IP Operations Manual
August 2009

Contents

Introduction

The information below was current at time of publication. However, products and product options are in continuous development. Please check current availability by contacting your local dealer or at www.ndmeter.co.uk.

IP Meters are available as follows:
- ➤ *PowerRail 350IP* System Meter;
- ➤ *PowerRail 350IP* Energy Management Meter;
- ➤ *Cube 350IP* System Meter;
- ➤ *Cube 400IP* System Meter;
- ➤ *Cube 400IP* Energy Management Meter.

Key hardware differences between the various Meters are as follows:
- ➤ *PowerRail* Meters mount on a DIN Rail;
- ➤ *Cube* Meters are DIN 96x96 panel mounting;
- ➤ *PowerRail 350* and *Cube 350* feature a single line LCD display;
- ➤ *Cube 400* Meter features a 3-line LCD display;
- ➤ *Cube 400* Meters are optionally available with 2 digital inputs (for counting or status indication) and 2 digital outputs (for alarm of remote control).

Key software differences between the various are as follows:
- ➤ *Energy Management* Meters feature a comprehensive set of web pages, providing an Energy Management solution to the user;
- ➤ System meters feature a limited set of web pages, sufficient for installation, commissioning and basic remote trouble shooting.

IP Meter Webpages

There are three types of web page configuration available as shown below: Energy Management, Energy Management with IO and System Meter.

Energy Management

All pages are available except
- ➤ Totals & Alarms
- ➤ Totals & Alarms under Setup
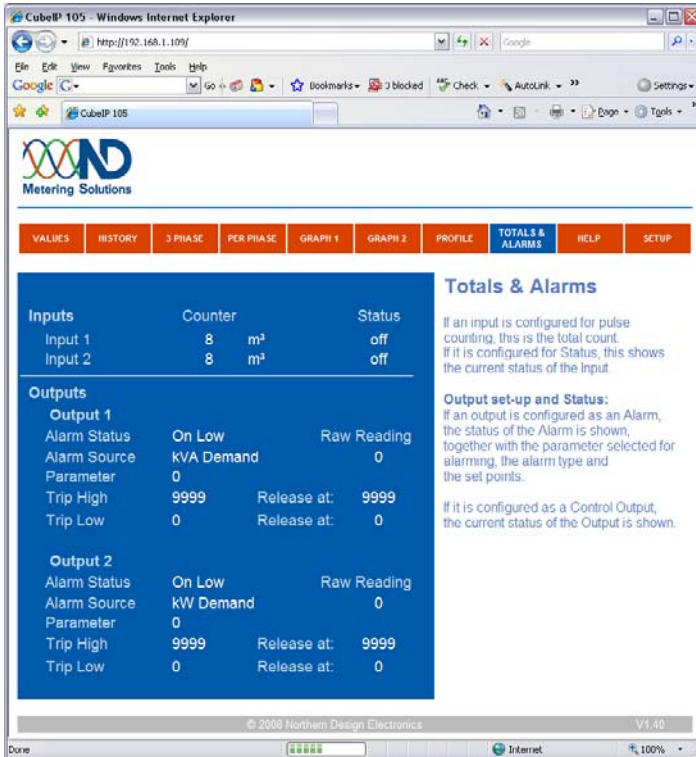
Energy Management with Digital I/O

All pages are available

System Meter

Only the following pages are available:
- ➢ Values page
- ➢ Pages used for network setup
- ➢ Pages used for file transfer

IP Meter Pages

Values

The *Values* page provides live real time measurements from the meter.

VALUES	HISTORY	3 PHASE	PER PHASE	GRAPH 1	GRAPH 2	PROFILE	TOTALS & ALARMS	HELP	SETUP

Per Phase	1	2	3	
Current	11.4	11.4	11.4	Amps
Voltage	228.5	229.0	227.3	Volts
Power Factor	0.96	0.96	0.95	
Power	2.5	2.5	2.5	kW

3 Phase		
Active Power	7.4	kW
Reactive Power	0.8	kvar
Cost per Hour	0.48	£
Carbon per Hour	0.9	kg

Energy		
Active Energy	69785.3	kWh
Cost	4536.04	£
Carbon	8.235	tonnes
Reactive Energy	5711.4	kvarh

Instantaneous Values

Per Phase
Real time Voltages, Currents and Power Factors for the 3 phases.

NOTE: If the PFs of two of the phases (or any other readings) seem wrong then the Meter may be incorrectly wired. See: Check Wiring.

3 Phase
Real time instantaneous 3 phase powers.

Energy
Total 3 phase Energy consumption to date together with cost & carbon emissions.

The values refresh rate can be altered. To change this setting see: Values Refresh time

The *Per Phase* section displays individual values for each of the three phases.
In the event of a 3-phase meter being configured for a single-phase voltage connection (only phase 1 of the meter is connected), then phase 1 will display the measured values while phases 2 and 3 will display zero. Power factor will display 1 for both phases 2 and 3.

The *3 Phase* section shows the three phase totals of active and reactive power plus the present hourly cost and hourly carbon emissions.

The *Energy* section shows accumulated values. The values displayed on the screen are updated at regular intervals.   The interval at which the screen is updated can be changed by clicking on the link "Values Refresh Time" in the right-hand text panel.   This displays a window showing the refresh time in a text box.   To change the refresh time type a new value into the text box and then press the 'Tab' key.

Scale Settings

Display
Update/refresh time in seconds. | 2 |

The text panel also contains a link labelled "Check Wiring"; this is an Internet link to a document that provides advice on correcting faults that may have occurred when the meter was installed.

NOTE: Cost and CO_2 are calculated from the consumption when the page is displayed.   If the "Cost per kWh" is changed to reflect a change in the tariff, the costs as displayed will be calculated on this new rate rather than reflecting the actual cost at the time consumption occurred.

History

The *History* page provides displays of present and historic energy consumption for the last 12 months, together with cost and carbon emissions.   The cost and carbon are based on the cost per kWh and carbon per kWh that are entered on the meter setup page.

History	kW	Cost/hr	kg C/hr
Instantaneous	14.2	0.01	1.66
	kWh	Cost	kg C
Meter Reading now	10363.5		
This Month	381.9	0.38	44.68
	kWh	Cost	kg C
January			
February			
March			
April			
May			
June			
July			
August			
September			
October	8812.0	8.81	1031.00
November	1169.6	1.17	136.84
December			
per kWh		0.10p	117g C

History

Summary kW information

- Present load with hourly cost & carbon emissions
- Total kWh month to date with total cost & carbon emissions
- kWh's for each of the previous 12 months with cost & carbon emissions

NOTES:
kWh's as the total, recorded by your meter.

