/field when editing an alphanumeric field).

### 5.3 SETTING LCD CONTRAST

Set the display contrast to your preference by scrolling to the **LCD Contrast** menu item (Figure 4) using the **Up/Down** buttons. Cycle through the 11 available contrast settings using the **Enter** button. (This setting is stored in non-volatile memory and should need to be set only once).

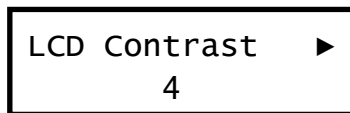


Figure 4: LCD Contrast

### 5.4 SETTING TIME AND DATE

Scroll down to the **Time** menu using the **Up/Down** buttons. The current time setting is displayed.

Set the time using the 24hr clock. The **Enter** button starts editing the time and moves the cursor from one digit to the next (Figure 5). **Up/Down** changes the underlined digit.

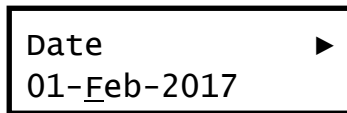
After editing the minutes units digit, pressing **Enter** a final time sets the time and exits to the main instrument display screen.



**Figure 5: Editing the Time**

Scroll down to the **Date** menu using the **Enter** button. The current date is displayed. Press **Enter** to start editing the date and to move the cursor from one field to the next (Figure 6). The **Up/Down** buttons change the underlined digit/month.

After editing the year units digit, pressing **Enter** a final time sets the date and exits to the main instrument display screen (if an invalid date has been set, e.g. 31-September, the unit will briefly display 'INVALID DATE' and return to date editing mode).

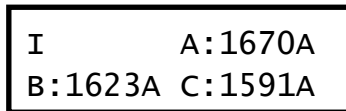


**Figure 6: Editing the Date**

A small internal backup battery maintains the time and date even when the main battery is flat.

## 5.5 CURRENT MEASUREMENTS

For live three-phase current measurements, press **Enter** button until the screen of Figure 7 is displayed.



**Figure 7: Live Current Measurements (Report Neutral Off)**

This displays the instantaneous AC current readings for three phases (I) in Amps.

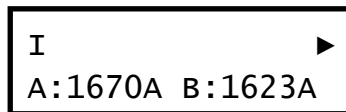
Pressing **Enter** again repeatedly will move on to screens showing the Maximum (I<sub>max</sub>), Minimum (I<sub>min</sub>) and Average (I<sub>avg</sub>) current readings determined over the previous **Log Interval** setting. If no

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max/min/avg reading is yet available i.e. if the measuring interval has not yet elapsed, these readings are temporarily blanked (shown as '----').

If the instrument has been logging, Ipeak shows the peak value of the Iavg reading in the currently active (or most recent) log.

The **Report Neutral** menu allows the reporting (and recording) of the Neutral current values. Pressing **Enter** toggles the Neutral reporting ON or OFF (this setting cannot be changed if already logging). When **Report Neutral** is ON, the current display screens change as shown in Figure 8.

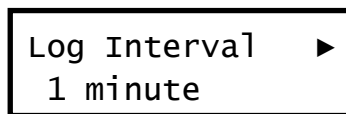


**Figure 8: Live Current Measurements (Report Neutral On)**

In this 4-phase mode, pressing **Enter** will toggle between displaying the first two phases (A and B) or the other two phases (C and N).

## 5.6 LOGGING

Prior to beginning logging, check or set the desired **Log Interval** (Figure 9), **Log Duration** (Figure 10) and **Log Label** (Figure 11) via the menus.



**Figure 9: Log Interval Menu**

**Log Interval** sets the time between current readings in the log file (it also sets the interval over which minimum, maximum and average currents are measured when not logging). The interval can only be adjusted when not logging (if logging the current interval is shown but the **Enter** button is disabled).

The **Enter** button cycles through: 10s, 30s, 1min, 2mins, 5mins, 10mins, 15mins, 30mins and 60mins.



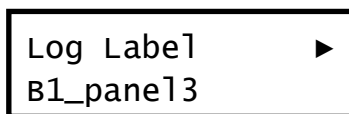
**Figure 10: Log Duration Menu**

**Log Duration** sets the length of the next log created by the **Start New Log** command. The duration can only be adjusted when not logging (if logging the current duration is shown but the **Enter** button is disabled).

