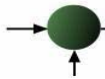


## Elnet GR

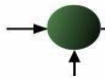
Electrical Measurements & Power Quality



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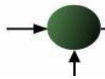
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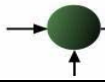
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## CHAPTER 1 – INTRODUCTION

### 1.1 About the *EINet* Multimeter

Large consumers of electricity e.g. factories, hotels, hospitals, municipalities, need to know the history of their consumption and the quality of the power supply. Details such as Voltage, Current, Power Factor, Hertz, Neutral Current, Energy Demands and all electricity related events are recorded in the ***EINet*** Energy & Power Multimeter.

An additional feature of the Multimeter is the ability to measure Harmonics. Part of the Electricity Supply Authority's bill reflects poor or good Harmonics in the consumer's system, therefore it is in his interest to monitor Harmonics and try to improve it.

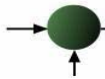
These are all recorded on a continual basis and can be recalled and shown on the front panel display of the instrument with a few simple key-strokes any time the user wishes.

The ***EINet*** Energy & Power Multimeter is a compact, multi functional, three-phase Multimeter simple to install and is especially designed to integrate into Building Management Systems. It requires no special mounting and is ideally suited for mounting on the front face of any standard electrical panel.

The Configuration and Setup is menu driven, with password protection.

Communication with external devices is simple and is based on standard known technology.

The ***EINet*** Energy & Power Multimeter boasts a new innovative built in "Flash Memory", which pioneers a new frontier into electrical measurement. It has a 1 MB of FLASH



---

MEMORY with a capacity of recording up to 2 years of power malfunctions and interruptions.

Readings, graphs, tables & history are shown on the graphic display of the **EINet** Energy & Power Multimeter. This display is a state of the art screen with a resolution of 160X128.

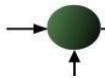
Each **EINet** Energy & Power Multimeter is carefully and meticulously manufactured using quality components and the latest production methods. Before leaving the factory each **EINet** Energy & Power Multimeter is calibrated and sent to the customer accompanied by the test certificate and Certificate of Compliance (C.O.C).

## 1.2 How to use this manual

We at CONTROL APPLICATIONS Ltd, envisage this manual to be used by three types of people, i.e. the **Installation Technician**, the **Senior Electrical Engineer** and the end **User**. For this reason this manual is divided into chapters for ease of reference by each of these different people. There could be a situation where two of the abovementioned tasks can be combined, or in a rare instance one person could handle all three tasks.

CHAPTER 1, *Introduction*, describes the **EINet** Energy & Power Multimeter, its potential users, the readings it can provide and some of its features in brief.

CHAPTER 2, *Installation*, provides detailed instructions for unpacking, mechanical mounting, and electrical wiring up instructions for the **Installation Technician**.



---

CHAPTER 3, *Using the **EINet** Energy & Power Multimeter*, describes in detail front Panel, the functions of the control buttons, and the Lock Utility.

CHAPTER 4, *Parameter Configuration & Settings* explains in detail the minimum parameters settings needed by the **Senior Electrical Engineer** to set up and configure the **EINet** Energy & Power Multimeter.

CHAPTER 5, *Front Panel Displays*, is an easy to follow step-by-step guide to obtain readings, graphs, tables and histories for the **User**.

CHAPTER 6, *Alarm reports* gives details about how to program the Alarms in the **EINet** Energy & Power Multimeter.

CHAPTER 7, *Demand reports* is an easy to follow step-by-step guide to obtain the Demand reports up to 2 years.

CHAPTER 8, *Data Logging* is an easy to follow step-by-step guide to obtain all the stored peaks of current, voltage, energy, power factor etc. up to 2 years of data logging.

CHAPTER 9, *Communications* gives details about the Communication capabilities of the **EINet** Energy & Power Multimeter, and how to Set Up.

CHAPTER 10, *Specifications*, is a detailed list of specifications of the **EINet** Energy & Power Multimeter.

APPENDIX A, *Installation & Configuration Check List*, provides a Check List to insure no important steps will be missed during the initial set up.



### 1.3 Safety Information

The purpose of this manual is to help you. Please read the instructions carefully before performing any installation and note any precautions.

#### WARNING

- Ensure that all incoming AC power and other power sources are turned off before performing any work on the ***ELNet*** Energy & Power Multimeter. Failure to do so may result in serious or even fatal injury and/or equipment damage.
- If the ***ELNet*** Energy & Power Multimeter is damaged in any way do NOT connect it to any power source.
- To prevent a potential fire or shock hazard, never expose the ***ELNet*** Energy & Power Multimeter to rain or moisture.
- Keep the surrounding area free of dirt and clutter especially metal objects. Good housekeeping pays.
- Inspect the cables periodically for cracks, kinks or any other signs of wear
- Keep children away.
- Do not pull the cords.





- Users should stay alert and not approach the rear of the **EINet** Energy & Power Multimeter while tired or under the influence of alcohol, medicines or any other chemical substance that would tend to make a person drowsy.
- Do not wear loose clothing or dangling jewelry.
- Above all use common sense at all times.

## 1.4 Warranty

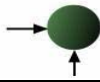
CONTROL APPLICATIONS Ltd provides a 12- Month warranty against faulty workmanship or components from date of dispatch provided that the product was properly installed and used.

CONTROL APPLICATIONS Ltd does not accept liability for any damage that may be caused by natural disasters (such as floods, fire, earthquake, lightening etc.).

CONTROL APPLICATIONS Ltd does not accept liability for any damage that may be caused by malfunction of the **EINet** Energy & Power Multimeter.

CONTROL APPLICATIONS Ltd will advise the customer on the proper installation and use of the **EINet** Energy & Power Multimeter, but will not accept any responsibility that the instrument is suitable for the application for which it was originally purchased.

This warranty may become void if the Installation; Parameter Configuration & Setting Instructions are not carried out according to the instructions set out by CONTROL APPLICATIONS Ltd.

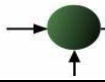


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The ***ELNet*** Energy & Power Multimeter has no user serviceable parts and should be opened and serviced by a duly qualified authorized representative only. The sensitive electronics could become damaged if exposed to a static environment. This action would void the warranty.

This warranty is limited to the repair and/or replacement at CONTROL APPLICATION Ltd sole discretion of the defective product during the warranty period. Repaired or replaced products are warranted for ninety (90) days from the date of repair or replacement, or for the remainder of the original product's warranty period, whichever is longer.

CONTROL APPLICATIONS Ltd is always at your service to advise the customer on any problem that may be encountered regarding any installation, operation, parameter & configuration settings or maintenance.

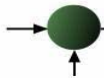


## 1.5 Your comments are welcome

CONTROL APPLICATIONS Ltd. sincerely thanks you for choosing our ***ELNet*** Energy & Power Multimeter. We are confident that it will provide you with many years of trouble free service and give you all the power and energy information and history that you expected from the instrument when you bought it.

While every effort was made to keep the information as reliable, helpful, accurate and up to date as possible, all possible contingencies cannot be covered. Technical or typographical errors could occur, and we would be happy to receive any comments, criticisms or notifications of any such errors from you, our valued customer.

Street Address: 24A HaBarzel St.  
Tel-Aviv 69710  
Israel  
Tel: 972-3-647-4998  
Fax: 972-3-647-4598  
Electronic Address: cal@ddc.co.il



## 1.6 Disclaimer

Information in this User Manual is subject to change without notice and does not represent a commitment on the part of CONTROL APPLICATIONS Ltd.

CONTROL APPLICATIONS Ltd supplies this User Manual as is without warranty of any kind; either expressed or implied, and reserves the right to make improvements and/or changes in the manual or the product at any time.

While it is the intention of CONTROL APPLICATIONS Ltd to supply the customer with accurate and reliable information in this User Manual, CONTROL APPLICATIONS Ltd assumes no responsibility for its use, or for any infringement of rights of the fourth parties which may result from its use.

This User Manual could contain technical or typographical errors and changes are periodically made to the information herein; these changes may be incorporated in new editions of the publication.



## CHAPTER 2 — INSTALLATION

In this Chapter you will find the information and instructions that the *Installation Technician* needs to mount and connect the ***ELNet*** Energy & Power Multimeter

### WARNING!

- During operation, hazardous voltages are present in connecting cables and terminal blocks.
- Fully qualified personnel must do all work. Failure to follow this rule may result in serious or even fatal injury to personnel and/or damage to equipment.
- Refer to Section 1.3 Safety information before carrying out any installation.
- Read this manual thoroughly and make sure you understand the contents before connecting the ***ELNet*** Energy & Power Multimeter to any power source.



## 2.1 Contents of packaging

The **EINet** Energy & Power Multimeter is packed and shipped in a carton approximately 24.5 cm long X 19 cm wide X 12 and cm high.

Before opening the package, ensure the area, clean and dry.

Without using any sharp instruments, carefully open the carton of the **EINet** Energy & Power Multimeter.

Please check the contents of the carton, it should contain:

1. Your new **EINet** Energy & Power Multimeter.
2. **EINet GRAPHIC** User Manual (this book).
3. Test Certificate and Certificate of Compliance (C.O.C).
4. A pair of Panel mounting clips.
5. 1 X two pole connector plugs
6. 1 X three pole connector plugs
7. 3 X Four pole connector plugs



## 2.2 Mechanical mounting

### To Mount the *EINet* Energy & Power Multimeter

#### NOTE!

Do not mount the *EINet* Energy & Power Multimeter too close to any main electrical conductors.

Allow sufficient space to carry out maintenance to the back of the *EINet* Energy & Power Multimeter

Choose a suitable location, and prepare a rectangular hole according to the dimensions shown in Figure 2.1

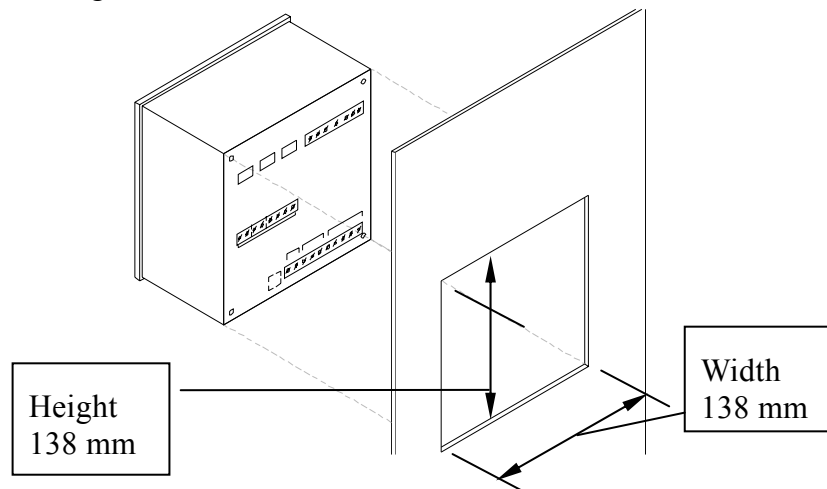
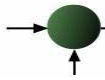


Figure 2.1. Panel Cutout



- Slide the **EINet** Energy & Power Multimeter into the pre-prepared rectangular hole (ensure it is the right way up), then push the two mounting clips provided in the packaging into position. Use mild force to ensure the clips are securely positioned on the outer case of the **EINet** Energy & Power Multimeter.
- Tighten the two mounting screws and ensure the **EINet** Energy & Power Multimeter is firmly in place.