Cost & carbon emissions are calculated on the values entered in the Setup screen. If there are multiple tariffs, an average cost should be used & the costs will be estimates.

Readings for the current calendar month are shown underneath the instantaneous values, with a table for the previous 12 months below that.   Only complete months are shown in this table so readings for the current month are not included; if values for the current month are shown, these will be for the previous year.

The illustration above shows a meter part way through the month of December.   The total for December so far is shown in the line labelled "This Month".   The complete totals for the previous months are shown in the table; 'December' being the total in the previous year.   It is important to note that the most recent entry in the table will be the month before the current calendar month.

If the meter has been running for less than one year then entries for previous months will be blank. The Set-up facility allows historic data to be manually entered to provide a complete picture even with a newly installed meter.

The text panel includes links to help on the setup screen and details of how cost and carbon are calculated.

NOTE: Cost and CO_2 are calculated from the consumption when the page is displayed.   If the "Cost per kWh" is changed to reflect a change in the tariff, the historic costs as displayed will be calculated on this new rate rather than reflecting the actual cost at the time consumption occurred.

3 Phase

The *3 Phase* page provides simulated analogue meters of four key system parameters, together with the reading in digital format in the top left hand corner of each meter.
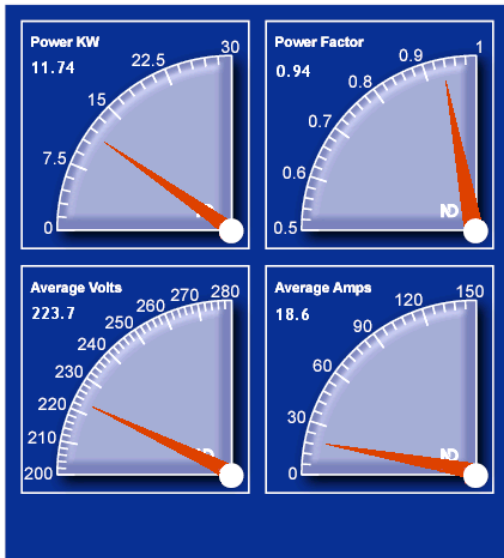
3 Phase

The meters display instantaneous system Power in kW, Power Factor and the average of the three Currents and Voltages. Readings are updated every few seconds to track changing load conditions.

Each meter shows a traditional analogue indication together with the digital value. The analogue pointer shows the value at a glance while the digital display makes taking precision readings easy. Full Scale values are determined by the Meter settings.

Help
Power Factor is a measure of how efficiently electricity is being used.

A poor Power Factor, below 0.85, may need to be investigated - particularly if the load is high.

The voltage and current meters show the average value of the three phases. The power is the total active power, the sum of the three individual phase powers. The power factor is derived from the total active and reactive power for the system. The scales of the meters can be altered through the setup pages by selecting the "Configuration" access level and then selecting the *scales* page.

NOTE: When calculating the average voltage, a low or zero reading is ignored — the meter presumes that it is connected to a single-phase system.

Per Phase

The *Per Phase* page provides displays the voltages and currents of each phase. The scales of these meters are the same as the scales of the voltage and current meters on the *3 Phase* page and can be set in the same way.
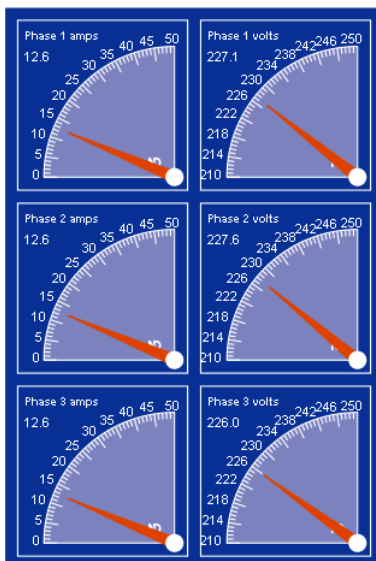
Per Phase

The meters display the instantaneous Currents and Voltages (line or phase as selected) for all three phases. Readings are updated every few seconds to track changing load conditions.

Each meter shows a traditional analogue indication together with the digital value. The analogue pointer shows the value at a glance while the digital display makes taking precision readings easy. Full Scale values are determined by the Meter settings.

Help
All three currents and voltages should be roughly the same. Any significant and constant differences may need to be investigated.

Graph 1

The first graph page provides a live graph of the average voltage across the three phases and the individual phase currents.
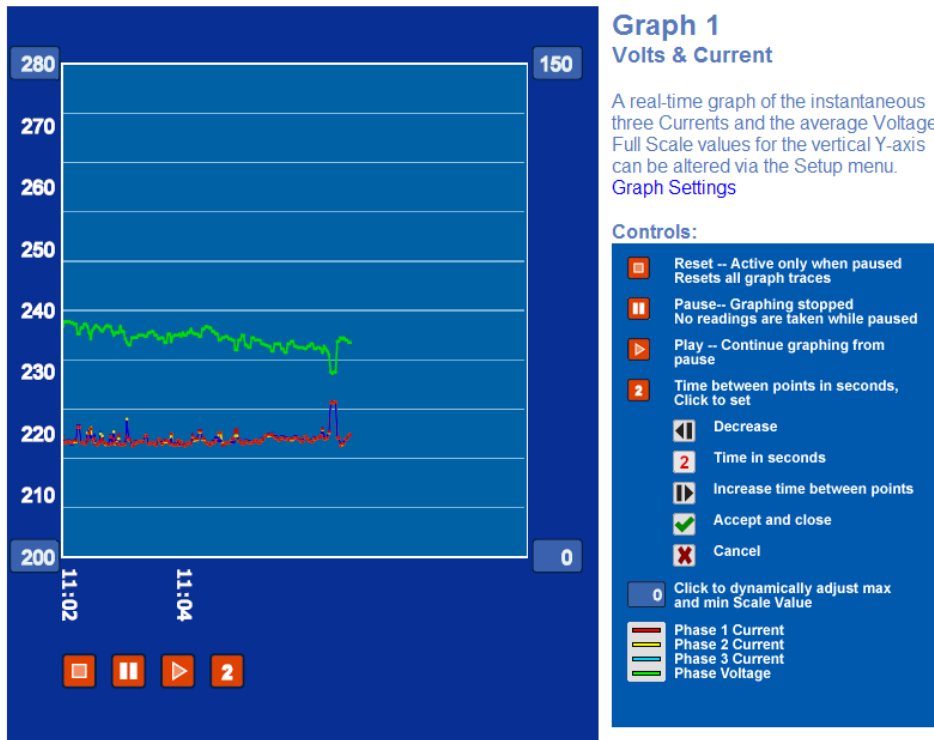

The graph starts plotting as soon as the page is loaded.   Hovering the mouse over any point on a trace opens a small window displaying the actual data at that point.   Clicking the pause button (⏸) freezes the display; while frozen click the reset button (■) to clear the display or the play button (▶) to resume plotting.   The time interval button (2) shows the interval between points in seconds, click on this button to change the interval.