The **Enter** button cycles through: 1, 3, 8, 24, 48 and 72 hours, then 'Unlimited'.

In the Unlimited mode, the instrument will log readings continuously for as long as power is available (or until the user selects 'Stop Logging').

When a fixed duration is selected, the instrument will shut down at the end of log to conserve power.



**Figure 11: Log Label Menu**

**Log Label** allows an optional text label to be stored in the log which will be added as a prefix to the .csv filename (for identification when the log is transferred to a computer or phone/tablet using USB or Bluetooth). The maximum length of the label is 12 characters.

When editing the text

- clicking the **Up** and **Down** buttons cycles through alphanumeric characters at the cursor position
- clicking the **Right** button moves the cursor on to the next character
- a long press (greater than 0.5s) of the **Up** or **Down** button changes between character sets: lower case -> upper case -> digits -> symbols (reverse order with **Down**)



- 
- a long press (greater than 0.5s) of the **Right** button inserts a character
  - to finish/confirm a label, move the cursor to the right of the final character then select the tick ✓ from the symbol characters and press **Enter** (any previous characters to the right of the tick will be discarded)
  - to delete the character at the cursor position, select ← from the symbol characters and press **Enter**
  - to move the cursor back to the start of the label, first move to the character after the end of the label, then select ← from the symbol characters and press **Enter**
  - to abort all the changes made to a label, select x from the symbol characters and press **Enter**

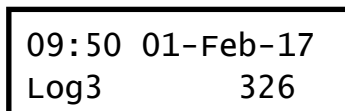
The **Clear Label** menu item will remove any existing label.

To begin logging, use the **Up/Down** buttons to scroll down to **Start New Log** (Figure 12) in the menus, then press **Enter**.



**Figure 12: Start New Log Menu**

The instrument will start logging and return to the main display, which in logging mode is as shown in Figure 13.

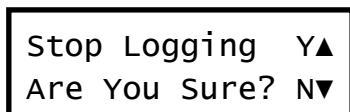


**Figure 13: Main Display (logging)**

When the command to start logging is given, readings commence at the next clean time boundary based on the logging interval e.g. if a log is started at 10:26 with readings at 15 minute intervals, the first reading will be averaged from 10:30 to 10:45 and recorded at 10:45.

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To stop logging (either to close an unlimited log or end a fixed-duration log early) scroll to the **Stop Logging** menu item and press **Enter**. The confirmation screen of Figure 14 will be shown.



**Figure 14: Stop Logging Confirmation Screen**

Press **Up** to confirm, or **Down** to cancel.

After stopping logging, if the previous log was unlimited, or it had a fixed duration and the original end-time has not yet passed, you may resume the log. To do so, select **Resume Log** in the menus and press **Enter**. Readings will be appended to the previous log file. If the previous log file had a fixed duration (and was stopped early) logging will stop again the designated number of hours after the log start time.

Up to 10 log files are retained in the instrument internal memory. The log file currently in use (selected automatically) is indicated by the number next to 'Log' at the bottom left of the display. The figure at the bottom right of Figure 13 initially indicates the number of readings in the log. Pressing the **Right** button repeatedly will change this display to the log time elapsed and then to the log time remaining (for logs of finite duration).

Logs may be transferred to computer using an external USB memory stick (formatted as Fat32) or transferred via Bluetooth to a smartphone or tablet (using a dedicated App) and then emailed from that device as an attachment.

After 10 logs have been created, the internal log files will be reused sequentially i.e. the internal log files will be overwritten, starting with the oldest.

To delete all the log files in the instrument scroll to the **Delete All Logs** menu item and press **Enter**. A confirmation screen similar to that of Figure 14 will be shown. NB. There is no menu item to separately delete an individual log because the internal log files are reused (overwritten) after 10 logs have been created.



Using the **Delete All Logs** command will result in **ALL** readings stored in the instrument's internal memory being **permanently lost**. Take care to ensure that any desired logs have been transferred to a computer and backed-up before using this option.

## 5.7 TRANSFERRING LOGS USING USB

Logs of any size may be copied to an external USB memory stick for importing into a computer.