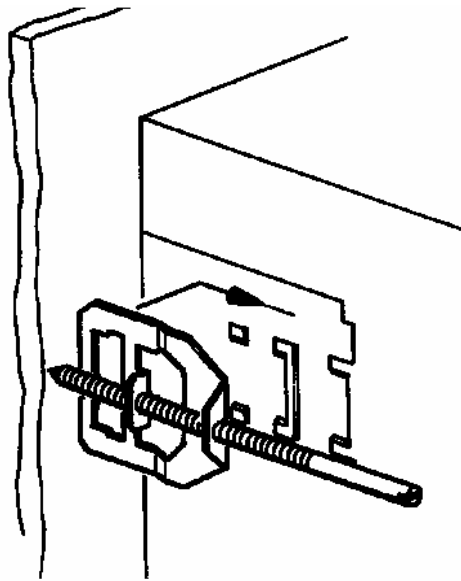


Figure 2.2. Mounting Clips





## 2.3 Wiring Schematics

To wire up the **EINet** Energy & Power Multimeter

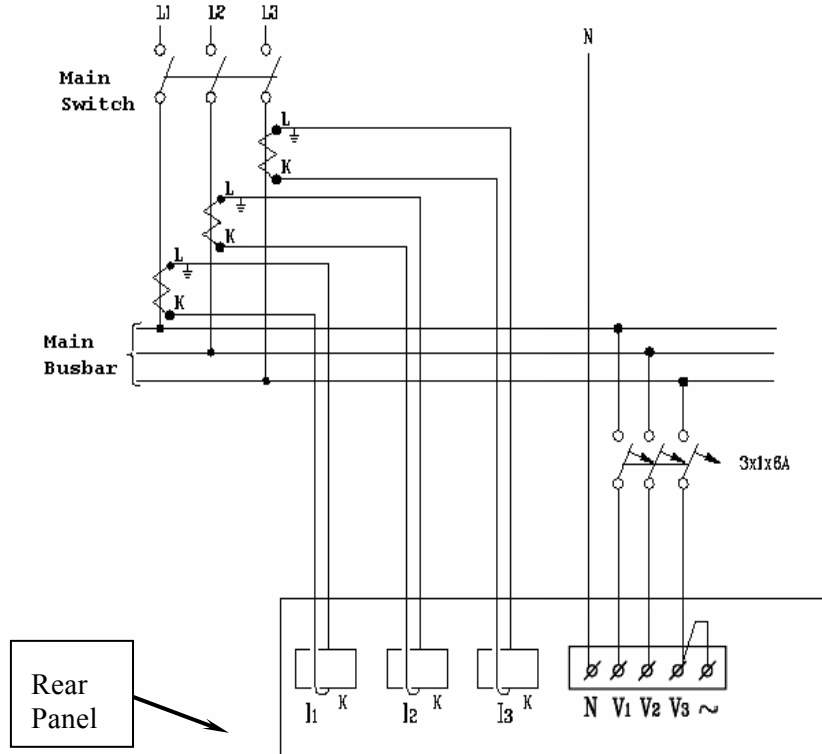


Figure 2.3. Schematic Wiring Diagram



## 2.4 Rear Panel Connections

Please re-read section 1.3 for safety instructions.

### To connect the Rear Panel

All Connections, except those to the CT core of the **ELNet** Energy & Power Multimeter are made via terminal connector plugs (Voltage input, Power Supply, Communication etc.).

Max. recommended tightening torque for the connector screws is 0.5 Nm.

The CT cores of the **ELNet** Energy & Power Multimeter are located externally on the rear of the instrument and the lead from the leg of the external Current Transformer must pass through in the correct direction.

### NOTE!

Ensure all the connections to the leads of the current transformer wiring are secure and there is no mechanical strain on the wire. The cross section of the leads to the current transformer must be compatible to the power of the current transformer. We recommend a power transformer with at least 3VA and the length of the wiring of the transformer no longer than 3m.

Insert the lead from side “L” of the Current Transformers of **Line 1** through the bottom of the CT core I1A, (top left looking from back), of the **ELNet** Energy & Power Multimeter.



- Ensure the leads from leg “L” of the Current Transformer on **Line 1** pass through the bottom of CT core I1A.
- Ensure the other end of the lead emerging from the top of C T core I1A is connected to leg “K” of the Current Transformer on **Line 1**

## **WARNING!**

Never allow an open circuit between the two Current Transformers.

Repeat the procedure for **Line 2** and **Line 3**.



Connect the rest of the connections to the **ELNet Energy & Power Multimeter** by means of terminal connector plugs. The Rear Panel (See Figure 2.4.) has all connections printed and is simple to follow. (See table 2-1 for connections)

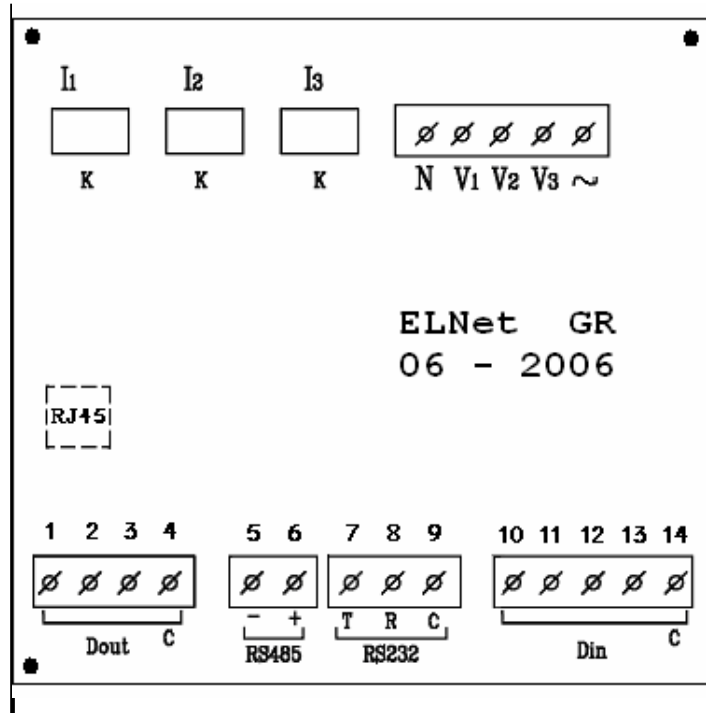
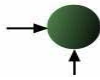


Figure 2.4. Rear Panel

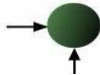


<b>Pin Designation</b>	<b>Description</b>	<b>Remarks</b>
<b>V<sub>1</sub></b>	<b>Line1</b> Supplied Voltage	Through a 6Amp fuse
<b>V<sub>2</sub></b>	<b>Line2</b> Supplied Voltage	Through a 6Amp fuse
<b>V<sub>3</sub></b>	<b>Line3</b> Supplied Voltage	Through a 6Amp fuse
<b>V<sub>N</sub></b>	Neutral	
<b>I<sub>1A</sub></b>	From Current Transformer on <b>Line1</b>	Note the correct direction to insert the lead
<b>I<sub>2A</sub></b>	From Current Transformer on <b>Line2</b>	Note the correct direction to insert the lead
<b>I<sub>3A</sub></b>	From Current Transformer on <b>Line3</b>	Note the correct direction to insert the lead
<b>L</b>	Power 85 - 260 VAC	Or 110-360 VDC
<b>N</b>	Neutral	Bridged from the neutral Line
Dout	Alarms, see chapter 5.6.1	
Din	Not in use	



<b>Pin Designation</b>	<b>Description</b>	<b>Remarks</b>
RS485 — -	RS485 Comm. (-) Line	
RS485 — +	RS485 Comm. (+) Line	
RS232 — TXD	RS232 Comm. Transmit	
RS232 — RXD	RS232 Comm. Receive	
RS232 — COM	RS232 Comm. Common	
RJ45	10 BASE-T line to Network	Via standard Communications plug

**Table 2-1 Rear Panel connections**



## 2.5 Manufacturing Data.

Press F1 on the keyboard for 6 seconds. The following screen will appear.

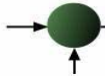
```
ELNET INFORMATION
Ep.Date:Jun 28 2005
Ep.Time: 14:03:41
Version:0.640 Flash
Comm # : 1
Unit ID: 50511001
IP:192.168.35.3
MC:00.02.79.C0.00.4B

Hit any key.. 
```

Figure 2.5. Elnet Information

Number	Screen	Description
1	Ep. Date	Production date of software operating system
2	Ep. Time	No. of times the program has been updated
3	Version	Program version no.
4	Comm #	Address of MODBUS Protocol
5	Unit ID	Consecutive calibration no.
6	IP	Ethernet/IP address
7	MC	Ethernet/MAC address

Table 2-2 Production Data



## CHAPTER 3 — USING THE *EINet* Multimeter

In this chapter you will find descriptions and functions of the front panel and the control buttons and how to use them.

### 3.1 Front Panel

#### To operate the front panel

The Front Panel has a graphic screen and 6 operating buttons.

All the readings are shown on a state of the art 160 X 128 resolution graphic screen and are explained in detail in Chapter 5.

The Control Buttons and their functions are fully explained in Section 3.2.