> NOTE   There is no indication on the graph if the display had been paused and then restarted, or the time interval had been changed.

There are two ways to change the scale of the graph.   Clicking on the maximum or minimum number for either of the scales causes a text box to be displayed.   A new value entered in this text box causes the display to be rescaled immediately.   The changed scales are effective as long as the graph page is displayed and lost when another page is viewed.   The next time the graph page is displayed the scales revert to their default values.   The default values can be changed through the setup pages by selecting the "configuration" access level and then choosing the *scales* page.   The default scale values apply to both the graphs and the analogue meters on the *3 Phase* and *Per Phase* pages.
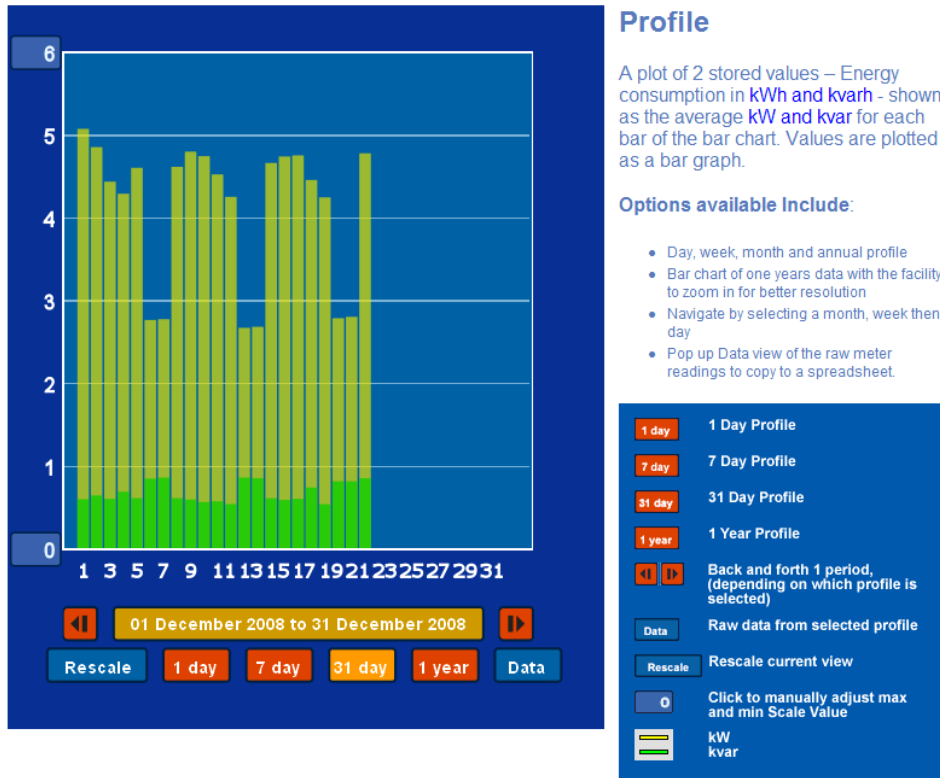
Graph 2

The second graph page provides a live graph of the total system power (in kW) and the system Power Factor.
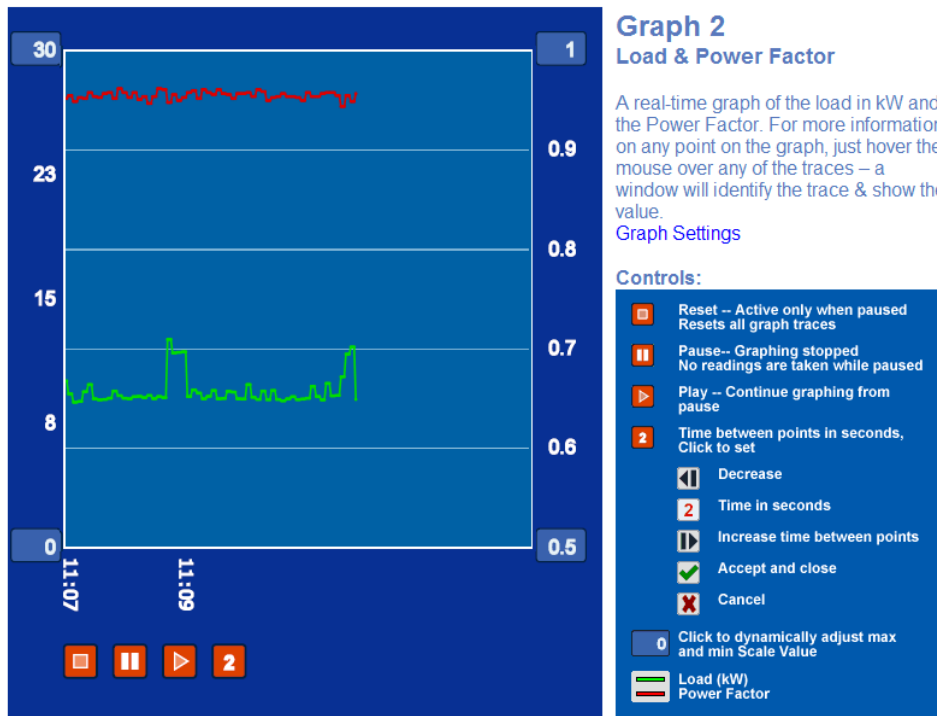
The controls for this graph are same as those for the *Graph 1* page.

Profile

The *Profile* page provides a display of the historic energy consumption logged by the meter.

The energy profile is presented as a bar chart and can be shown across a single day, 7 days, 31 days or a whole year.   The chart can be auto-scaled (by clicking the Rescale button) or manually by clicking on the maximum or minimum number of the energy consumption axis. The latter causes a text box to be displayed where new max / min scale value can be entered.   The periods immediately before or after the one displayed can be selected for viewing by clicking on the arrow buttons (◀,▶).   The Data button causes a new window to be displayed that contains the currently viewed data as text; this can be copied and pasted into another application.

To navigate to a particular day:
Select 31 day and then use the arrow buttons (◀,▶) to view the month you require.
Then select 7 day, use the arrow buttons (◀,▶) to scroll through the weeks with in that month, until the required week is displayed.
Now select 1 day and use the arrow buttons (◀,▶) to select the day of the week you require.

NOTE: In order for profiling to function correctly, the first four parameters on the logging page must be set to log kWh (high and low words, 7680 and 7681 respectively) and kvarh (high and low words, 7684 and 7685 respectively).