The instrument cannot copy files while it is still logging (the Copy commands will not appear in the menus). If necessary, **Stop Logging**, first before copying files out. (If desired, the current log may be continued after copying using **Resume Log**).

The memory stick used must be formatted with the FAT32 file system. Most memory sticks already have this format and can be used in the instrument without modification or re-formatting. The instrument can add log files to a memory stick that already contains other files.

In the unlikely event that a memory stick does need to be reformatted, please refer to section 5.11 (and take the necessary precautions to avoid data loss).

To copy the **latest** log file to a USB memory stick, use the **Up/Down** buttons to scroll to **Copy Log to USB** in the menus, then press **Enter** to perform the copy. The name that the copied log file will have on the USB stick, and the progress of the file copy, is displayed on screen as shown in Figure 15.

```
MCL67890_171225
_1159           43%
```

Figure 15: File Copy Progress



**Do not remove the USB memory stick while the file copy is in progress.**

The filename created on the USB memory stick is based on characters 6 to 10 of the serial number of the logger combined with the date and time of the first reading in the log e.g. with no log label set, if the serial number is M17400000316 and the first entry in the log was taken at 01-Feb-2017 18:42, the output file name will be MCL00003\_170201\_1842.csv generated as follows:

		S/N extract		Year	Month	Day		Hour	Minute	
without label:										
	MCL	00003	_	17	02	01	_	18	42	.csv
with label:										
(label)	_	00003	_	17	02	01	_	18	42	.csv

If a label of “Panel3” was set, the filename would be Panel3\_00003\_170201\_1842.csv

The output file format is plain-text (.csv) which can be read by many applications including Excel. A sample of the log file format (for a 3-phase log) is shown in Figure 16.

```
Time,IA Avg,IB Avg,IC Avg,IA Min,IB Min,IC Min,IA Max,IB Max,IC Max
21-Feb-2017 11:32:05,100,200,300,50,100,150,199,299,399
21-Feb-2017 11:33:05,100,200,300,50,100,150,199,299,399
21-Feb-2017 11:34:05,100,200,300,50,100,150,199,299,399
21-Feb-2017 11:35:05,100,200,300,50,100,150,199,299,399
```

**Figure 16: Output .csv file format**

To copy **ALL** the log files in the instrument (up to 10 previous logs) to a USB memory stick, use the **Up/Down** buttons to scroll to **Copy All to USB** in the menus, then press **Enter** to perform the copy.

## 5.8 TRANSFERRING LOGS USING BLUETOOTH

Logs of up to 3000 readings can be transferred via Bluetooth Low Energy (BLE) to a compatible smartphone or tablet running the GMC-I PROSyS Logger App, refer to section 6.

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## 5.9 SECURITY

The instrument has a passcode-protected lockout option to prevent and changes to settings via the menus. This can be used to prevent anyone from stopping the logger or interrupting measurements (e.g. if the unit is to be left logging unattended for several days)

To enable locking, select **Enable Lockout** from the menus (Figure 17). This menu item is only displayed if the lockout is currently disabled.

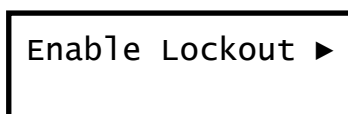


Figure 17: Enable Lockout Menu

The **Enter** button prompts the user to set and confirm a 4-digit numeric passcode (Figure 18). Once this is done, the instrument will lock (requiring the passcode to unlock) if no keys are pressed for 90 seconds.

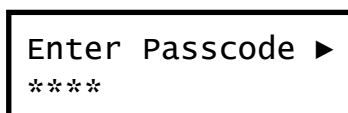


Figure 18: Passcode Entry Screen

After enabling the lockout, the instrument returns to the main screen.

Once in the locked state, all menu functions are disabled (including Start/Stop logging and Shutdown) except for the **Unlock** function. The status and current screens can be displayed, but no settings (time/date etc.) can be changed.

If the instrument is logging, it will continue to do so in the locked state.

To unlock the instrument, select **Unlock** from the menus (this menu item is only displayed if the unit is currently locked). The **Enter** button prompts the user to enter the previously stored

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passcode. The full menus will then be available again (but the instrument will re-lock if no keys are pressed for 90 seconds). After unlocking, the instrument returns to the main screen.