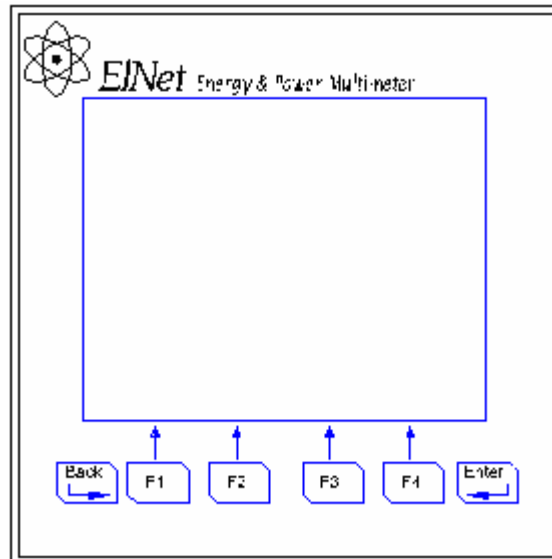


Figure 3.1. Front Panel





## 3.2 Control Buttons

### To operate the Control Buttons on Front Panel

The **ELNet** Energy & Power Multimeter has six Control Buttons. With these buttons the *User* and *Senior Electrical Engineer* can achieve all the functions necessary.

The Control Buttons are arranged on a keypad below the display screen and require slight finger pressure to click.

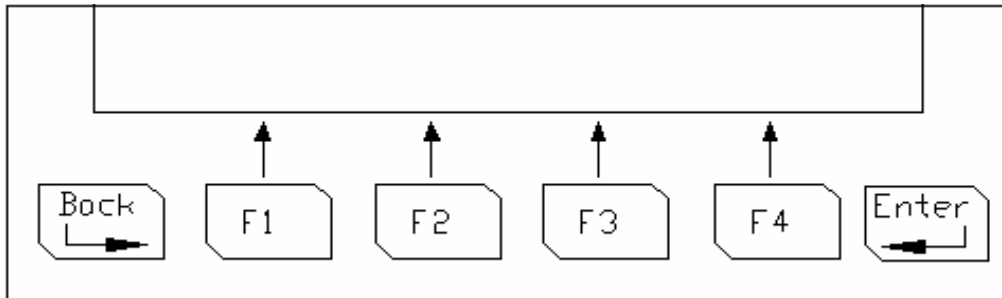
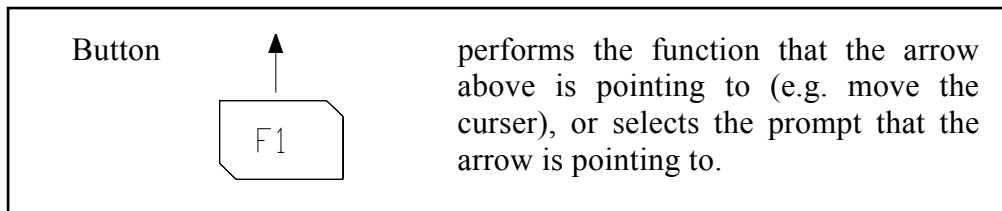
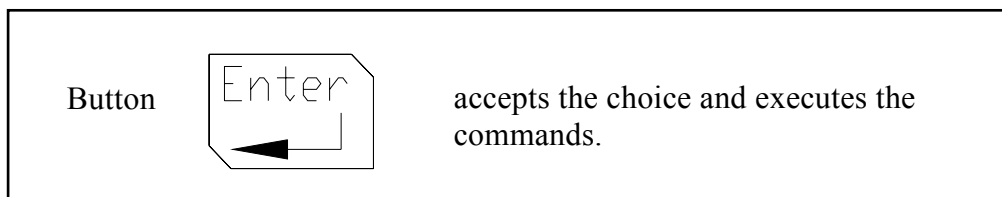
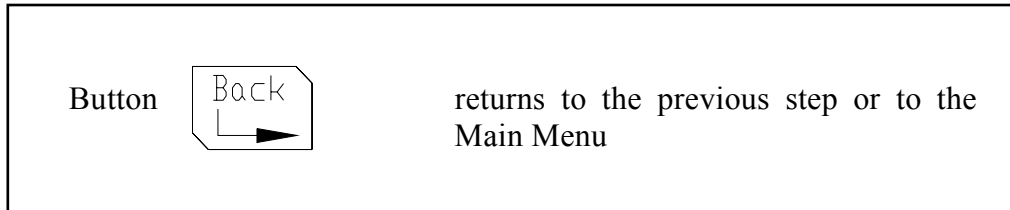
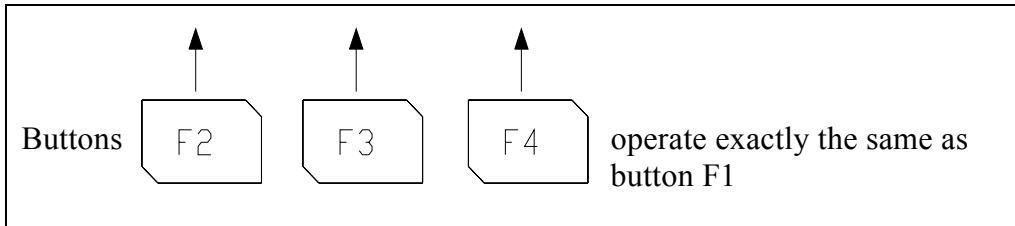
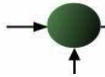


Figure 3.2. Control Buttons





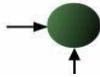
### 3.3 Lock Utility

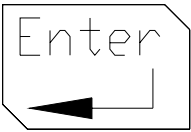
#### To lock and unlock the Control Buttons

The Control Buttons can be locked against any unauthorized or accidental usage.

#### **NOTE!**

Only sub menus can be locked. The Lock Utility does not work on the Main Menu.



To Lock press  for six (6) seconds.

A “Keyboard Locked!” message appears on the screen when any button is pressed.

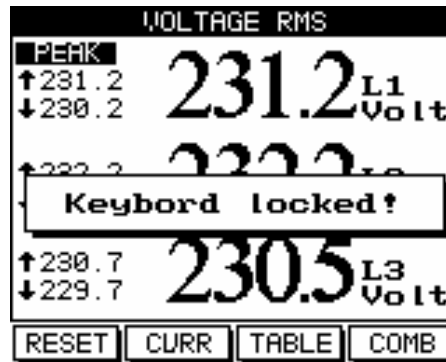
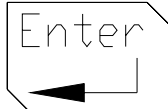


Figure 3.3. Keyboard locked

To Unlock simply press  for six (6) seconds.

A “Keyboard Unlocked!” message appears on the screen and normal functions can resume.

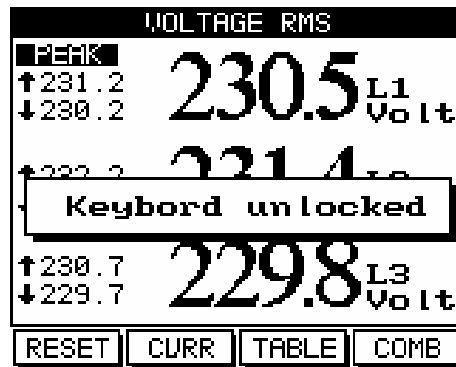
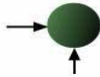
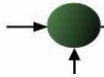


Figure 3.4. Keyboard Unlocked

NOTE!

In the event of a general power failure, the **EINet GR** will return to the screen that was showing before the power failure occurred.

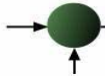


## CHAPTER 4 — NECESSARY *EINet* SETTINGS

In this chapter you will find instructions to set the minimum settings that are necessary to allow the *EINet* Energy & Power Multimeter to function properly.

### WARNING!

- The selection, installation and settings of the Current Transformer are the most vital and fundamental actions required to ensure the accuracy of the *EINet* Energy & Power Multimeter.
- It is essential to know the ratio of the Current Transformer being installed into the system in order to set the parameter for the Current Transformer correctly.
- All three main current Lines MUST have Current Transformers of the same ratio installed onto them.



## 4.1 Settings for Current Transformer

To set or change settings for Current Transformer

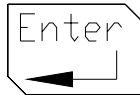
### NOTE!

The most important setting necessary for the proper functioning of the **EINet** Energy & Power Multimeter is the Current Transformer setting.

The cross section of the leads to the current Transformer must be compatible to the power of the current transformer. We recommend a power transformer with at least 3VA and the length of the wiring of the transformer no longer than 3m.

1 From Main Menu scroll to **Technical Menu**

2 Click



The **Check Password** screen appears

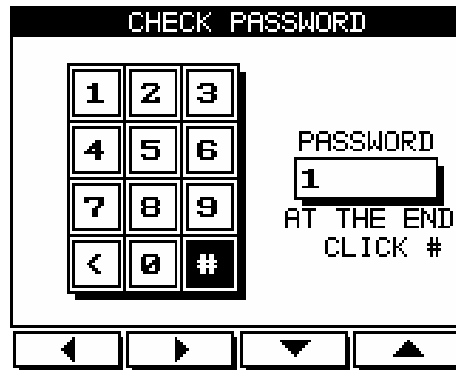


Figure 4.1. Check Password

**NOTE!**

The password is 1

- 3 Move the cursor with the F1, F2, F3, & F4 buttons to number 1. (See Section 3.2 for description of button functions).

- 4 Click



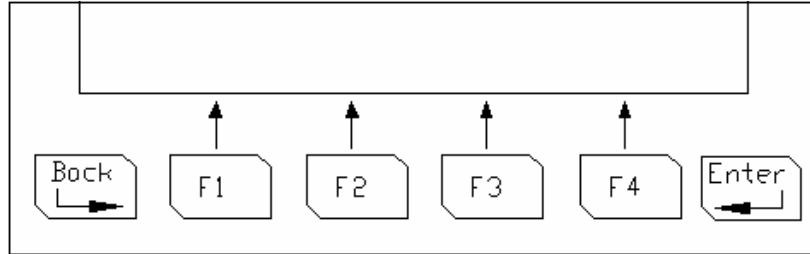
The number 1 will appear in the password field.



Figure 4.2. Password Field



- 5 Move the cursor to the # Sign with F1, F2, F3, & F4 buttons, (See Section 3-2 for description of button functions).



If the incorrect password is inserted into the Password field, an Error message appears

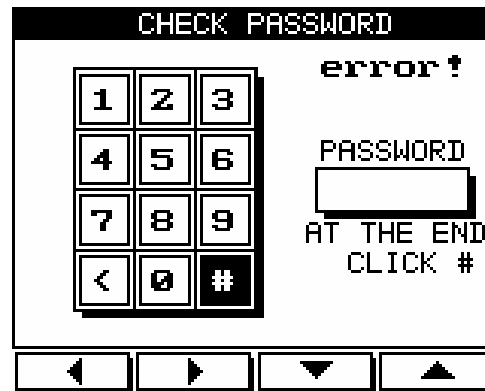


Figure 4.3. Error Message

Go back to step 3 and start again.