Totals & Alarms

If the digital input and output option is fitted to the meter then the Totals and Alarms page displays the counter inputs and alarm status.
- 11 -

Inputs	Counter		Status
Input 1	8	m³	off
Input 2	8	ltr	off
Outputs			
Output 1			
Alarm Status	On Low		Raw Reading
Alarm Source	kVA Demand		0
Parameter	0		
Trip High	9999	Release at:	9999
Trip Low	0	Release at:	0
Output 2			
Alarm Status	On Low		Raw Reading
Alarm Source	kW Demand		0
Parameter	0		
Trip High	9999	Release at:	9999
Trip Low	0	Release at:	0

Totals & Alarms

If an input is configured for pulse counting, this is the total count.
If it is configured for Status, this shows the current status of the Input.

Output set-up and Status:
If an output is configured as an Alarm, the status of the Alarm is shown, together with the parameter selected for alarming, the alarm type and the set points.
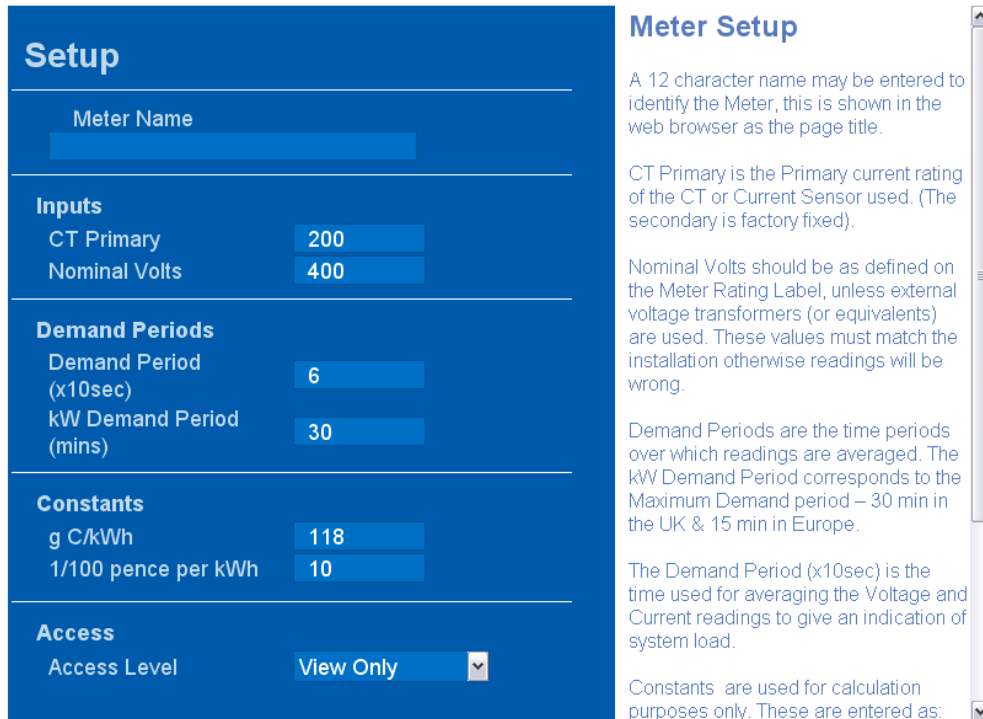
If it is configured as a Control Output, the current status of the Output is shown.

The values of the counters are displayed at the top of the page.   The status of the alarms is shown along with the high and low set points.   The counters and alarms can be configured using the setup pages.

Setup

The *Setup* page displays the meter settings and allows an operator or installer to update them.

Setup

Meter Name

Inputs
CT Primary 200
Nominal Volts 400

Demand Periods
Demand Period (x10sec) 6
kW Demand Period (mins) 30

Constants
g C/kWh 118
1/100 pence per kWh 10

Access
Access Level View Only

Meter Setup

A 12 character name may be entered to identify the Meter, this is shown in the web browser as the page title.

CT Primary is the Primary current rating of the CT or Current Sensor used. (The secondary is factory fixed).

Nominal Volts should be as defined on the Meter Rating Label, unless external voltage transformers (or equivalents) are used. These values must match the installation otherwise readings will be wrong.

Demand Periods are the time periods over which readings are averaged. The kW Demand Period corresponds to the Maximum Demand period – 30 min in the UK & 15 min in Europe.

The Demand Period (x10sec) is the time used for averaging the Voltage and Current readings to give an indication of system load.

Constants are used for calculation purposes only. These are entered as:

At the bottom of the screen the *Access* section contains a drop-down control that sets the level of control that the user has over the settings.

➤ The "View Only" option only allows the user to see the settings — they cannot be changed. If a user tries to edit the settings in "View Only" mode then the edits are discarded and the display reverts to the current values.

➤ The "Operator" setting is currently disabled.

➤ The "Configuration" setting gives access to further setup pages (such as Network Configuration) through an additional menu bar that is displayed at the bottom of the screen in this mode A 4 digit numeric Password is required to access "Configuration" mode.

The *Meter Name* is the title on the web browser page that displays the meter pages. This *Meter Name* can only be edited at "Configuration" level; other values on this page can be edited at "Operator" level.

The *Inputs* section describes the connection between the meter and the electricity supply in calculating readings. CT Primary is the primary rating of the current transformers that are sensing the current flowing in the circuit. Nominal Volts is the rating of the voltage inputs; this should be identical to the "Voltage Input" as shown on the meter label unless voltage transformers are used.

