Tinytag **Energy Logger**

Technical Manual

Tinytag

omni INSTRUMENTS

Measurement and data acquisition solutions

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02 Warnings & PAT Testing Instructions

Important Safety Information. Read the following warnings carefully before installing or operating the Energy Logger.

- The logger must only be used as intended and in accordance with the instructions in this manual. Failure to do so may impair the safety features of the logger.
- Never attempt to use the logger or accessories if they appear to be damaged or malfunctioning. Disconnect the mains supply and contact your supplier.
- The logger is for indoor use only. Do not use in damp or wet environments.
- Installation of this logger may expose the operator to hazardous voltages. If in doubt, refer to a qualified electrician.
- The mains input of the logger (see page 6) must only be connected to an AC mains socket using the supplied lead. Do not exceed the maximum rated input voltage for the logger.
- The current measurement inputs must only be connected to approved flexible coil current transducers, Gemini part number ACS-002X. Any other type of connection may damage the logger and expose the user to hazardous voltages.
- An earthed mains connection is required for correct operation, not for device safety.
- When changing batteries, make sure the mains lead is removed from the logger.
- Only use 4 x Alkaline AA batteries, observing the correct polarity.
- The logger must only be operated with the battery cover fitted.
- The logger contains no user-serviceable parts. Do not open (except to remove the battery cover when replacing batteries).
- The logger contains hazardous voltages and a lithium battery. Servicing must be carried out by an authorised service centre only. Please contact your supplier for further information.

- This equipment should be used within the temperature range and other environmental conditions specified in this manual.

Voltage Range	230V ±10%
Mains Transient Overvoltage	Category II, 2.5kV
Measurement Category	IEC61010: 2001 CAT II
Operating Temperature	0 to +50°C
Maximum RH	95% (non-condensing)
Maximum Altitude	3000m

This logger is fitted with a magnet.

- Keep away from pacemakers
- Keep away from iPods and hard drives
- Keep at least 10mm from credit cards

If the magnet is removed from the logger:

- There is a danger it will shatter if it makes a sudden contact with a hard surface.
- Keep away from children, this magnet is not a toy.

Portable Appliance Testing - Flash Test

- Do not Flash Test this product at more than 3000v RMS.
- Due to EMC filtering components within the product, the leakage current at the flash test voltage may be up to 10mA & register as a fail on some PAT testers.

03 Introduction

The Tinytag Energy logger combines the level of performance required by experts with the level of simplicity required by those that are new to energy management.

The logger is ideal for monitoring building energy supply, sections within a building or individual pieces of equipment.

Data from the Tinytag Energy Logger can be used to identify power-hungry or inefficient equipment and peak load times, and can highlight equipment that is left powered up or idling unnecessarily.

The Tinytag Energy Logger provides visibility of energy usage so that effective measures can be taken to reduce electricity bills, lower carbon footprint and improve environmental performance.

- Simple to use
- High accuracy
- Non-invasive
- Small size/lightweight
- Reduce energy costs
- Reduce carbon foot print
- Can be used straight out of the box
- Track down inefficient pieces of equipment

Warning!

Text marked with this symbol is important information, vital to the correct and safe usage of this data logger. Please read these warnings carefully.

Disclaimer

The information presented in this document has been carefully checked for reliability; however, no responsibility is assumed for inaccuracies. The information in this document is subject to change without notice.

04 In the Case

The following items are supplied in the carry case:

- 1 x Tinytag Energy Logger
- 3 x Clip on coils
- 1 x UK mains lead
- 1 x EU mains lead
- 1 x USB cable
- 1 x User Manual

The Tinytag Explorer software used to configure the logger and view the data from it is downloadable from our website. See page 28 for further instructions.

05 Controls and Connections

1. PC interface connection (USB “B” Socket)
2. Mains input
3. Display
4. Control buttons
5. Coil connections (for ACS-002X coils)

Buttons

Function: Allows you to step through the different wiring configurations the logger supports

Record: Starts and stops the data logger recording

Scroll: Allows you to scroll through current, voltage and power readings from the logger

06 Logger Display

1. Wiring Configuration

This shows the different wiring configurations supported by the logger. To step though them, press the Function button.

2. Prompts and Error Messages

When a wiring configuration is selected, the logger will show prompts in this area of the display to tell the user what needs to be plugged in next. This area of the display is also used to display error messages.