To disable the passcode lockout, select **Disable Lockout** from the menus. This menu item is only displayed if the lockout timer is currently enabled but the instrument has not (yet) locked. **Enter** disables the lockout and returns to the main screen.

A (new) passcode is entered via the **Enable Lockout** screen.



**If enabling the lockout, ensure that you keep a record of the passcode you enter!**

## 5.10 INSTRUMENT STATUS

The **Battery** menu item shows the Lithium-Ion battery status. It indicates whether the battery is Trickle Charging, Fast Charging, Not Charging (e.g. no external power available) or Full.

The **Power** menu item shows which external power sources are available, AC (energy harvesting) and/or USB (mains charger).

The **Bluetooth** menu item shows the status of the Bluetooth connection between the logger and a smartphone/tablet.

In the **About** menu item, **Enter** cycles through S/N (Serial Number); Firmware (F/W) version; Firmware date; BLE MAC (Bluetooth module address); and BLE version.

## 5.11 FORMATTING A USB MEMORY STICK

If a memory stick needs to be re-formatted to be used in the instrument, it is preferable to do this using a computer. If a computer is not available, a memory stick may be formatted in the instrument itself by scrolling to the **Format USB** menu (Figure 19) using **Up/Down**.



Figure 19: Format USB menu

Pressing **Enter** to format the memory stick will then produce the warning screen of Figure 20.

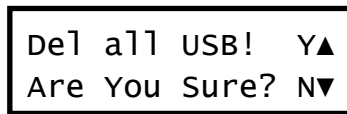


Figure 20: Format USB Warning Screen

Pressing the **Up** button (Y) will format the inserted memory stick.



**Formatting a memory stick (in a computer or in the instrument) will erase ALL existing data from it!** Ensure that any required files on the memory stick are backed-up first.

## 5.12 FIRMWARE UPDATE

GMC-I PROSyS may, from time-to-time, release an updated version of the internal firmware of the logger to fix bugs or to introduce new features.



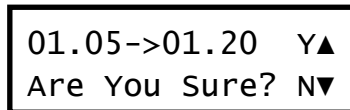
**It is recommended that you transfer any logs stored in the instrument to a computer before performing a firmware update.**

If you have received an update file from GMC-I PROSyS and wish to reprogram the logger, copy the required update file, **update.bin** to the top-level directory of a USB memory stick (it doesn't matter if the memory stick also contains other files and directories).

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Insert the memory stick into the logger, connect an external AC power source and select **Firmware Update**.

The logger will show the current version of firmware installed as well as the firmware version found on the memory stick as shown in the example of Figure 21.



**Figure 21: Firmware Update Confirmation**

Normally, you would want to replace the firmware with a newer version (higher version number). If you are happy to go ahead and replace the internal firmware with the version shown, press **Up** (Y) or press **Down** (N) to cancel.

If the update is confirmed, the progress of the update will be displayed on screen and, after a short while, the logger will restart with the new version of the firmware.



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## 6. APPLICATION SOFTWARE

### 6.1 DOWNLOAD APP

The METSYS Current Logger app can be downloaded by scanning the QR code below or search “METSYS” in the App Store or Google Play.



### 6.2 TURN ON BLUETOOTH

To enable Bluetooth LE on the Logger, scroll to the **Bluetooth** menu and press **Enter** to toggle the status to ON. The logger will show the current Bluetooth status as shown in the example of Figure 22.



Figure 22: Bluetooth Status (Advertising)

### 6.3 CONNECT TO CURRENT LOGGER

When the logger is in **Advertising** mode, it can be discovered by a smartphone or tablet running the Current Logger App. If the logger is selected within the App, see Figure 23, it will connect to the smartphone/tablet and the logger will display **Data Mode**. Data can then be transferred between the logger and the App.

If no data is transferred between the logger and a tablet for a period, Bluetooth on the logger will be automatically switched off.