- 6 Click







The **Technical Menu** screen appears



Figure 4.4. Technical Menu

7 Scroll to **Current Transformers**

8 Click



The **Current Transformer** screen appears

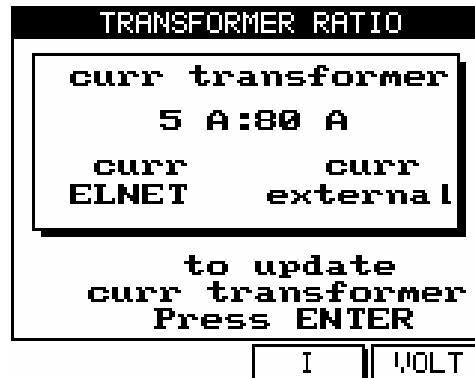
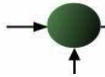
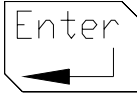


Figure 4.5. Current Transformer



The present setting for the **Current Transformer** is shown.

If it is a new installation, the ratio will show 5 A:5 A

9 Click 

The **Insert Value** screen appears

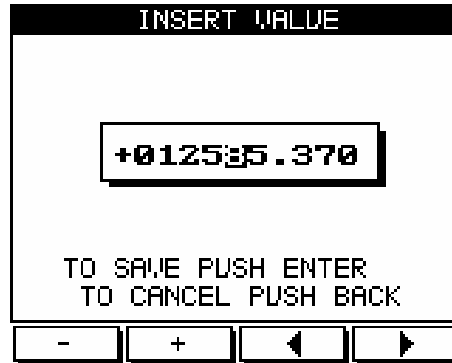

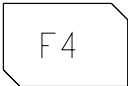

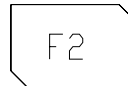


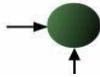


Figure 4.6. **Insert Value**

Use Button  **or**  to move the cursor.

Use Button  **or**  to change the value + or -.

10 To save Click  11 To cancel Click 



## 4.2 Electrical Connection Check

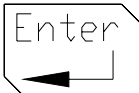
### NOTE!

To avoid any problems arising from incorrect Voltage Connections or accidental reversal of Current Transformer Connections, it is necessary to perform a Phase Order Check before continuing.

### To perform Electrical connection Check

See Section 4.1 for instructions to arrive at the **Technical Menu**

1 From Technical Menu scroll to **Connection check**

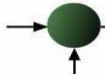
2 Click 

The **Connection Check** screen appears

CONNECTION CHECK		
	Voltage	Current
<b>L1</b>	<b>OK</b>	<b>NO</b>
<b>L2</b>	<b>OK</b>	<b>NO</b>
<b>L3</b>	<b>OK</b>	<b>NO</b>
<b>Phase Order= OK</b>		

**Hit any key..**

Figure 4.7. Connection Check



### Voltage and Current Messages

Message	Voltage	Current
<b>OK</b>	Voltage "OK" present on Lines. If "OK" is not present on 3 Lines, then its not connected correctly	Current present in Lines <u>and</u> synchronized with Voltage Lines. If "OK" is not present on 3 Lines, then its not connected correctly
<b>OPP</b>	Not Applicable	Wired in incorrect direction
<b>NO</b>	No Voltage	No current

Table 4-1 **Voltage and Current Messages**

### Phase Order Messages

Message	Voltage
<b>OK</b>	Correct Phase Order of Voltage Connections
<b>OPP</b>	Incorrect Phase Order i.e. Line 2 does not follow Line 1 and/or Line 1 does not follow Line3

Table 4-2 **Phase Order Messages**



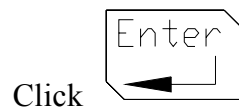
## 4.3 TOU Setting

**ELNet** Energy & Power Multimeter is capable of working in several TOU Settings. The user can choose the TOU Setting according to the country requested.

### To set TOU

See Section 4.1 for instructions to arrive at the **Technical Menu**

From Technical Menu scroll to **TOU Setting**



The **TOU Setting** screen appears

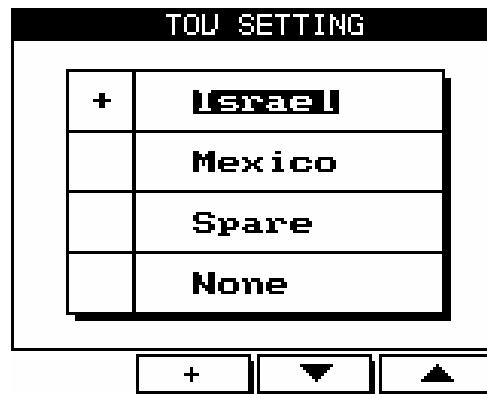
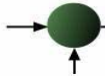


Figure 4.8. TOU Setting

Then choose the relevant country by pressing the enter button on its name.




## 4.4 Change language

**To change language on the display screen**

### **NOTE!**

The “Change Language Utility” toggles between English and Hebrew and works on the Main screen only.


Click  for 6 seconds

## 4.5 Time Settings

**To set Time**

See Section 4.1 for instructions to arrive at the **Technical Menu**

From Technical Menu scroll to **Set Clock**


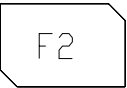
Click 






The **Set Clock** screen appears




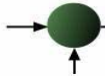
Figure 4.9. **Set Clock**

Use  or  to select Hour, Minute, Second.

Use  or  to change time.

Click  to return to **Technical menu**.

Click  to return to Main menu.



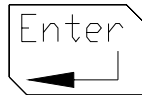
## 4.6 Date Settings

### To set Date

See Section 4.1 for instructions to arrive at the **Technical Menu**

From Technical Menu scroll to **Set Date**

Click



The **Set Date** screen appears




Figure 4.10. Set Date






Use  or  to select Day, Month, Year.

Use  or  to change Day, Month, Year.

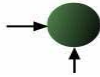
Click  to return to **Technical menu**.

Click  to return to Main menu.

## 4.7 Zero Accumulating Values

### To set all accumulating values to Zero

- 1 Repeat step 1 and 2 from Section 4.1.
- 2 Move the cursor with the F1, F2, F3, & F4 buttons (See Section 3.2 for description of button functions).
- 3 Insert **6425** into the password field.
- 4 Click #



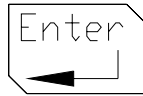
## CHAPTER 5 — FRONT PANEL DISPLAYS

In this chapter you will find instructions on how to obtain the readings that the **EINet** Energy & Power Multimeter provides, e.g., Current, Voltage Power, Power Factor, Energy, and Power quality.

### 5.1 Current for 3 Phases

To display Current for all 3 Phases

- 1 From Main Menu scroll to **Current & Voltage**



- 2 Click

The **Current** screen appears

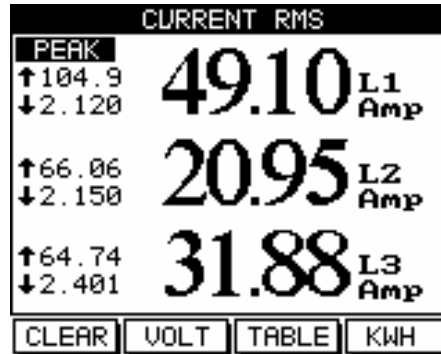
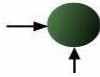


Figure 5.1. Current Display


- 3 Read the **Current for Line1, Line2 and Line3**

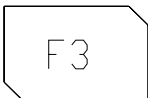


## 5.2 Frequency for 3 Phases

### To display Frequency for all 3 Phases

- 1 Display the current screen as described in section 5.1

- 2 Click  "TABLE"

- 3 Click  "FREQ"

The **Frequency** screen appears

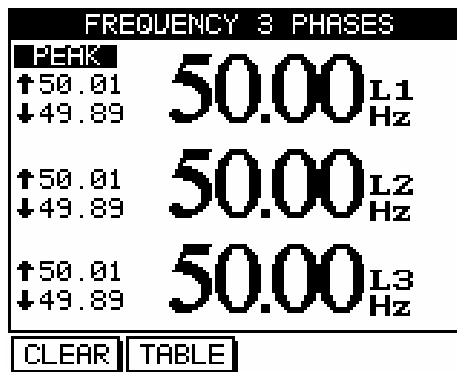
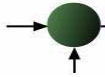


Figure 5.2. Frequency for all 3 Phases



---

You can reset the Peak values by using the “CLEAR” button  
Read the **Frequency** in Line 1, Line 2, Line3

### 5.3 Current in Neutral Line

By using the Vector value of L1/2/3 **Current *ElNet* Energy & Power Multimeter** calculates the Current in the **Neutral Line**.

**To display Current in the Neutral Line**


**NOTE!**

If the reading for neutral line is “0” (i.e. there is no current in the neutral line), then either there is no current in system,


OR

the current for all three phases is balanced.