3. Current Readings

Current, voltage, power and power factor information is displayed here. To step through them, press the Scroll button.

07 Logger Markings

CE

This equipment meets the requirements of the EMC Directive and Low Voltage Directive of the European Union.

A Declaration of Conformance for this product is available upon request, please contact your supplier for further information.

WEEE

Data loggers, accessories and batteries should be disposed of at organised facilities, where available, in line with local regulations.

In accordance with the WEEE directive Gemini Data Loggers (UK) Ltd. will take back and dispose of any equipment purchased directly. Equipment not purchased directly should be returned to the point of sale for disposal.

WARNING!

Observe the text of any warning messages associated with this symbol.

USB CONNECTION

Indicates the position of a USB B socket, on the side of the logger, to connect it to a computer to configure and recover data from it.

EARTH

Indicates the position of the logger's earth connection.

MAGNET

This product is fitted with a strong magnet to attach the unit to panels whilst in use. This symbol on the back of the logger indicates where the magnet is positioned. Observe the warnings on page 4 of this manual.

08 Quick Start

Starting an Energy Logger

1. Insert the supplied batteries in logger, observing the correct polarity.
2. Press any of the loggers three buttons to wake it up.

   Select the wiring configuration to be monitored by pressing the function button.

3. Follow the on-screen prompts and plug in the current coils and mains lead as directed.
4. Clip the current coils around the appropriate conductors. The logger will self configure.

- If monitoring three-phase current and voltage, adjust the position of the coils if directed to do so (see page 17 for further information).

5. Read values directly from the logger's display, pressing the scroll button to view different properties.

Or

6. Press the data logging button to start it recording.

Viewing Recorded Data

- Follow the instructions on page 28 to download and install the Tinytag Explorer software.

7. Connect the logger to the computer using the USB cable.

- Click the Get Data button in the software.

For more in-depth information on all of the above, please see the following pages.

09 Modes of Operation: Single Phase Current

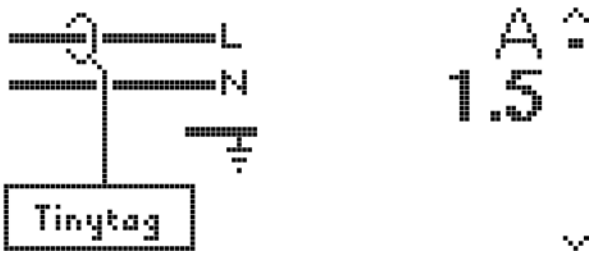
Set-up

For monitoring single-phase current where no mains connection is available.

In this mode the logger will be powered by its batteries, and will be able to log for a minimum of two months.

Instructions

- Fn Select the wiring configuration to be monitored by pressing the function button.



- Follow the on-screen prompt and plug in the L1 coil.
- Clip the coil around the correct conductor.
- Wait for the logger to complete a self check.
- Read current from the screen.

Data Logging

- Press and hold the Record button until the logger confirms it is recording.

10 Modes of Operation: Three Phase Current

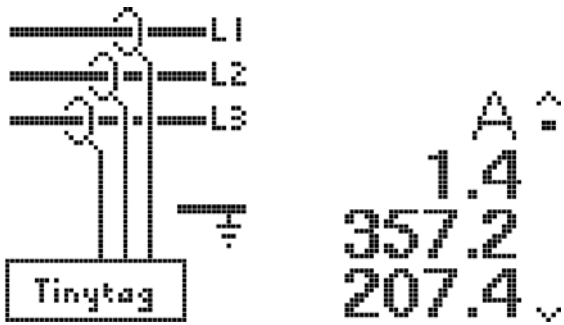
Set-up

For monitoring three-phase current where no mains connection is available.

In this mode the logger will be powered by its batteries, and will be able to log for a minimum of two months.

Instructions

- Fn Select the wiring configuration to be monitored by pressing the function button.



- Follow the on-screen prompt and plug in the L1, L2 & L3 coils.
- Clip the coils around the correct conductors.
- Wait for the logger to complete a self check.
- Read currents from the screen.

Data Logging

- Press and hold the Record button until the logger confirms it is recording.