The *Demand Periods* are the length of time over which readings are averaged.
Demand Period is the averaging time for Current & Voltage measurements.
kW Demand Period is the averaging time for kW, kVA & kvar measurements.
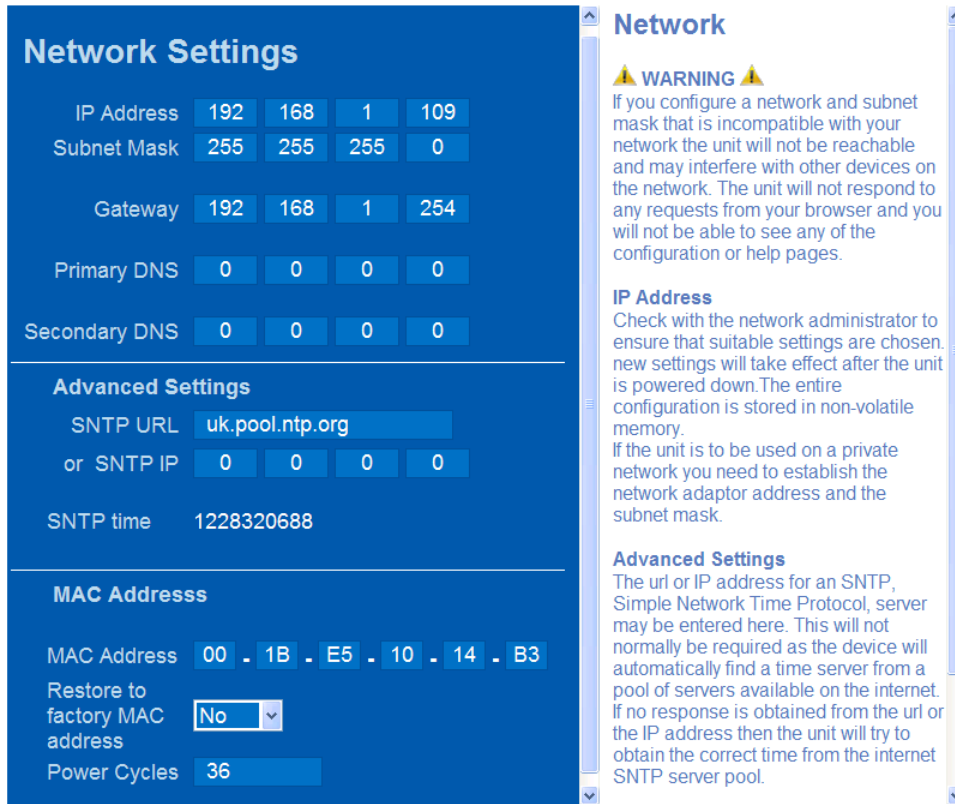
The *Constants* section contains the cost of each unit of electricity (kWh) and the amount of carbon emission that is associated with generating each kWh. Carbon is entered in grams per kWh and cost in hundredths of a penny. These constants are used to calculate the Cost and Carbon fields on the Values page.

• To change a parameter, type in the value you require followed by the Tab key.

Network Setup

The *Network Setup* page is only accessible in Configuration mode. Generally a network administrator should provide the necessary parameters for setting up the network interface.

Network Settings

IP Address	192	168	1	109
Subnet Mask	255	255	255	0
Gateway	192	168	1	254
Primary DNS	0	0	0	0
Secondary DNS	0	0	0	0

Advanced Settings

SNTP URL   uk.pool.ntp.org

or SNTP IP   0   0   0   0

SNTP time   1228320688

MAC Addresss

MAC Address   00 . 1B . E5 . 10 . 14 . B3

Restore to factory MAC address   No

Power Cycles   36

Network

⚠ WARNING ⚠
If you configure a network and subnet mask that is incompatible with your network the unit will not be reachable and may interfere with other devices on the network. The unit will not respond to any requests from your browser and you will not be able to see any of the configuration or help pages.

IP Address
Check with the network administrator to ensure that suitable settings are chosen. new settings will take effect after the unit is powered down.The entire configuration is stored in non-volatile memory.
If the unit is to be used on a private network you need to establish the network adaptor address and the subnet mask.

Advanced Settings
The url or IP address for an SNTP, Simple Network Time Protocol, server may be entered here. This will not normally be required as the device will automatically find a time server from a pool of servers available on the internet. If no response is obtained from the url or the IP address then the unit will try to obtain the correct time from the internet SNTP server pool.

The meter is supplied with a default IP address of 192.168.1.127 and a subnet mask of 255.255.255.0. The DNS server addresses are only required if the meter is used for automatic remote data-logging.

Advanced Settings

The Advanced Settings section allows the name or IP address of a simple network time protocol (SNTP) server to be specified. If your default gateway is set correctly it is not necessary to specify an SNTP server as the meter will usually find the default server automatically (uk.pool.ntp.org). If you wish to use a local time server, then enter the IP address of that server in the SNTP IP. For a list of timeserver URL's visit www.pool.ntp.org/zone.
If the meter has obtained the correct time then the SNTP time will be greater than 1200million. This value is the number of seconds calculated from the 1st January 1970.

In the event you don't have access to the Internet and are just connected to a small network or stand alone PC then the Default Gateway and the SNTP IP address on the meter, must be set to the IP address of a local PC. You may need to open Port 123 in Windows Firewall (under Control Panel, select Windows Firewall, Exceptions, Add Port, enter Name as ntp, Port number as 123, select UDP then click ok) to allow access to your PC as a time server.

MAC Address

The meter's MAC address is set at the time of manufacture; it should never be necessary to change this value.
Power Cycles refer to the number of times the meter has lost the power supply (Aux).

Notes:

To change a parameter, type in the value you require followed by the Tab key.
The meter uses a software timer to maintain the date and time, when the time-server is not available. In the event of the supply to the meter being lost, the correct date and time will also be lost. Upon the supply being returned to the meter, the meter will return the default date and time. Access to the time-server will be required for the connect time.

Comms & Logging

The *Comms & Logging* page is only accessible in Configuration mode and is used to configure the logging function of the meter.   The meter measures multiple parameters and any of them can be recorded at regular intervals.   The meter can be configured to send recorded data to a remote ftp server.

Comms & Logging Setup

Logging Parameters

Parameter number	Modbus Address of the parameter to be logged
Number of Parameters to Log	20
1	7680
2	7681
3	7688
	7689
18	
19	7736
20	7737
Logging period (seconds)	900
Enable logging	Yes

FTP Details

FTP URL				
OR Remote IP	0	0	0	0
User Name				
Passcode				
Archive Period (minutes)	15			

Monthly kWh Totals

January	0
February	0
March	0

Comms & Logging

⚠ **WARNING** ⚠

Changing the 'Number of Parameters to Log' will erase the data log. Changing any of these settings will disable Data Logging. Re-enable data logging in the control box below when changes have been completed.

Parameters

Up to 20 parameters can be recorded in the internal non-volatile datalog. New values are recorded at the logging time interval entered. When the data log is full the oldest entries are overwritten with the most recent values. The modbus address for each ...

... entries a... ...most recent values. The address for each parameter can be found in the Cube350 or Cube 400 comms manual. For example, to record Phase 1 voltage, enter modbus address 7691 into the table.

Modbus Tables

Click to download MODBUS address tables for the full range of IP Meters.

FTP Details

The data recorded in the internal data log can be automatically transmitted to an ftp server using the passive ftp protocol. Only previously unsent data will be transmitted. For example, datalogging every 15 minutes, 900s, with an ftp interval of 1 hour, 3600s, will, on average, send files containing 4 records every hour. If the network link is broken then the next file would contain records for the number of hours the link has been down times four.

Monthly kWh Totals

The monthly total for the current month is automatically updated when the new month is detected.