1 From Main Menu scroll to **Current & Voltage**

2 Click 

3 The **Current & Voltage** screen appears as described in section 5.1

4 Click  - “TABLE”

5 The **Current & Voltage** table screen appears

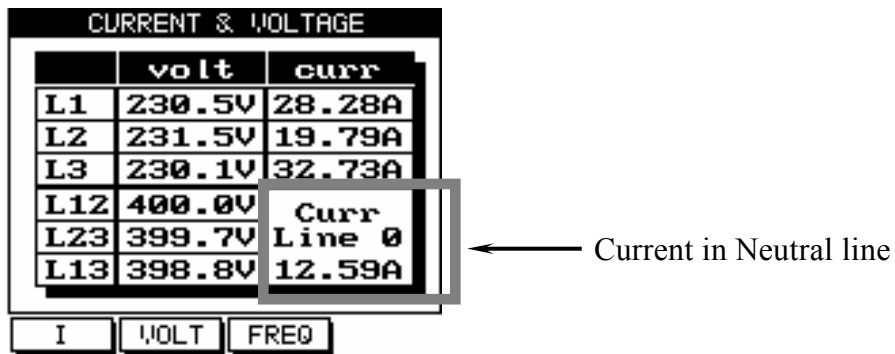
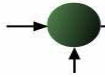


Figure 5.3. Combined Displays

Parameter	Description	Units
L1	Voltage from <b>Line1</b> to Neutral	Volts
L2	Voltage from <b>Line2</b> to Neutral	Volts
L3	Voltage from <b>Line3</b> to Neutral	Volts
L12	Voltage across <b>Line1</b> and <b>Line2</b>	Volts
L23	Voltage across <b>Line2</b> and <b>Line3</b>	Volts
L13	Voltage across <b>Line1</b> and <b>Line3</b>	Volts

Table 5-1 Voltage Readings

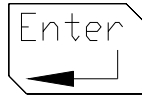


## 5.4 Voltage for 3 Phases

To display Voltage for all 3 Phases and across Phases

1 From the Main Menu scroll to **Current & Voltage**

2 Click



The **Current & Voltage** screen appears

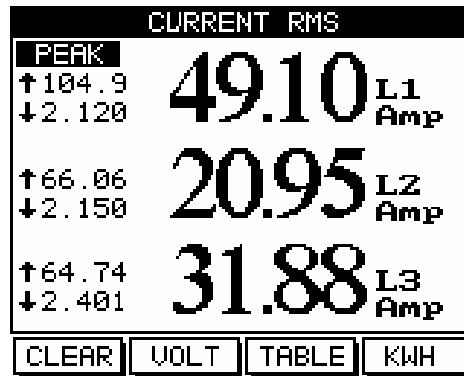
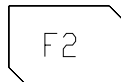
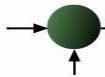


Figure 5.4. Combined Displays

3 Click "VOLT"



The **Voltage** screen appears

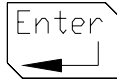


## 5.5 Active Power for all 3 Phases (P)

To display Active Power for all 3 phases

1 From Main Menu scroll to **Power Display**

2 Click



The **Active Power** screen appears

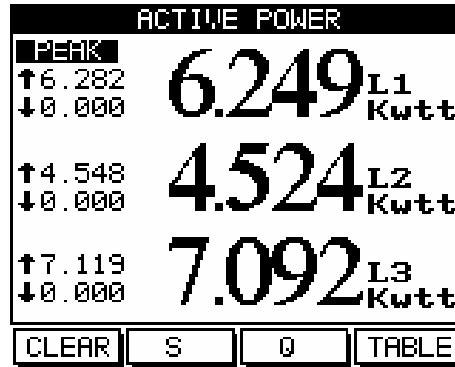


Figure 5.5. Active power

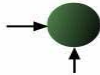
3 Click



To display **Power Table**

Parameter	Description	Unit
P	Active Power for each Line	Watts
Q	Reactive Power for each Line	VAR
S	Apparent Power for each Line	VA
$\Sigma P$	Total Active Power for all 3 Lines	Watts
$\Sigma Q$	Total Reactive Power for all 3 Lines	VAR
$\Sigma S$	Total Apparent Power for all 3 Lines	VA
PF	Power Factor	

Table 5-2 Power Readings



**NOTE!**

Peak ↑ is the highest value reached for the adjacent reading since the ***ELNet*** Energy & Power Multimeter was first switched on,

**OR**

Since the last time the reset button was pressed.

Peak ↓ is the lowest value reached for the adjacent reading since the ***ELNet*** Energy & Power Multimeter was first switched on,

**OR**

Since the last time the reset button was pressed.

**NOTE!**

The "CLEAR" button resets the Peak values only for the screen presently being shown.



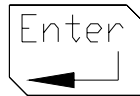


## 5.6 Reactive Power for all 3 Phases (Q)

To display Reactive Power for all 3 phases

- 1 From Main Menu scroll to **Power Display**

- 2 Click



The **Power Table** screen appears

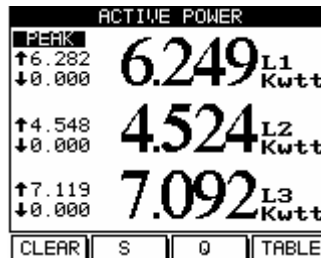
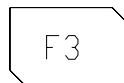


Figure 5.6. Active Power

To display Reactive Power for all 3 phases in a single screen

- 3 Click



The **Reactive Power** screen appears

Refer to section 5.4 for description of peaks.  
The "CLEAR" button resets the Peak values

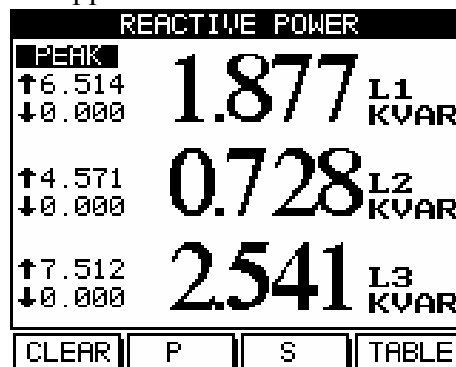
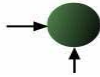


Figure 5.7. Reactive Power

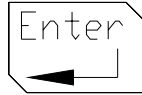


## 5.7 Apparent Power for all 3 Phases (S)

To display Apparent Power for all 3 phases

1 From Main Menu scroll to **Power Display**

2 Click



The **Power Table** screen appears

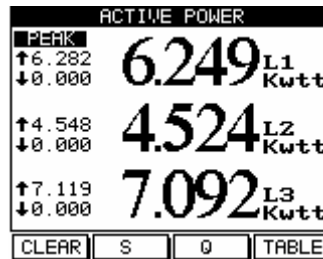
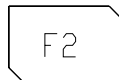


Figure 5.8. Power Table

To display Apparent Power for all 3 phases in a single screen

3 Click



Refer to section 5.4 for description of peaks.

The "CLEAR" button resets the Peak values

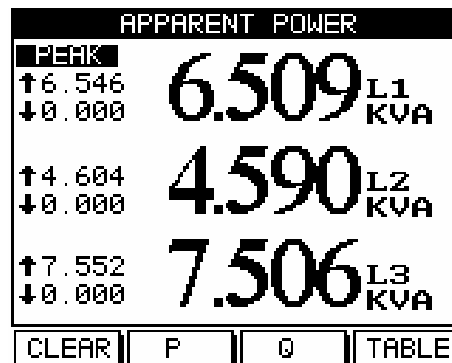
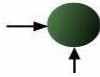



Figure 5.9. Apparent Power




## 5.8 Power Factor for each Phase

To display Power Factor for each phase

1 From Main Menu scroll to **Power Display**

2 Click 

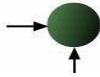
3 Click  to display "TABLE" format

The **Power Table** screen appears

POWER TABLE			
POWER UNITS WATT/VAR/VA			
L	P	Q	S
1	513.3	150.9	535.0
2	398.7	117.2	415.6
3	601.1	176.7	626.5
Σ	1513	444.8	1577
PF= 0.963			

P Q S PF

Figure 5.10. Power Table



4 Click



The Power Factor for each Line screen appears

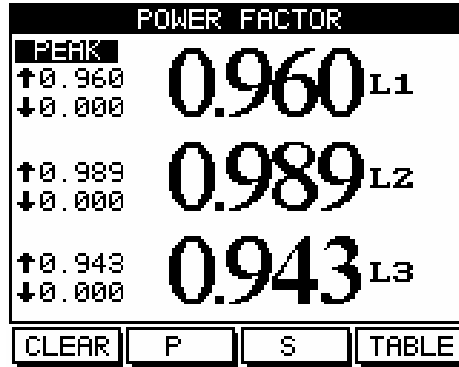


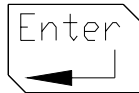
Figure 5.11. Power Factor for each line

## 5.9 Overall Power Factor

To display Overall Power Factor

1 From Main Menu scroll to **Power Display**

2 Click



and then click





The Power Table screen appears

POWER TABLE			
POWER UNITS WATT/WAR/WA			
L	P	Q	S
1	513.3	150.9	535.0
2	398.7	117.2	415.6
3	601.1	176.7	626.5
Σ	1512	444.8	1577
PF=0.963			

Overall Power Factor

P	Q	S	PF
---	---	---	----

Figure 5.12. Power Table

### 5.10 Active Energy

To display Overall Active Energy

- 1 From Main Menu scroll to **Energy Display**

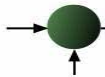
- 2 Click 

The Energy Meter screen appears

ENERGY METER	
98459.77	KWh
100007.1	KVAh
17523.83	KVRh

Active Energy

Figure 5.13. Energy Meter



3 Read the **Active Energy for Line1, Line2, Line3**

**To return to Main Menu**

To return to Main Menu click



### 5.11 Reactive Energy

**To display Overall Reactive Energy**

1 From Main Menu scroll to **Energy Display**

Click



The **Energy Meter** screen appears

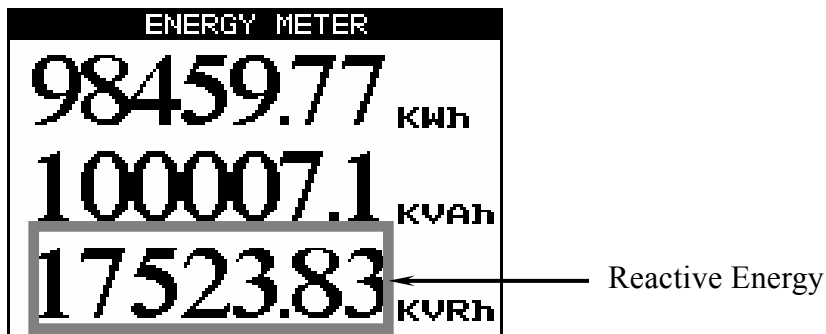


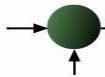
Figure 5.14. Energy Meter

2 Read the **Reactive Energy for Line1, Line2, Line3**

**To return to Main Menu**

3 To return to Main Menu click



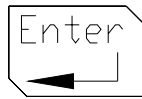


## 5.12 Apparent Energy

### To display Overall Apparent Energy

1 From Main Menu scroll to **Energy Display**

2 Click



The **Energy Meter** screen appears

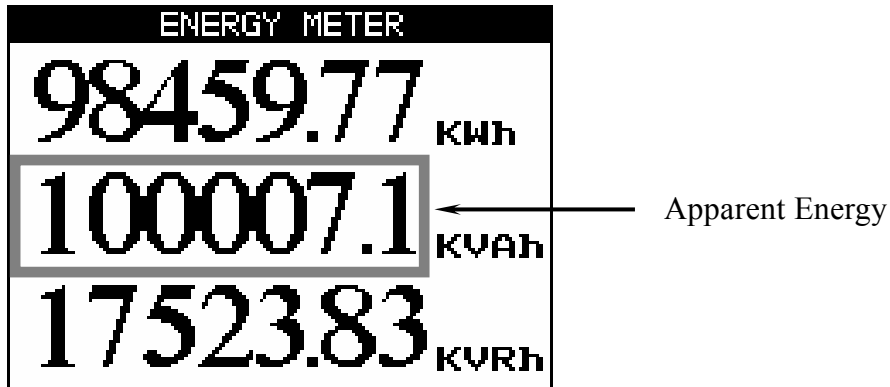


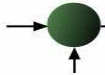
Figure 5.15. **Energy Meter**

3 Read the Apparent Energy for Line1, Line2, Line3

### To return to Main Menu

4 To return to Main Menu Click





## 5.13 Power Quality

### NOTE!

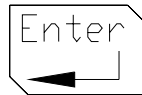
Poor Harmonics could invoke a fine and damage to the electrical system and can be improved by adding filters.