11 Modes of Operation: Single Phase Current and Voltage

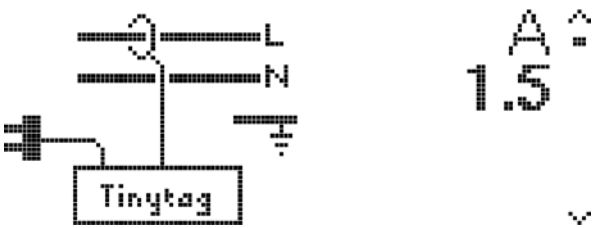
Set-up

For monitoring single-phase current with a voltage reference.

In this mode the logger will be powered from the mains, and will be able to log for six weeks before it fills its memory at the default five minute logging interval.

Instructions

- Fn Select the wiring configuration to be monitored by pressing the function button.



- Follow the on-screen prompt and plug in:
  - The mains cable.
  - The L1 coil.
- Clip the coil around the correct conductor.
- Wait for the logger to configure.
- Read values from the screen, pressing the scroll button to step through the current, voltage and power readings.

Data Logging

- Press and hold the Record button until the logger confirms it is recording.

12 Modes of Operation: Three Phase Current and Voltage

Set-up

For monitoring three-phase current with a voltage reference.

In this mode the logger will be powered from the mains, and will be able to log for six weeks before it fills its memory at the default five minute logging interval.

Before logging is started, the logger is in a set-up mode where it automatically matches the voltage measurement against the three current measurements.

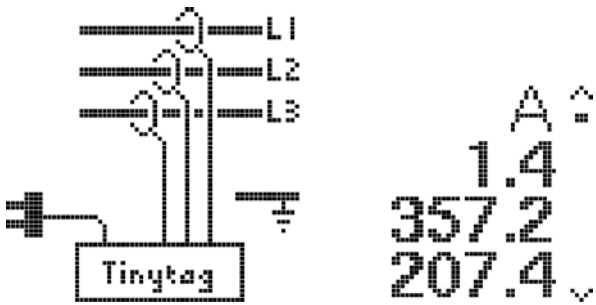
Coil positioning is particularly important to allow this automatic set-up to complete. See page 20 for examples, and follow the prompts on the display.

Automatic set-up is complete once the prompts disappear; recording can then be started.

Once recording, the position of the coils is no longer as important and provided they remain around the conductors they were configured to, the logger will measure correctly.

Instructions

- Fn Select the wiring configuration to be monitored by pressing the function button.



- Follow the on-screen prompt and plug in:
  - The mains cable.
  - Coils L1, L2 & L3.

CONTINUED OVERLEAF

12 Modes of Operation: Three Phase Current and Voltage (cont.)

Set-up (cont.)

- Clip the coils around the correct conductors. For recommendations on coil positioning, see page 20.
- Wait for the logger to complete a self check, adjusting the position of coils if prompted. For information on screen messages, see page 20.
- In the event that the automatic configuration fails, the logger can be configured manually. For information on manually configuring the data logger, see page 24.
- Read values from the screen, pressing the scroll button to step through the current, voltage and power and power factor readings.

Data Logging

- Press and hold the Record button until the logger confirms it is recording.

12.1 Modes of Operation: Three Phase Current and Voltage

Positioning Coils

Automatic Configuration

Before logging can be started the logger has to determine which current phase the voltage reading is being derived from.

For the automatic configuration to work successfully, the current coils need to be separated correctly.

Connecting Coils

The three supplied coils are interchangeable and can be plugged into any socket (they are not calibrated to a specific socket or phase).

Ensure, where possible, that coils are connected around the correct conductor, pairing any colour indicators on the conductors with the appropriate socket on the logger.

The orientation of the coil, with regard to the direction of the current flow, is not important and coils can be connected around a conductor either way around.

On the following page is a table offering some guidance on good and bad coil positioning for the set-up.

Once the logger has configured itself, and logging has started, the coils simply need to be kept around the correct conductor.

If Automatic Detection Fails

If the logger cannot automatically configure it will display prompts to guide the user what to do (see page 24).