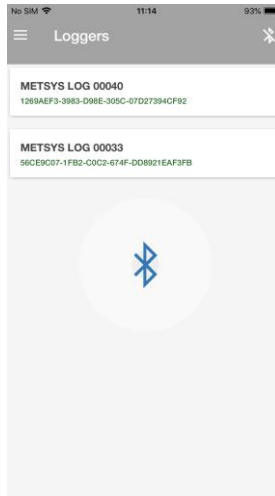


Figure 23: Current Logger Selection Screen

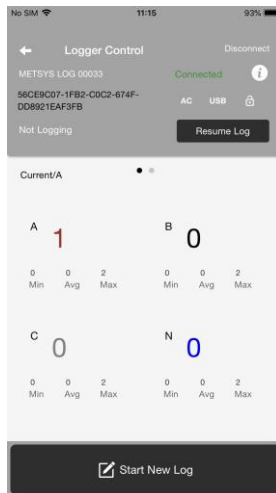


Figure 24: Live Readings

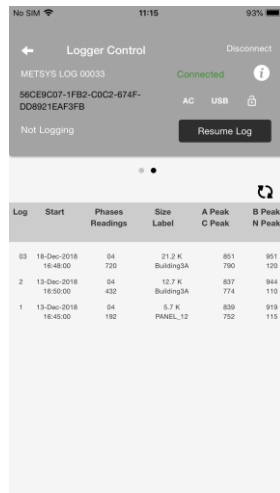


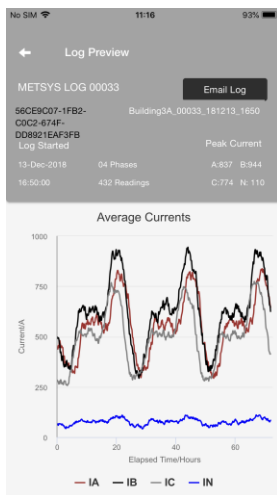
Figure 25: Log Screen

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## 6.4 VIEW LIVE DATA AND LOGS

When connected, the App can display the live readings from the logger (I, Imin, Imax, lavg), see Figure 24. Sweeping to the left moves to the log screen, see Figure 25.

The App can be used to select any one of the internal logs (up to 10 previous logs) to be transferred to the tablet or smartphone. The selected log will be downloaded from the logger and a preview graph displayed in the App, see Figure 26. The log can then be emailed as an attachment, by selecting "Email Log". The attached file will have the same in file name and format (as described in Section 5.7) as it would have if it was transferred via USB.



**Figure 26: Log Preview**

The instrument can transfer files via BLE when it is in logging mode, but no readings will be recorded to the internal log while the BLE file transfer is in progress.

Logs of up to 3000 readings can be transferred via Bluetooth Low Energy (BLE) to a compatible smartphone or tablet running the GMC-I PROSyS Logger App. The log size limit is imposed

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because the data transfer rate of BLE is considerably slower than that of USB.

## 6.5 START LOGGING

The App can be used to configure and start a new log as an alternative to using the front panel controls on the logger itself. To start a new log, press the “Start New Log” button at the bottom of the live reading screen shown in Figure 24.

The Start New Log screen, Figure 27, allows a log label to be entered. Upper- and lower-case letters, numbers and ( ) - \_ can be used in the label. If no label is entered, then the default label described in Section 5.7 will be used. The log interval and duration can then be selected. If neutral is to be measured, then it can be enabled. Finally pressing “Start” will start the logging session.

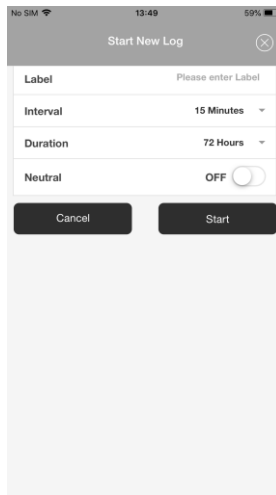


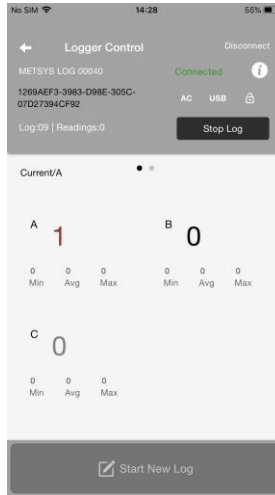
Figure 27: Start New Log

## 6.6 RESUMING AND STOPPING LOGGING

The App can also be used to remotely stop or resume logging on a connected logger. When not logging, pressing the “Resume