The ***ElNet*** Energy & Power Multimeter **GRAPHIC** Model is capable of displaying Harmonics in **Wave Form Graph**, **Harmonics Bar Graph**, **Harmonic Tables** and **Total Harmonic Distortion** for Voltage and Current.

### 5.13 .1 Wave Form Graphs

To display Wave Form Graphs

1. From Main Menu scroll to Power Quality



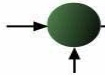
2. Click

The **Power Quality** screen appears

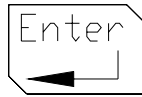


Figure 5.16. Power Quality





### 3. Scroll to **Wave Form Graphs**



4. Click

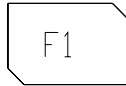
The **Wave Form Graphs** screens appear.

## **NOTE!**

### Available **Wave Form Graphs**

- |                          |                           |
|--------------------------|---------------------------|
| 1. <b>Volts</b>          | Line 1, Line 2 and Line 3 |
| 2. <b>Current</b>        | Line 1, Line 2 and Line 3 |
| 3. <b>Active Power</b>   | Line 1, Line 2 and Line 3 |
| 4. <b>Reactive Power</b> | Line 1, Line 2 and Line 3 |
| 5. <b>Apparent Power</b> | Line 1, Line 2 and Line 3 |

### **To display Voltage Wave Form Graphs**



1. Click

The **Voltage Graph** screens appears

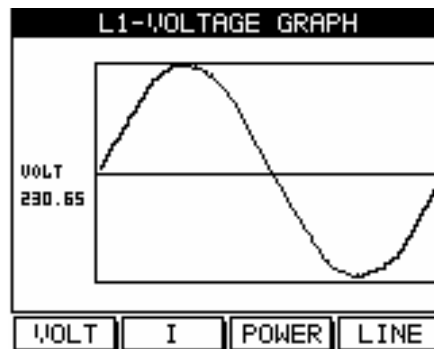



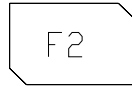
Figure 5.17. **Voltage Graph**



2. Press  to change **Voltage Graph** to Line 1, Line 2 and Line 3

### To display Current Wave Form Graphs

1. Click



The **Current Graph** screens appears

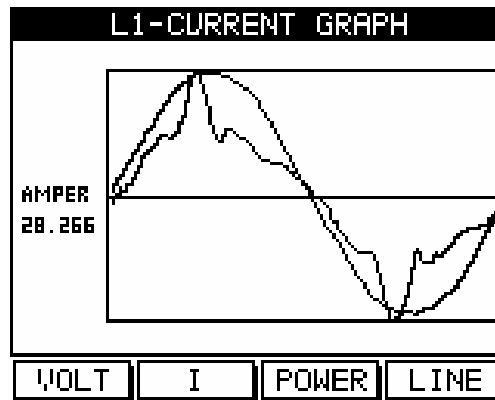



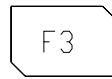
Figure 5.18. **Current Graph**

2. Press  to change **Current Graph** to Line 1, Line 2 and Line 3



## To display Active Power Wave Form Graphs

1. Click



The **Active Power Graph** screens appears

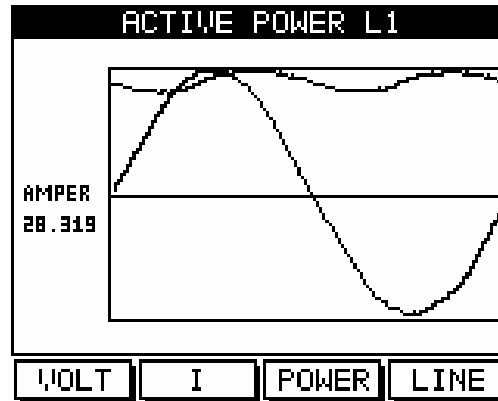
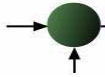


Figure 5.19. **Active Power Graph**

2. Press

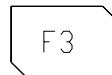


to change **Active Power Graph** to Line 1, Line 2 and Line 3



## To display Reactive Power Wave Form Graphs

1. Click



The **Reactive Power Graph** screens appears

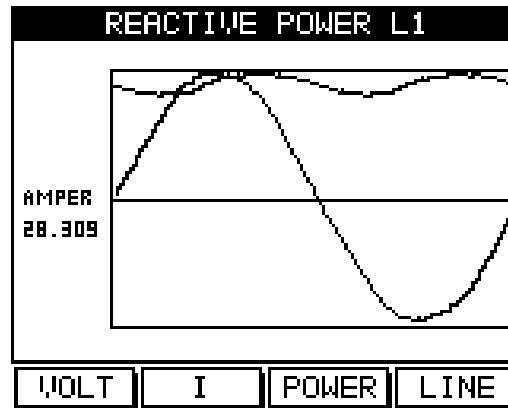


Figure 5.20. **Reactive Power Graph**

2. Press

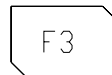


to change **Reactive Power Graph**  
to Line 1, Line 2 and Line 3



## To display Apparent Power Wave Form Graphs

1. Click



The **Apparent Power Graph** screens appears

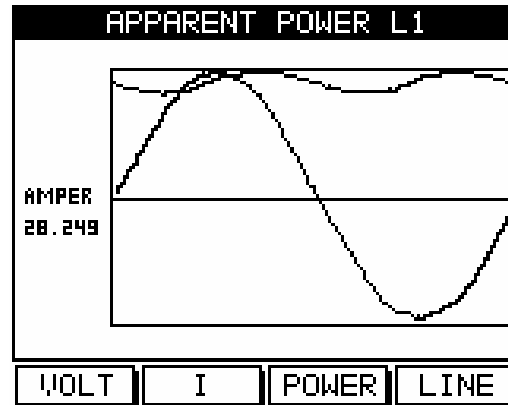


Figure 5.21. Apparent Power Graph

2. Press



to change **Apparent Power Graph** to Line 1, Line 2 and Line 3

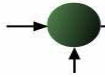
## 5.13 .2 Harmonics Bar Graphs

### To display Harmonics Bar Graphs

1. From Main Menu scroll to **Power Quality Display**

2. Click





The **Power Quality** screens appears

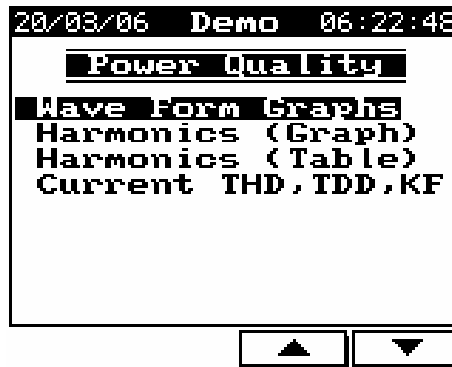
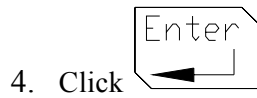


Figure 5.22. **Power Quality**

3. Scroll to **Harmonic (Graphs)**



The **Harmonics Volt Bar Graph** screens appears

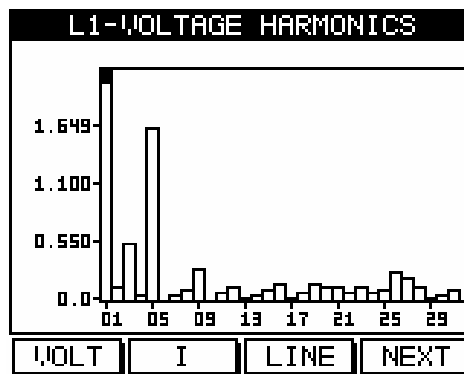
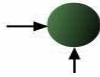


Figure 5.23. **Harmonics Bar Graph**



5. Press

F3

to change **Harmonics Volts Bar Graph** to Line 1, Line 2 and Line 3

**NOTE!**

1<sup>st</sup> Harmonics is normally 100%. If shown together with the other Harmonics, distortion to the rest of the

Harmonic Bar Graph will occur. By toggling **F4**, the **EINet** Energy & Power Multimeter are able to separate 1<sup>st</sup> Harmonics to prevent this distortion.

### To display Harmonics Current Bar Graph

Click

F2

The **Harmonic Current Bar Graph** screens appears

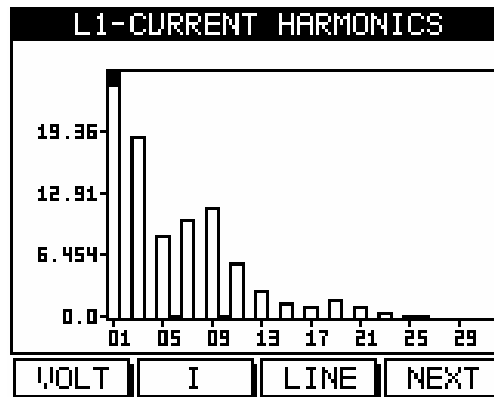
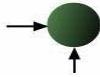


Figure 5.24. Harmonic Current Bar Graph



### 5.13 .3 Voltage Total Harmonic Distortion (THD)

#### **NOTE!**


The ***EINet*** Energy & Power Multimeter is capable of measuring Voltage and Current Harmonic Distortion for the first 60<sup>th</sup> Harmonics. These are presented in a table format with the Total Harmonics Distortion (THD) also shown.