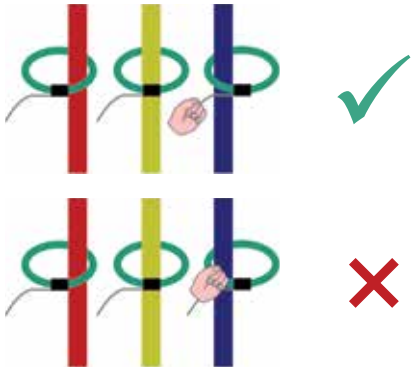
12.1 Modes of Operation: Three Phase Current and Voltage

Positioning Coils

Care should be taken when positioning coils during the set up of the logger to ensure they are well spaced, don't overlap or are placed too closely to neighbouring conductors. Poor positioning of coils can prevent the logger configuring automatically.

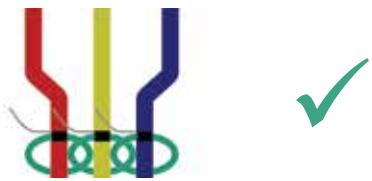
The coil around the blue conductor is too close to the yellow conductor. Ensure that coils are not positioned too closely to neighbouring conductors.

If the conductors are close together, coils can be angled around conductors.



When separating coils, move them holding the grey cable. Holding the green part of the coil may affect the set up.

Ensure coils are not positioned next to secondary conductors from the other phases.



Once the logger has automatically configured and logging has been started, the position of the coils is no longer important and as long as they are left around the conductors they were configured to the logger will record correctly.

12.2 Modes of Operation: Three Phase Current and Voltage

Screen Messages

Battery Low

The batteries in the logger need replacing.

Checking Coils...

This error message shows for a few seconds after clearing the "Plug in I1, I2 or I3" message.

Clip I1, I2, and I3

A three-phase current configuration is selected and one or more of the coils have not been clipped around a conductor. This error may also be caused by a placement problem.

Connect Mains!

A configuration using the mains connector is selected, but mains is not connected or has not been switched on.

Mains Voltage Low!

The mains voltage is lower than the minimum operating voltage (200V).

Over-Current I1, I2, and I3

Instantaneous current levels are too high. The current profile probably has large spikes exceeding 5,000A (instantaneous). Alternatively the current may significantly exceed the 2000A RMS rated range. Logging will continue, but power measurements may be underestimated.

Plug in I1, I2, or I3

This error messages indicate that one or more coils are not connected to the logger.

Proximity I1 and I2

A three-phase current and voltage configuration is selected. This message indicates that two (or maybe all three) coils appear to be correlated with the same conductor. The coils may all be clipped around different phases, but one of them may be lying too close to one of the other conductors. See page 17 for recommendations on positioning coils.

Use Computer to Set Time!

This error message indicates that the data logger's internal clock is not set. It can be set by connecting the data logger to Tinytag Explorer and performing a current reading (click **Logger** and **Current Readings** in the software).

The logger's clock is synchronised with the computer clock every time it is used with Tinytag Explorer (whether for starting the logger, downloading data or showing current readings).

12.3 Modes of Operation: Three Phase Current and Voltage

Manual Configuration

In some applications, such as those where conductors are armoured, the logger may fail to configure automatically. In these instances, it may still be possible to get it to configure.

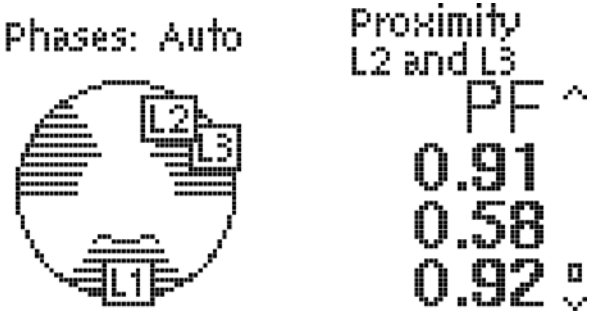
Phase Matching Diagram

This is a tool that may help to visualise the separation of coils that are too close to each other.

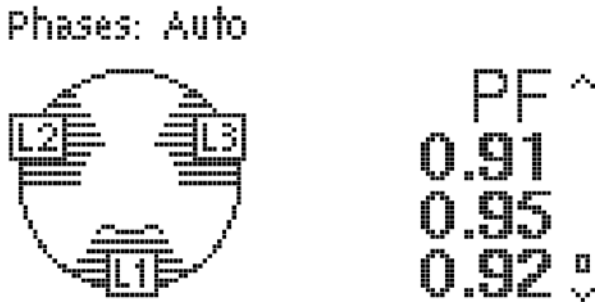
To get to the diagram , press and hold the scroll key and press the function key at the same time.