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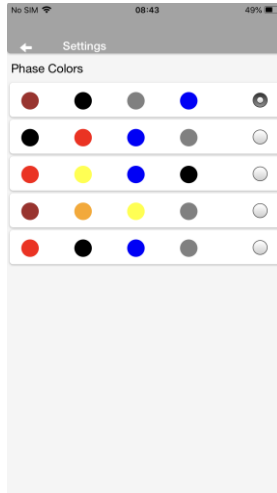
Log” button on either the live reading screen Figure 24 or log screen Figure 25 will continue logging to the most recent log. If logging, pressing the “Stop Logging” button, Figure 28, will stop the current logging session.



**Figure 28: Live Readings with Stop Log Button**

## 6.7 CHANGING PHASE COLOURS

Colours used for each phase can be changed by first selecting the menu item in the top right hand side of the Current Logger Selection screen, shown in Figure 23. Then select the “Settings” option. Select the required phase colour option, shown in Figure 29, and exit the menu.



**Figure 29: Settings Screen**

## 7. MENUS

The menu items available depends upon the status of the instrument (e.g. whether it is currently logging, or passcode locked). For reference, the full sequence of menu items (scrolled through by pressing **Down**) in each mode is shown in Table 1.

When the last menu item in the list is reached, the menu returns to the top (Main Screen).

Many menu items (eg. Start New Log), if activated using **Enter**, will cause an immediate return to the main screen.

<b>Instrument Mode</b>		
<b>not logging (unlocked)</b>	<b>logging (unlocked)</b>	<b>passcode locked</b>
Main Screen	Main Screen	Main Screen
↓	↓	Unlock
Bluetooth	Bluetooth	Bluetooth (show status only)
Start New Log	↓	↓
Resume Log <sup>*1</sup>	↓	↓
↓	Stop Logging	↓
Copy Log to USB <sup>*2</sup>	↓	↓
Copy All to USB <sup>*2</sup>	↓	↓
Log Label	Log Label (read only)	Log Label (read only)
Clear Label	↓	↓
Log Interval	Log Interval (read only)	Log Interval (read only)
Log Duration	Log Duration (read only)	Log Duration (read only)
Report Neutral	Report Neutral (read only)	Report Neutral (read only)
Imax	Imax	Imax
Imin	Imin	Imin
Iavg	Iavg	Iavg
Ipeak	Ipeak	Ipeak
Time	↓	↓
Date	↓	↓
Power	Power	Power
Battery	Battery	Battery
About	About	About
Delete All Logs <sup>*2</sup>	↓	↓
Format USB	↓	↓
Enable/Disable Lockout	Enable/Disable Lockout	↓
Firmware Update	↓	↓
LCD Contrast	LCD Contrast	↓
Shutdown	↓	↓

**Table 1: Menu Sequence**

<sup>\*1</sup> Only appears if at least one log file exists, and the end time for the log has not yet expired.

<sup>\*2</sup> Only appears if at least one log file exists.

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## 8. MAINTENANCE



**Do not use the logger if damaged.**

Always inspect the logger and flexible probe for damage before use.

To avoid electric shock, keep the logger and probe clean and free of surface contamination.

Use Isopropyl alcohol to clean the electronics unit and the probe

Make sure the flexible probe, connecting cable, and electronics enclosure are dry before further use.

## 9. FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

## 10. WARRANTY

Your logger is guaranteed for one year from the date of purchase against defective material or workmanship. If the unit fails during the warranty period, we shall at our discretion, repair or replace it with a new or reconditioned unit provided we are satisfied that the failure is due to defective material or workmanship. To make a claim under warranty, the unit should be returned to us, postage prepaid, with a description of the defect. The use of a battery or external power supply, other than that specified invalidates this warranty.



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Goods alleged by the buyer to be defective shall not form the subject of any claim for injury, loss, damage, or any expense howsoever incurred whether arising directly or indirectly from such alleged defects other than death or personal injury resulting from the seller's negligence.

No condition is made or to be implied nor is any warranty given or to be implied as to the life or wear of goods supplied or that they will be suitable for any purpose or for use under specific conditions, notwithstanding that such purpose or conditions may be made known to the seller.

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METSyS NEC 220 Logger English Rev 3.0

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