#### **To display Harmonics Tables**

1. From Main Menu scroll to **Power Quality Display**

2. Click 

3. Scroll to **Harmonic (Table)**

4. Click 


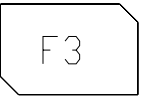




The **Harmonics Volt Table** screens appears

L1-VOLTAGE HARMONICS			
##	Value%	##	Value%
1	100.00	9	0.59
2	0.24	10	0.15
3	0.68	11	0.26
4	0.13	12	0.16
5	1.72	13	0.20
6	0.10	14	0.18
7	0.13	15	0.07
8	0.16	16	0.08
THD=2.171 %			
VOLT		I	
LINE		NEXT	

Figure 5.25. **Harmonic Volt Table**

5. Click  to scroll down the Table to observe all Volt Harmonics till 60<sup>th</sup>
6. Click  to change **Harmonics Volt Table** to Line 1, Line 2 and Line 3

#### 5.13 .4 Current Total Harmonic Distortion (THD)

To display **Harmonics Current Table**

Repeat steps 1-4 from Section 5.13.3



F2

1. Click

The **Harmonic Current Table** screens appears

L1-CURRENT HARMONICS			
##	Value%	##	Value%
1	100.00	9	11.70
2	0.21	10	0.31
3	19.30	11	6.12
4	0.19	12	0.20
5	8.84	13	3.07
6	0.44	14	0.09
7	10.31	15	1.64
8	0.23	16	0.06
THD=27.5% Kf=1.8			
VOLT	I	LINE	NEXT

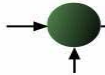
Figure 5.26. **Harmonic Current Table**

F4

2. Click to scroll down the Table to observe all the Current Harmonics till 60<sup>th</sup>

F3

3. Click to change **Harmonics Current Table** to Line 1, Line 2 and Line 3



## 5.13 .5 Current THD,TDD,KF

From Main Menu scroll to Power Quality Display and then scroll to THD, TDD, KF Current.

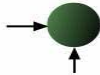
The **Current, THD, TDD, KF** Table screens appears

CURRENT THD, TDD, KF			
L	THD	TDD	KF
1	6.096	0.346	5.151
2	2.552	0.196	7.567
3	6.051	0.130	5.424
0	6.319	0.345	6.106
I.MAX=1000			

I.SET

Figure 5.27. Current THD, TDD, KF

In order to enable the system to calculate properly the TDD value, user should set the max line current value by using "F4".



## CHAPTER 6 — ALARM REPORT

Every second automatically the **EINet** monitor all the electrical values and compare them to the pre-setting alarm values.

The **EINet** can handle and store up to 1,000 alarms that are stored in the **EINet** memory with their time & date data.

The **EINet** has three alarm relays each one of them can be linked to one or more pre-defined alarms.

The following alarms can be defined:

	<u>Lines</u>
1. Voltage alarms	L1; L2; L3
2. Current alarms	L1; L2; L3 + neutral line
3. Power factor alarms	L1; L2; L3 +General
4. Harmonics alarms	L1; L2; L3; L0
5. PEAK & SAG alarms	L1; L2; L3

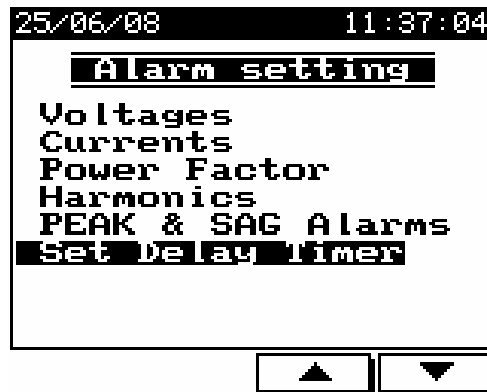
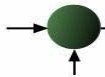


Figure 6.1. Alarm Setting



For each one of the above alarms the user can define two alarms - low value alarm and high value alarm.

The user can select one of sixteen different timers in order to delay each one of the alarms.

### 6.1.1. Alarm setting

See chapter No. 4.1 how to get in the **Technical Menu** from the main screen.

From the **Technical Menu** select “**Alarm setting**” and press Enter. The **Alarm Setting Screens** appear. (See figure 6.1).

From this screen you will be able to set alarms for Voltages, Currents Power Factor, Harmonics, PEAK& SAG alarms and to set the values for 16 delay timers that can be linked to each one of the alarms.

**For each alarm the user can define:**

**High alarm** – The set point that above that the alarm will be generated.

**Low alarm** – The set point that below that the alarm will be generated.

**Delay timer** – One of sixteen timers that define the time duration that the alarm should be “ON” in order to be written in the memory.

VOLTAGE L1		
OUT	VALUE	ALARM
3	253.0	High Value
<input checked="" type="checkbox"/>	207.0	Low Value
	T 1	DelayTimer

Figure 6.2. Alarm user defines



## Set Delay Timers:

Up to sixteen delay timers can be defined in the **EINet** Multimeter, user can link for each one of the timer one or more alarms, the delay timer will check that the alarm is stable and will not write the alarm in the memory of the **EINet** unless the alarm is in “ON” position for the time duration as set.

In order to set the time duration for the sixteen timers select “**Set Delay Timer**” form the screen described in Figure 6.1. **Alarm Setting Screens** the following screen appears.

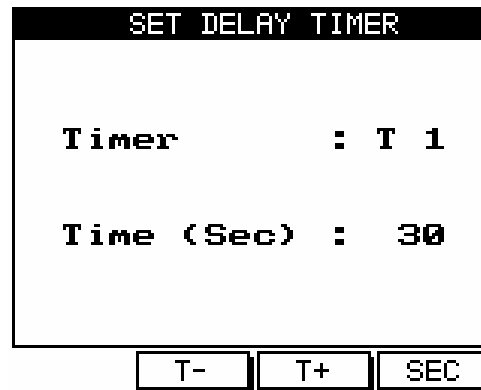
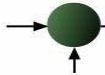


Figure 6.3. Timer Delay

By using “**T- / T+** “ (F2 / F3) the timer number can be changed.

By using “**SEC** “ (F4) the time delay value can be changed.



---

## 6.1.2. Display Alarms Report

Two alarm reports can be generated:

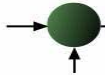
Historical alarm report – includes all the information about fixed alarms (return to normal status).

Current alarm report - includes all the information about existing alarms.

In order to generate an alarm report, from the Main Menu scroll to “**Alarm report**” and press enter, scroll to “Historical Report or Current report” and select one of them by using ( F3/F4) and press enter. A list of alarms appear – Press “INFO” (F1) in order to get detailed information. The following screen will appear:

```
ALARM DETAILS
POWER UP
-----
25/06/08 11:32:09 -ALARM
25/06/08 11:32:09 - OFF
-----
ALARM SET POINT      :    0.00
MEASURED VALUE >    :    0.00
NUMBER OF EVENTS     :        1
```

Figure 6.4. Alarm Details



---

## CHAPTER 7 — DEMAND REPORTS

**ElNet** Multimeter can generate reports that will inform the user the date of the maximum demand. The reports include:

*Maximum Demand* – for active power and power factor.

*Maximum Demand* –for reactive power and power factor.

*Maximum Demand* – for apparent power and power factor.

*Maximum Demand* – for current and voltage.

The **ElNet** informs the value of the demand and the relevant power factor, the time. The date, for all three phases, the demand is the maximum value within the predefine time interval specified by the user.

Press F1 in order to select I / PF - Current / power factor maximum Demand

Press F2 in order to select P / Q / S active / reactive / apparent power Demand

Press F4 n order to see the power factor together with the power demand

Press F3 “DATE” in order to change the time interval within which the

**ElNet** will check the maximum demand.





## CHAPTER 8 — DATA LOGGING

**ElNet** multimeter collects automatically important electrical data day by day, for approximately two years.

From the Main Menu scroll to “**Data Logging**” and press Enter. The following screen appears

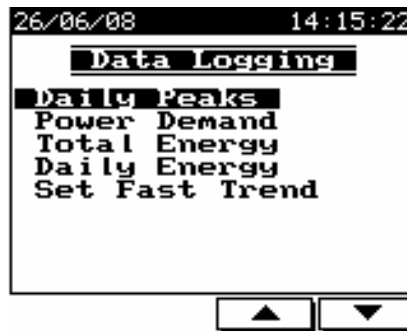


Figure 8.1. Data Logging

### Daily peaks :

Select Daily peaks and press Enter, then you will be able to get the following information:

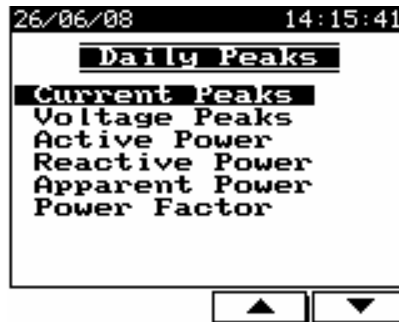
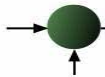


Figure 8.2. Daily Peaks



For each one of the above options you will have the ability to get for each phase the lowest-level value and the highest-level value as specified in the following screen:

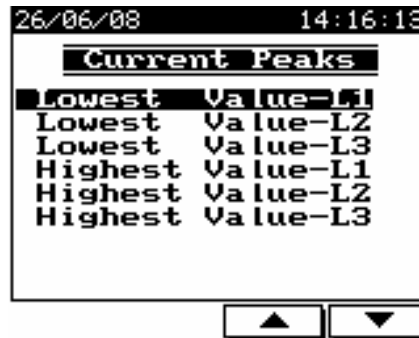


Figure 8.3. Current Peaks

Select one of the above options and press Enter, the following screen will appear:

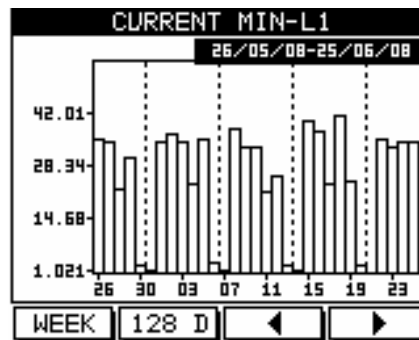
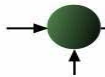


Figure 8.4. Current Min. L1

F1 / F2 – change the interval - time base between week / month / 128 days

F3 /F4 – change the date, each press will increase / decrease the date by week / month / 128 days.



---

### **Power Demand :**

The operation method is very similar to the above paragraph "Daily peaks" and the information includes the maximum average for 15 minutes of the active power, reactive power and apparent power demand.

### **Total Energy :**

The operation method is very similar to the above paragraph "Daily peaks" and the information includes the total energy values for active energy, reactive energy and apparent energy for each phase and total energy.