Press and hold and press

A graphical representation of the coil positions is shown as a circular diagram, with shaded areas representing the phases and boxes for each of the coils (these are labelled I1, I2 and I3).



Moving the coils in proximity to the conductors will change their positions on the diagram. If coils are correctly separated they should each be positioned in their own shaded area.



If this is not the case, try separating the coils further from their neighbouring conductors.

Once the coils are in the shaded areas, and the error messages have disappeared, the record button can be pressed to start the data logger recording.

Once the logger is logging, the coils simply need to be kept around the correct conductor.

If a cable with a non-polarised mains plug is being used, where the polarity of the connection can be **reversed, coils may move to the white areas between** the shaded area. As long as all three coils are positioned in the same style of area the logger should configure.

Manual Configuration

If the automatic configuration fails, and the phase matching diagram doesn't help, it is possible to manually specify which phase the voltage is being derived from, and the relative order of the other two phases.

To get to this manual configuration mode, enter the phase matching diagram mode, as described above, and then press and hold the function key.

Press and hold

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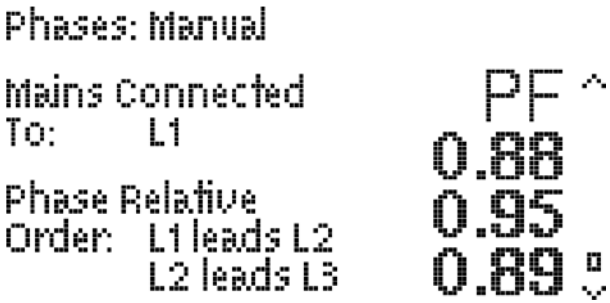
12.3 Modes of Operation: Three Phase Current and Voltage (cont.)

The mains connection and relative order information is shown on the left-hand side of the screen, whilst the readings from the current configuration are shown on the right.



Pressing the function key will step the logger through six different configurations:

- Mains connected to L1; L1 lags L2 lags L3
- Mains connected to L2; L1 lags L2 lags L3
- Mains connected to L3; L1 lags L2 lags L3
- Mains connected to L1; L1 leads L2 leads L3
- Mains connected to L2; L1 leads L2 leads L3
- Mains connected to L3; L1 leads L2 leads L3

If you know the wiring diagram of the application you are monitoring it should be possible to determine which of the above is the correct option.

It may help to determine which is the correct configuration by pressing the scroll button to step through the current, power and power factor readings from the logger.

Once you have determined which configuration is the correct one, press the record button to start the data logger recording.

Pressing the scroll button and the function button together will exit the manual setup and return you to the main page.

13 Data Logging

Data Logging

The energy logger can be started and stopped multiple times without needing to connect it to a computer.

Starting a Logger

Once a logger has been connected, pressing and holding the logging button will start it recording. On screen prompts will confirm the logger has started, and a logging icon will be shown on the display.

Logging Interval

As supplied the logger is configured to record at a five minute logging interval. This logging will allow the logger to record for six weeks when three-phase current and voltage is being monitored. If less phases are being monitored, the logger will record for longer.

The logger can be configured to record from a minimum of once every 30 seconds to a maximum of once every 10 days, using the supplied Tinytag Explorer software.

Stopping a Logger

Logging can be stopped at any time by pressing and holding the logging button. On screen prompts will confirm the logger has been stopped and the logging icon will disappear.

Multiple Logging Runs

The logger can record multiple logging runs, using the logging button to start and stop recording sessions as required.

By default, the logger will keep recording, over-writing the oldest data when its memory is full. The logger can be set to stop recording when it fills its memory using the Tinytag Explorer software.

14 Tinytag Explorer

Tinytag Explorer

The Tinytag Explorer software is used to reconfigure an energy logger and to view recorded data.

The following takes you through the process of installing Tinytag Explorer, the basics of configuring an energy logger and downloading the data recorded by it.

Once Tinytag Explorer has been installed, you can find further information in the software's Help file by going to **Help** and **Contents**.

Installing Tinytag Explorer

To install Tinytag Explorer, you will need to have Windows Administrator access rights on the PC you are using.

- To start using Tinytag Explorer, you will need to register and download the software.