The first text box in the *Logging Parameters* section sets the number of parameter registers that are to be logged.   Up to 20 registers can be logged.   (Note that some parameters - such as the energies - are split into high and low portions and take up two registers in the list.)   The parameters registers are entered into the table as MODBUS® addresses.   For MODBUS® addresses see appendix A. A full list of MODBUS® addresses is also available for download from the Help page.

Below the parameter table is the *Logging Period* entry box — this sets the Data Log interval.   The *Enable Logging* control enables or disables data-logging.

NOTE: The minimum logging period is dependant on the number of registers selected.   The theoretical minimum is 1 second, but in practice this may not be possible.   If all 20 registers are selected, the minimum period is 3 seconds.

Data is stored in a circular buffer; once the memory is full, new records overwrite the oldest ones. The length of data that can be held in the memory depends upon how many parameters are recorded. Each record requires 32 bits for the time stamp and 16 bits for each register (parameter). Logging all 20 registers every 5 minutes would fill the memory in 10 days, logging 4 registers every 15 minutes would take allow over 3 months of data to be stored. Appendix B provides a table of memory requirements and examples of calculating memory capacity.

The meter can automatically send logged data to a remote FTP server. The URL or IP address of the FTP server is entered in the *FTP Details* section. A username and password is required, they are entered here. Finally the time period between file transfers is entered in Archive Period (in minutes). If a file transfer is unsuccessful, readings are stored until such time that a file transfer is possible. If the memory is filled, the oldest data is overwritten.

The final section of this page contains monthly kWh totals for the previous 12 months. These are the totals displayed on the "History" page; they are provided here so that old readings (prior to the installation of the meter) can be entered.

If you wish to manually download the logged data, copy the code from Appendix C into a text editor and save it as mem_dl.bat into an accessible folder. Run the file mem_dl.bat by double clicking the file and follow the instruction. You will be asked for a meter ID, this is just a name which identifies the meter and the name of a subdirectory in which your data log file will be placed. The file downloaded will show the whole memory (the logged data and any free memory available for logging). Now you can open the downloaded file into a spreadsheet program such as Excel.

- To change a parameter, type in the value you require followed by the Tab key.

  NOTE: In order for profiling to function correctly, the first four parameters on the logging page must be set to log kWh (high and low words, 7680 and 7681 respectively) and kvarh (high and low words, 7684 and 7685 respectively).

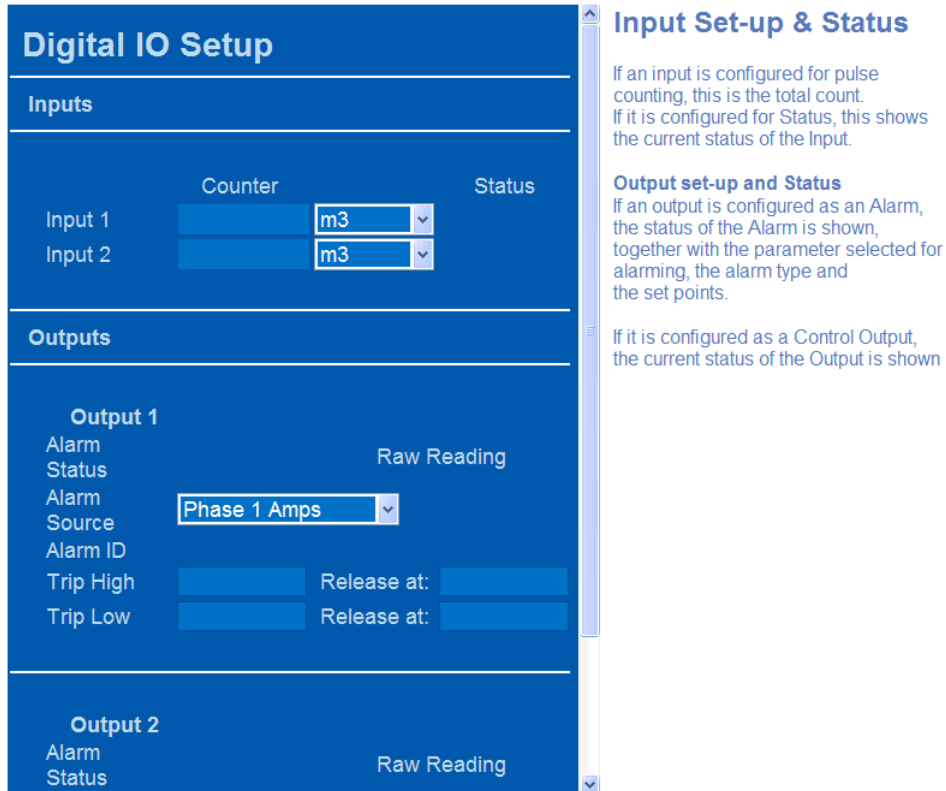 To combine the High and Low word values using the following:
  Total raw value = (65536 x High Word) + Low Word

  To calculated real value for kWh use the following:
  kWh = Total raw value x $10^{(eScale-6)}$

Totals & Alarms

The setup page for *Totals & Alarms* is only accessible in Configuration mode, and only if the meter is fitted with the "Digital Input and Output" option. This option provides two external inputs (for Pulse Counting or Status) and two outputs (for local Alarms or remote control via the communications link).

The *Inputs* section of this page allows the inputs to be configured.

➢ If used as a Counter Input, each can have an associated unit legend representing the quantity that the counter represents. Units are chosen from the drop-down control box.

The *Outputs* section allows the two outputs to be configured.

➢ If used as an Alarm, each has settings for both a high trip level and a low trip level.
The alarm output is switched on if the alarm source goes above the Trip High value or below the Trip Low value.
Each trip level has a separate Release value; this is the value at which the output is switched off.
The Release value for Trip High should be slightly below the Trip High value; the Release for Trip Low should be slightly above the Trip Low value.

• To change a parameter, type in the value you require followed by the Tab key.

Scales

The *Scales* page that is accessed through the Settings Menu is the same page as is displayed when "Scales" is selected from one of the Graph pages.

The *Display* text box sets the refresh time for displays of instantaneous values; this is the same as the time between points for the two graphs.   Values between 1 and 60 seconds are allowed.

The *Amps* section contains the high scale setting for the graph scales and analogue meter displays of current.   The high setting for Amps should be set at the rating of the connected current transformers, though they may be reduced if better resolution is required.   The low scale setting is always zero. The major divisions (*mjr divs*) sets the number of major divisions that are printed on the scale.

The *Volts* section contains the high and low (maximum and minimum) scale settings for the graph scales and analogue meter displays of voltage.   The factory default high setting for scale high is 250 volts and the low setting is zero.   The major divisions (*mjr divs*) sets the number of major divisions that are printed on the scale.