### **Daily Energy :**

The operation method is very similar to the above paragraph "Daily peaks" and the information includes daily energy consumption for active energy, reactive energy and apparent energy for each phase and total energy.

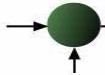
### **Set Fast Trend :**

Selecting **Data logging** from the screen described in Figure 8.1. will enable you to set a trend report. The size of the trend report is 4200 samples of all the measurements (currents, voltages, power, power factor and more for all phases).

The user can set only the cycle time (sampling rate) and the range is from one second up to 3600 seconds (one hour)

SET FAST TREND			
MAX TREND RECORDS 4200			
CURRENT RECORD 1			
CYCLE TIME-SECONDS 15			
-	+	STOP	CLEAR

Figure 8.5. Set Fast Trend



## CHAPTER 9 — COMMUNICATION

### 9.1 Communication Connections

The **EINet** Energy & Power Multimeter supports RS232 and RS485. Connections for both are provided on the Rear Panel, (see Figure 6.1) and are made by means of the connectors provided. The same information can be transmitted along both, but only one at a time. The user can choose the one that best suits his current situation and equipment.

The 10 BASE-T sockets support a standard connection to any Ethernet network.

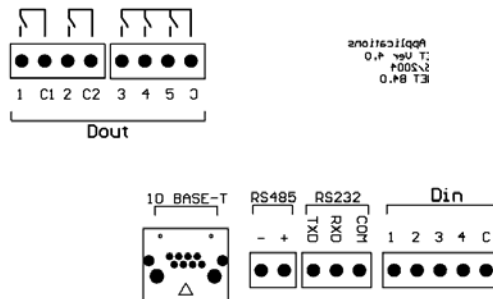
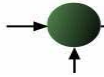


Figure 9.1. Communication Connections

### 9.2 Communication Settings

To enable the *User* connecting the **EINet** Energy & Power Multimeter to a PC **master** computer for successful communications, the Communication Setup parameters of both must match; i.e. the port of the PC **master** and the configuration settings of the Power meter.



### 9.3 Address

Each Power meter in a communication system must have its own unique address.

Since the **EINet** Energy & Power Multimeter works on MODBUS, the available addresses are from '1' to '247'.

### 9.4 Baud Rate

The Baud Rate is the communication speed in Bits per second (BPS) that the **EINet** Energy & Power Multimeter communicates with the PC **master**. The better the communication line Quality, the faster the communications may be.

If the communication line is routed through a "noisy" environment, it may be necessary to decrease the Baud Rate.

Available Baud Rates for the **EINet** Energy & Power Multimeter:

600	bps
1200	bps
2400	bps
4800	bps
9600	bps
19200	bps



## 9.5 Parity

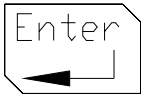
The choices of parity are either NONE or EVEN (see section 6.1.1 for description of Parity).

## 9.6 Communication Set Up

### To set up Serial Communications

See Section 4.1 for instructions to arrive at the Technical Menu.

From Technical Menu scroll to **Communication Settings**

- 1 Click 

The **Communication Setup** screen appears

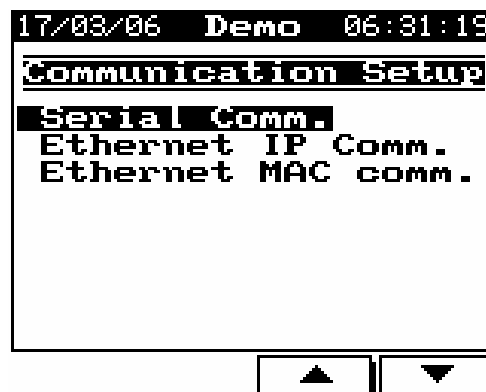
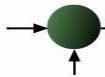
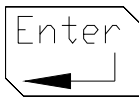


Figure 9.2. Communication Setup



From Communication Setup Menu scroll to **Serial Comm.**

2 Click 

The **Communications Settings** screen appears

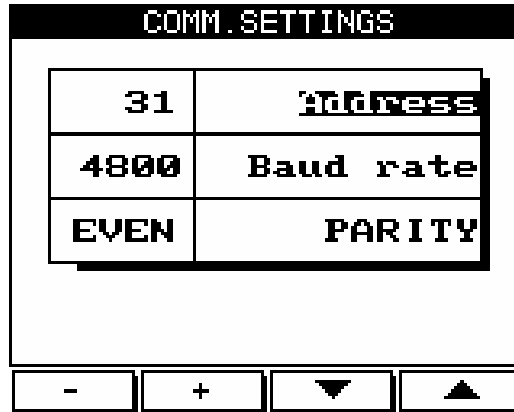
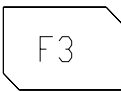


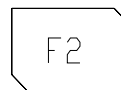
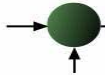


Figure 9.3. **Communications Settings**


Use Button  or  to select Address, Baud Rate, Parity


Use Button  or  to change value in selected field



## NOTE!

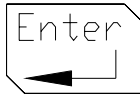
When the selection is made it takes immediate affect with no further action required.

Click  to return to Technical menu.

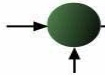
Click  to return to Main menu.

### To set up Ethernet Communications

From the Communication Setup Menu scroll to **Ethernet Comm.**

1 Click 





The **Set IP Address** screen appears

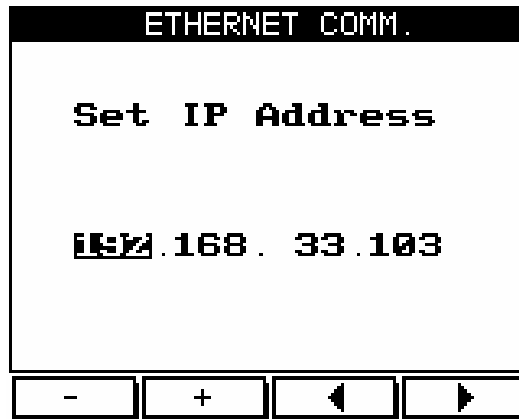
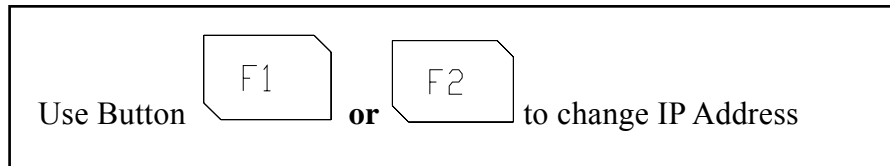
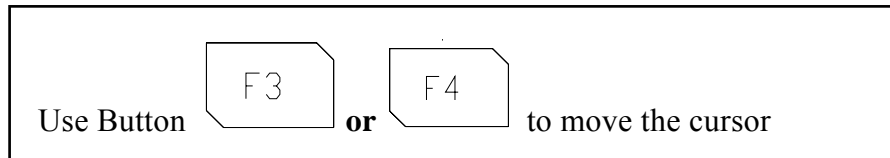
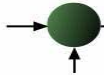


Figure 9.4. **Set IP Address**





## 9.7 Communication with UniArt Software

CONTROL APPLICATIONS Ltd propriety software, “UniArt” is used to **Read** and **Write** Registers of the ***ELNet*** Energy & Power Multimeter. Each Item number in the Registers Table is a unique field containing information. The UniArt software manages each Item number as a parameter. Refer to the UniArt manual how to set up parameters.

### To read fields using UniArt

- 1 Find the reading required in the MODBUS Registers Table
- 2 Note the Item Number from the Registers Table
- 3 Go to the correct File number

Because File capacity in UniArt is limited to 128 parameters, the information contained in the ***ELNet*** fields is stored in several files.

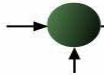
File number is determined by the Item number

File # 0 contains	Item number	1 - 128
File # 1 contains	Item number	129 – 256
File # 2 contains	Item number	257 – 384
File # 3 contains	Item number	385 – 512

- 4 Go to the correct Point number within that file

Point number is determined by the formula:

$$\text{Item number} - [\text{FILE X } 128] = \text{Point Number}$$



E.G. 1 If the user wishes to read Voltage Line 2 (Item No 2)  
By applying the formula:  $2 - [0 \times 128] = 2$   
File = 0 and Point within that file = 2

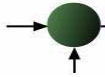
E.G. 2 If the user wishes to read 30<sup>th</sup> Harmonics for Volts Line1  
(Item No 330)  
By applying the formula:  $330 - [2 \times 128] = 74$   
File = 2 and Point within that file = 74

E.G. 3 If the user wishes to read 7<sup>th</sup> Harmonic for Current Line 3  
(Item No 467)  
By applying the formula:  $467 - [3 \times 128] = 83$   
File = 3 and Point number within that file = 83

More Examples

E.G. No	Item No	Field Description	File	Point
1	2	Voltage Line 2	0	2
2	330	30 <sup>th</sup> Harmonics for Volts Line1	2	74
3	467	7 <sup>th</sup> Harmonic for Current Line 3	3	83
4	128		0	128
5	129		1	1
6	256		1	128
7	257		2	1
8	384	20 <sup>th</sup> Harmonics for Volts Line 3	2	128
9	385	21 <sup>st</sup> Harmonics for Volts Line3	3	1

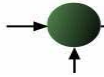
Table 6-6 Examples how to calculate Point for UniArt



## CHAPTER 10 — Specifications

Item	Description
Power requirements	110/230VAC,60/50 Hz, 30VA
Dimensions	(HxWxD) 144x144x100 mm
Shipping Weight	750 gr.
Measuring voltage limits	700 VAC
Measuring current limits	6 A
Operating Voltage limits	1000VAC
Operating Current limits	50A
Enclosure material	ABS Anti flame
Display	Graphic 160x128
Operating temperature	-20 - + 50 C
Storage temperature	-20 - + 80 C
Humidity	0- 90 RH%
Voltage input terminals	VL – E10 1708
Communication port	RS232/ RS485/ 10 BASE -T
Mounting	Front Panel Mounting

All technical specifications are subject to change without notice.



## Appendix A — Installation & Configuration Check List

### INSTALLATION CHECK LIST

Description	Date	Signature
Check contents of packaging		
Remove from packaging		
Prepare hole		
Mount Multimeter		
Connect Multimeter power supply		
Connect 3 Current Transformers		
Connect 3 Voltage lines		
Connect Neutral line		
Set Current Transformer Ratio		
Connect Communication lines		
Check Phase Order Connections		
Set Time and Date		

Appendix A Table - Installation & Configuration Check List