You will find a label on this manual's inside front cover that contains a **Tinytag Explorer activation code** and a website address to register and download the software. After downloading Tinytag Explorer, open the file **tinytag.msi**. The Tinytag Explorer Installer will run after a few seconds and present you with a Welcome screen.

- Click **Next** to start the installation.
- Review the software's license agreement and if you accept the terms click **I accept the terms in the License Agreement,** then **Next**.
- You will then be asked where you want to install the software (we recommend you use the default installation path) and whether you would like a shortcut for the software to be created on your desktop. Once you have made your choices, click **Next**, then **Install**.
- The software will then install automatically (Windows may prompt you to confirm your agreement to the installation). When you see the Installation Complete screen, click **Finish**.
- Once the installation is complete, you will be asked to restart your computer, click **Yes** to do this.

Starting Tinytag Explorer

To start Tinytag Explorer, click on the desktop icon for the software:

If you didn't create a desktop icon when installing the software, you can start the software by going to:

Start >> All Programs >> Tinytag Explorer >> Tinytag Explorer

Activating Tinytag Explorer

The first time you run Tinytag Explorer, you will be prompted to activate the software.

The activation code for Tinytag Explorer can be found on the label on the inside front cover of this manual. It is a set of 20 characters split up into five blocks of four.

If you have lost or misplaced your activation code, you can request a new one from the Tinytag web site at www.tinytag.info/activationcode

Enter the activation code into the box provided and choose whether you want it to be applied to all the user accounts on the computer.

Next click **Confirm Code** and you will see a message to confirm that the code has been accepted.

You will need Windows Administrator access rights to activate the software for all user accounts. If you do not have Administrator access rights, leave the box unchecked and the software will only be enabled for the current user account.

Connecting to the Energy Logger

Plug the USB cable into your computer.

Turn on the energy logger (by pressing any of the buttons on the front of the unit) and plug in the USB cable.

After a few moments Windows should inform you that the logger has installed and is ready to use.

14 Tinytag Explorer (cont.)

Offloading Data

Because the energy logger can be used to record multiple runs, it displays multiple files, one for each recording session, so the user can chose what data they wish to view.

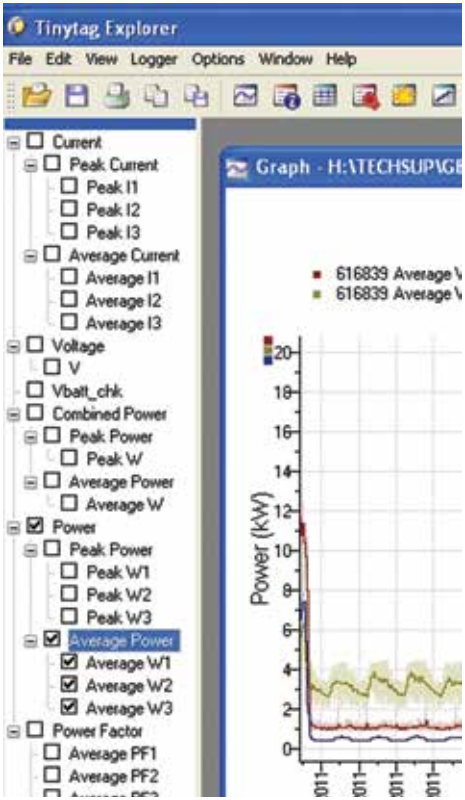
In the download window that opens when the **Get Data** option is selected in Tinytag Explorer, only new data, that has not been downloaded before, is shown by default.

Clicking on a file for a recording session will open that data.

Data from older logging runs that is held on the logger can be accessed from the download window by clicking the **Show other sessions which have been opened previously** check box.

Old data files are shown fainter than ones that have not been downloaded before.

Viewing Data



When data is downloaded from an energy logger, a trace selector will appear on the left hand side of the screen.

Expanding this selector and checking and un-checking the different boxes will allow different properties to be displayed.

A kW hour figure is shown in the graph key when average power information traces are selected.

A total kWh figure for the data being viewed can also be found in the Information View.

14 Tinytag Explorer (cont.)

Configuring an Energy Logger

To configure an energy logger, to change how often a unit records, or to clear old readings from a unit, click the **Configure** icon:

The first time you start a data logger, you will be presented with the **Basic Settings** view.