The *Power* section contains the high scale setting for the graph scales and analogue meter displays of power (1 = 1kW).   The low scale setting is always zero.   The major divisions (*mjr divs*) sets the number of major divisions that are printed on the scale.

- To change a parameter, type in the value you require followed by the Tab key.
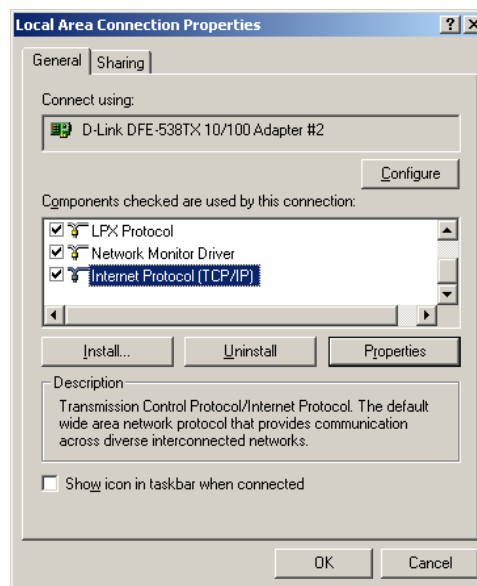
Stand Alone Laptop/PC Setup

Ensure the Laptop/PC network settings are configured to communicate with a single fixed IP address.
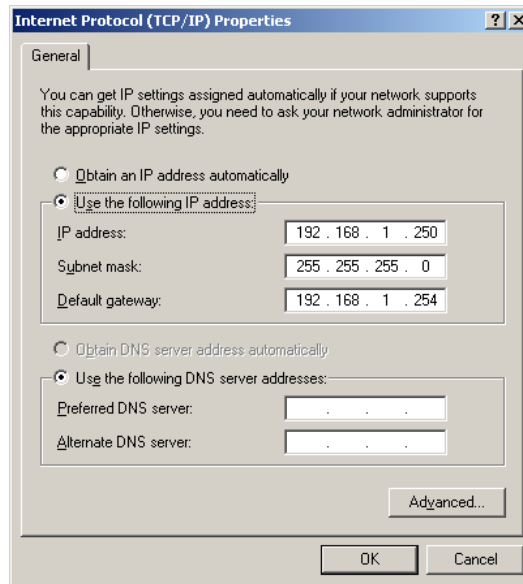*For MS Windows®:*

- From the *Start* menu select *Settings - Control Panel*.
- Open the *Networks and Dial-Up Connections* Dialog.
- Double Click on the *Local Area Connection Icon*.
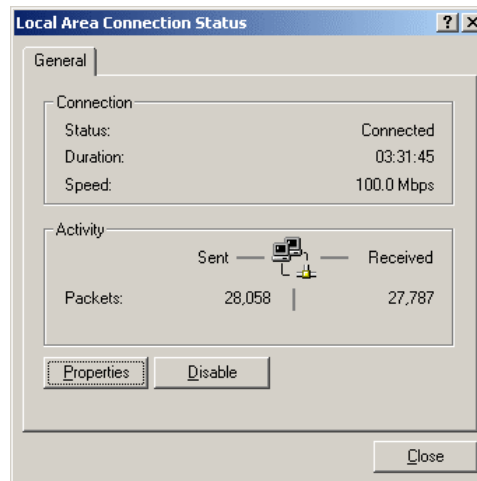
- Click on the *Properties* button.

- Select *Internet Protocol (TCP/IP)* from the component list as shown above.
- Click on the *Properties* button.

- Select the *Use the following IP address* radio button.
- Enter a fixed *IP Address* for the PC. This must have the first 3 numbers the same as the meter address and the third number different eg. Meter=192.168.1.127, PC=192.168.1.250.
- Enter the *Subnet Mask* setting for the meter.
- Enter the *Default Gateway* setting for the meter.
- Click on the *OK* button.
- Close the *Local Area Connection Properties* dialog box.

The PC is now configured to talk only to the connected meter.

Note: Connection.
Ensure the meter is connected to the PC/laptop via a CAT45 cable and the crossover adaptor supplied.

SNTP

In order to confirm that the PC/laptop is ready to be used as a time-server and ensure your meter gets the correct date and time, use the following commands.
From the DOS command prompt enter:

```
w32tm /register

net start w32time
```

The first command adds the required entry in the Registry.
The second command starts the timeserver service

You may need to open Port 123 in Windows Firewall (under Control Panel, select Windows Firewall, Exceptions, Add Port, enter Name as ntp, Port number as 123, select UDP then click ok) to allow access to your PC as a time server.

Customer Upgrades

This procedure is designed to update the firmware and web pages in a CubeIP Energy meter. The PC must be connected to the Internet so that updates can be downloaded from CubeIP.co.uk. The PC must have browser and tftp access to the meter on port 80 and port 69 respectively.

The process is in distinct stages:-
1. Fetch the update files from CubeIP.co.uk
2. Establish Ethernet comms with the meter.
3. Save the datalog and configuration files from the meter.
4. Transfer the new firmware files to the meter.
5. Restart the meter to load the new firmware. Older meters will require power cycling, all later meters will load new firmware when leaving configuration mode.
6. Load the new web pages and the original configuration file.
7. End

You will need your meter's IP and MAC address to hand.

Using an Internet browser such as Internet explorer, type in the address bar ftp://cubeIP.co.uk
You will then be prompted for a username and password
Username: production
Password: bd30qw
(Note, password is case sensitive, use lower case)

1. Double click on the Directory(folder) you require, energy, energy_io (with IO) or system.
2. Double click on the Meter_Updater_production_*****_V1.01.bat, save the file in a local folder on you PC. (***** is name of required webpages ie, energy, energy_io, system).
3. Then run in by double clicking on it.

A dos window will open, follow the instructions carefully and press any key when prompted.
You will be prompted to enter the MAC address of the meter to be upgrade (found on the top of the meter or on the network setup webpage browsed on the meter) and then the IP address of the meter.(the meter must be connected to your network and have access to the internet to receive the updates)

Batch file process:

1. Introduction
   a. Press any key to continue…
2. Fetching Meter update files from ftp server.
3. Starting Meter Updates
   a. Prompt for MAC address
   b. Prompt for IP address
   c. Meter Connection Ok!
4. Backing Up Meter Files
5. Backing Up Clone.icf
6. Backing Up Webpages.fat
7. Backing Up Log.csv
   a. Meter Backup Completed
8. Now Uploading New Firmware
9. Meter Firmware Uploaded
   a. Press any key to continue…

PLEASE TURN THE METER OFF AND ON TO LOAD THE NEW FIRMWARE BEFORE CONTINUING!
Please enter **configuration mode** then return to **view mode**, using the drop down menu on the setup site page, which will automatically open in your browser.