Once you have entered a description for your logging run, and set the logging interval, the data logger will be ready to use. Click the **Configure** button to start recording.

Should you need to change further settings in the data logger, click the **Advanced Settings** button.

Advanced Settings

To change an option on the Advanced Settings page, you will need to click on the ⊞ icon next to the option.

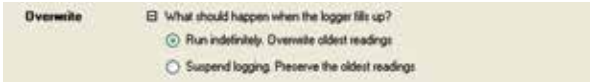
Logging Description

The logging description is a text label that is stored in the data logger. This is shown as title on the recorded data when it is downloaded from the logger .

Logging Interval

The Logging Interval option enables you to set how often an energy logger will record (the minimum interval is 30 seconds).

Overwrite



Overwrite allows you to chose what happens when a logger fills its memory.

If **Run indefinitely** is selected, the logger will overwrite its oldest readings when it fills its memory, meaning that only the most recent data recorded will be retained.

If **Suspend logging** is selected, the logger will stop recording when full and preserve the data it has already stored.

Clear Old Readings

Clear Old Readings allows you to configure an energy logger without losing the data already stored on it.

Selecting **Clear old readings now** will wipe the logger.

Configure

Once you have set up your logger as you wish it to record, click the Configure button.

Do not disconnect the logger until software tells you it is safe to do so.

Further Information

Further information on how to use Tinytag Explorer can be found in the software's Help file by going to **Help** and **Contents**.

15 What Does the Logger Record?

Property	Logger Display	Tinytag Explorer Software
RMS Current (A)	Per phase	
Instantaneous		Per phase
Peak over logging interval		Per phase
Average over logging interval		
RMS Voltage (V)	Single	Single
Instantaneous		
Power (kW)	Overall	
Instantaneous		Overall & per phase
Peak over logging interval		Overall & per phase
Average over logging interval		
Power Factor	Per phase	Per phase
Energy (kWh)		Overall & per phase

Display

The logger's display shows instantaneous RMS current (A) from all three phases, the instantaneous RMS voltage (V), an instantaneous overall power figure (kW) and power factor information for all three phases.

Automatic Software Calculations

When data is downloaded in the Tinytag Explorer software, the following information is calculated and displayed:

- Peak and average current per phase
- Peak and average power per phase
- Overall peak and average power
- Energy usage information (kWh)
- Power factor for each phase

16 How the Energy Logger Works

Voltage

Mains voltage is measured by direct connection to the mains supply. The data logger samples the voltage signal at 1kHz for 100ms to calculate RMS voltage and true power.

Current

Current is measured using flexible rogowski coils. They measure the current passing through the conductor which they are wrapped around. The current measurement is relatively immune to interference from currents in conductors which pass nearby, but not through, the coil.

The data logger samples the current signal at 5kHz for 100ms to calculate RMS current and true power.

The analogue current signal is filtered before being sampled. This ensures that the true power figure can be calculated accurately, even if the current signal has very sharp spikes. However this filter means that the RMS current figure displayed and logged by the data logger will be an underestimate if the current signal has very sharp spikes above the 6th harmonic.

True Power

At 1ms intervals (1kHz) the data logger multiplies together the instantaneous current and instantaneous voltage samples. The average over 100ms (five or six mains cycles) gives true power. This figure appears on the data logger display.

Three Phase True Power

The data logger can directly measure the current in three conductors simultaneously, however it can only measure the voltage of one.

The data logger generates equivalent voltage signals for the other two phases by delaying the measured voltage signal by one third and two thirds of a mains cycle. This is effectively assuming that:

- The phases are separated by 120°.
- The phases have the same voltage magnitude.
- Any voltage harmonic distortion is identical across three phases.

These assumptions may typically lead to an error of up to 1%.

Average and Peak

The 100ms burst of readings is repeated every two seconds (this is reduced to every five seconds if logging on batteries, to conserve battery power). The Average Power trace shown in Tinytag Explorer is the average value over the 5 minute logging interval - an average of 150 true power calculations.

The Maximum Power trace is the largest value calculated over the same interval. Maximum Current is calculated on the same basis.

Per-Phase Power

In some configurations Tinytag Explorer will display three separate traces for the power transferred by each of the three phases. This is in addition to the Overall Power trace.

The per-phase power traces are calculated assuming that the load is wye connected. That is, that all the current in each phase returns through neutral. This assumption is often entirely true, for example if the three phases power lighting and office circuits. The per-phase power traces can be used to judge the balance between those circuits.

If the three phase load is delta connected then it is not physically possible to break down the overall power into per-phase components. The per-phase traces are meaningless and should be ignored. Only the Overall Power trace is useful.

17 Logging Specification

Logging Interval	30 seconds to 10 days
Reading Capacity	Six weeks at the default 5 minute logging interval

18 Measurement Specification

Range

Current	2,000A AC RMS (Momentary peak surge current: 2x rated range)
Voltage	200-253V AC nominal
Frequency	Nominal 50/60Hz

Display Resolution

Current	0.1A
Voltage	0.1V
Power	0.1 or 0.01kW depending on the size of the load being measured.

Accuracy

Current (RMS)*	1% of reading ±0.5A (above 10A)
Voltage (RMS)	0.5% of reading
Power (kW)	2% of reading
Power Factor	<0.02 error (above 1kW)

*Temperature Stability of Current Accuracy 0.1%/°C (from 25°C)

Sampling Frequency	5kHz burst of samples every 2 seconds (every 5 seconds when logging on battery power)

Coils

Absolute Maximum Current	5kA AC RMS

19 Physical Specification

Logger

Operational Temperature Range	0 to +50°C
Maximum Humidity	95% (non-condensing)
Maximum Altitude	3,000m

For indoor use only!

Pollution Degree	IEC61010:2001 Pollution degree 2
Case Dimensions	
Length	195mm
Width	102mm
Depth	50mm
Weight (Including batteries)	600g

Coils

Coil Thickness (Diameter)	8mm
Internal Loop Diameter	
ACS-0020	85mm (typical)
ACS-0021	175mm (typical)
ACS-0022	38mm (typical)*
Cable Length	1m
Weight	
ACS-0020	72g
ACS-0021	125g
ACS-0022	100g
PC Connection	USB

*The loop diameter of the ACS-0022 coil can be minimised by fitting a cable tie around the lower part of the coil, once it has been clipped around a conductor.

20 Maintenance & Service Instructions

Maintenance

Energy loggers can be cleaned as follows:

1. Remove all leads and cables from the logger.
2. Wipe the case with a moist cloth using a mild detergent.
3. Allow to dry.
4. Do not allow liquids to enter the case or connectors.
5. Do not use abrasive materials or solvents.

Service Instructions

Users can only replace the 4 x 1.5V AA alkaline batteries. There are no other user-serviceable parts in this data logger and the case should not be opened except to remove the battery cover when replacing batteries.

1. Remove all leads and cables from the logger.
2. Remove the battery cover from the back of the data logger using a Philips screw driver.
3. Remove the old batteries from the logger.
4. Fit the new batteries in the logger, taking care to observe the correct polarity.
5. Press one of the buttons on the front of the logger to check it powers up.
6. Re-fit the battery cover to the logger.

21 Power Supply & Battery Information

Power Supply

Voltage	230V ±10%
Frequency	50Hz
Power	1W

Battery Information

Battery Type	4 x 1.5V AA Alkaline Batteries
Battery Life	60 days, typical, based on a battery capacity of 2500mAH*

When fitting batteries, observe the correct polarity.

*When a mains lead is plugged in, the logger will be mains-powered. If the mains should fail, the batteries in the logger will typically keep it recording for 60 days.

If the logger is not going to be used for an extended period, it is recommended that its batteries should be removed.

Logger Current Consumption	1.5mA (10mA when display backlight is on)

22 Approvals and Warranty

Approvals

Gemini Data Loggers (UK) Ltd. operates Quality and Environmental Management Systems which conform to ISO 9001 and ISO 14001.

A Declaration of Conformance for this product is available upon request, please contact your supplier for further information.

Warranty

This product carries a manufacturing defects warranty of 12 months from the date of purchase. Loggers returned under warranty will be repaired or replaced at the manufacturer's discretion. This warranty does not cover mishandling, modification or battery replacement and is subject to the standard Terms and Conditions of Sale, a copy of which is available on request.

The equipment/goods are sold "as is" and with "all faults" (applies in USA). Claims under warranty should be referred to the point of sale.

Designed and Manufactured by:

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