10. Press any key to continue…
11. Retesting connection to meter's IP address
    a. Press any key to continue…
12. Uploading New Meter Pages
13. Meter Update Complete!

PLEASE CHECK THE IP SETTINGS ON THE METER, AS THESE MIGHT NEED TO BE RESET!
    Press any key to continue…

Appendix A

Amalgamated Data Table – Modbus addresses for Logging

Data Address	Modbus Register	Data	Scaling
7680	47681	KWh High Word	eScale
7681	47682	KWh Low Word	
7682	47683	KVAh High Word	eScale
7683	47684	KVAh Low Word	
7684	47685	Kvarh High Word	eScale
7685	47686	Kvarh Low Word	
7686	47687	Export kWh High Word	eScale
7687	47688	Export kWh Low Word	
7688	47689	Phase 1 Amps	Ki
7689	47690	Phase 2 Amps	
7690	47691	Phase 3 Amps	
7691	47692	Phase 1 Volts	Kvp
7692	47693	Phase 2 Volts	
7693	47694	Phase 3 Volts	
7694	47695	Ph1-Ph2 Volts	Kvl
7695	47696	Ph2-Ph3 Volts	
7696	47697	Ph3-Ph1 Volts	
7697	47698	Frequency	500 = 50.00
7698	47699	Phase 1 PF	1000 = 1.000
7699	47700	Phase 2 PF	
7700	47701	Phase 3 PF	
7701	47702	System PF	
7702	47703	Phase 1 kW	Kp
7703	47704	Phase 2 kW	
7704	47705	Phase 3 kW	
7705	47706	System kW	
7706	47707	Phase 1 kVA	Kp
7707	47708	Phase 2 kVA	
7708	47709	Phase 3 kVA	
7709	47710	System kVA	
7710	47711	Phase 1 kvar	Kp
7711	47712	Phase 2 kvar	
7712	47713	Phase 3 kvar	
7713	47714	System kvar	
7714	47715	Ph1 Amps Demand	Ki
7715	47716	Ph2 Amps Demand	
7716	47717	Ph3 Amps Demand	
7717	47718	Ph1 Volts Demand	Kvp
7718	47719	Ph2 Volts Demand	
7719	47720	Ph3 Volts Demand	
7720	47721	Peak Ph1 Amps	Ki
7721	47722	Peak Ph2 Amps	
7722	47723	Peak Ph3 Amps	
7723	47724	Peak Ph1 Volts	Kvp
7724	47725	Peak Ph2 Volts	
7725	47726	Peak Ph3 Volts	
7726	47727	kW Demand	Kp + 1
7727	47728	kVA Demand	
7728	47729	kvar Demand	
7729	47730	Peak Hold kW Demand	Kp + 1
7730	47731	Peak Hold kVA Demand	
7731	47732	Peak Hold kvar Demand	
7732	47733	Neutral Current	Ki
7733	47734	Amps Scale Ki	-
7734	47735	Phase Volts Scale Kvp	-
7735	47736	Line Volts Scale Kvl	-
7736	47737	Power Scale Kp	-
7737	47738	Energy Scale Ke	-

Note: All values in this table have read only access.

Appendix B

Data Log Memory Capacity

Maximum Nº of Log Periods stored in Memory

No of Parameters	Maximum Log Periods
1	43,600
2	32,700
3	26,200
4	21,800
5	18,700
6	16,300
7	14,500
8	13,100
9	11,900
10	10,900
11	10,000
12	93,00
13	8,700
14	8,100
15	7,700
16	7,200
17	6,800
18	6,500
19	6,200
20	5,900

Example 1
Maximum Memory Usage; 30min periods, 20 parameters

30 x 5900	= 177,000	mins
177,000 / 60	= 2,950	hours
2,950 / 24	= 123	days
123 / 7	= 17.5	weeks

Example 2
Maximum Memory Usage; 15min periods, 4 parameters

15 x 21800	= 327,000	mins
327,000 / 60	= 5,450	hours
5,450 / 24	= 227	days
227 / 7	= 32.4	weeks

Logging Period

The minimum logging period is dependant on the number of registers selected.   The theoretical minimum is 1 second, but in practice this may not be possible.   If all 20 registers are selected, the minimum period is 3 seconds.

FTP Transmitted data log structure and time stamp.

Data structure is as follows:
Time Stamp (700717_073046 + parameter 1 value(2) + parameter 2 value(919) ....+ parameter 20 value(5).

E.g.

700717_073046,2,919,81,2449,944,187,81,2452,100,3226,49,77,22,162,499,2,2,2,4,5
700717_073546,2,923,81,2447,944,188,80,2445,100,3226,49,77,21,146,499,2,2,2,4,5

The time stamp eg 700717_073046 is broken down left to right as follows:

70 = year 1970, 07 = month July, 17 = day 17th, _ , 07 = hour, 30 = minutes, 46 = seconds

If the year shown is 1970 then the meter has failed to read the correct time from your PC, network or time server.

Appendix C

Manual download of Logging memory batch file.

```
echo off

cd\
for /F "tokens=1-4 delims=/:., " %%a in ('date/T') do set f_name=%%c%%b%%a
for /F "tokens=1-2 delims=:., " %%a in ('time/T') do set f_name=%f_name%_%%a%%b
ECHO.
SET /P _NAME=Enter the Meter ID [main_office]:
SET /P _IP=Enter the IP Address for your Meter :
IF NOT EXIST %_NAME% MD %_NAME%
ATTRIB -r %_NAME%\*.* /s
cd\%_NAME%
md %f_name%


ECHO.
ECHO Testing whether the Meters IP can be reached. . .
PING -n 1 -w 3600 %_IP% | FIND "TTL=" > NUL
IF NOT ERRORLEVEL 1 (
        ECHO Meter Connection Ok!
            ECHO.
            ECHO.
            ECHO.
        ECHO    Downloading Log.csv file:
            ECHO ===============================
            ECHO.
tftp -i %_IP% GET log.csv %f_name%\log.csv
ECHO.
ECHO.
        ECHO        Download Completed.
        ECHO ===============================
            ECHO
            ECHO.
            ECHO Your logged data is saved in C:\%_NAME%\%f_name%\log.csv
        ECHO.
            pause
) ELSE (
ECHO.
 ECHO   ###############################################################################
 ECHO   There is an error with the IP Address you entered Please check the following:
 ECHO   1. Did you enter the correct IP Address? IP Entered:%_IP%
 ECHO   2. Is the IP meter connected to the network?
 ECHO   3. Is your computer connected to the network?
 ECHO   4. Is the IP Address of the Meter on the same range as your network?
 ECHO   ###############################################################################
pause)
```