

PowerTrack

Energy Analyser & Verifier

Version 1.00

Advanced Monitoring Solutions



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1	Introduction.....	1
2	HARDWARE DESCRIPTION.....	2
2.1.	Voltage and Current inputs.....	2
2.2.	RS232 communications port.....	2
2.3.	LCD and keypad.....	3
2.3.1.	Introduction.....	3
2.3.2.	Default view screens.....	3
2.4.	Menu Structure.....	4
2.4.1.	Recording Menu (1).....	4
2.4.1.1.	Setup Wizard (1-1).....	4
	Description (1-1-1).....	4
	Feeder Id (1-1-2).....	4
	Connection (1-1-3).....	4
	Avg. Interval (1-1-4).....	4
	VT Ratio (1-1-5).....	4
	Clamp Type (1-1-6).....	5
	Max Current (1-1-7).....	5
	CT Ratio (1-1-8).....	5
2.4.1.2.	View Settings (1-2).....	5
2.4.1.3.	View Info (1-3).....	5
2.4.2.	Statistics (2).....	5
2.4.2.1.	Settings (2-1).....	5
	Block Demand Time (2-1-1).....	5
	Thermal Demand Time (2-1-2).....	5
2.4.2.2.	Demand (2-2).....	5
2.4.2.3.	Highest Current (2-3).....	6
2.4.2.4.	Voltages (2-4).....	6
2.4.2.5.	Energy (2-5).....	6
2.4.3.	Verify (3).....	6
2.4.3.1.	Setup Wizard (3-1).....	6
	Customer Name (3-1-1).....	6
	Meter Number (3-1-2).....	6
	Description (3-1-3).....	6
	Test Type (3-1-4).....	7
	Connection (3-1-5).....	7
	VT Ratio (3-1-6).....	7

Clamp Type (3-1-7)	7
Max Current (3-1-8).....	7
CT Ratio (3-1-9)	7
Pulse Weight (3-1-10)	7
Pulses per Test (3-1-11)	7
Meter K-Factor (3-1-12)	7
2.4.3.2. View Settings (3-2).....	7
2.4.3.3. Test a Meter (3-3)	7
kWh Pulse Test:	7
Dial Test :	8
CT Ratio Test:	8
2.4.3.4. View Reports (3-4)	8
2.4.3.5. Delete Reports (3-5).....	8
2.4.4. Settings (4)	8
2.4.4.1. Contrast (4-1)	9
2.4.4.2. Communications (4-2).....	9
2.4.4.3. Backlight (4-3)	9
2.4.4.4. Security (4-4).....	9
2.4.4.5. Device Info (4-5).....	9
2.4.5. Clock (5)	9

3 PowerTrack Software 10

3.1. Installation	10
3.2. Recorder Functions and Setup.....	10
3.2.1. Communications Link	10
3.2.2. General Settings	10
3.2.2.1. Communications Setup	10
3.2.2.2. Data Paths	10
3.2.3. Recorder Information Functions.....	10
3.2.3.1. Information	11
3.2.3.2. Sync Clock	11
3.2.3.3. Realtime View	11
3.2.4. Recorder Configuration	11
3.2.4.1. ID Configuration	11
3.2.4.2. Recorder Configuration	12
Recorder Parameters	12
3.2.4.3. Upload Recorder Data	12
3.2.4.4. PowerTrack Stats.....	12
3.2.4.5. Verify Setup.....	14
Verify Parameters	14

3.2.4.6.	Upload Verify Tests.....	14
3.3.	Data.....	14
3.3.1.	File Info.....	14
3.3.2.	Instrument Stats.....	15
3.3.3.	Graphs.....	16
3.3.3.1.	Zoom Settings.....	16
3.3.3.2.	Graph Settings.....	16
3.3.3.3.	Custom Setup.....	17
3.3.3.4.	Statistics.....	17
3.3.3.5.	View Values.....	18
3.3.3.6.	Print.....	18
3.3.3.7.	Copy Graph.....	18
3.3.4.	View Verify Data.....	18
4	TECHNICAL SPECIFICATIONS.....	20
4.1.1.	General.....	20
4.1.2.	Recording.....	20
4.1.3.	Onboard Statistics.....	20
4.1.4.	Verify Function.....	20
4.1.5.	Optional Extras.....	20
5	MENU STRUCTURE LAYOUT.....	22

1 INTRODUCTION

The *PowerTrack* energy analyzer & verifier is an advanced digital recording, analyzing, verifying and reporting system. The system consists of the recorder/verifier, current and voltage transducers and the *PowerTrack* software. The system can be used for various tasks such as CT and Meter verification, load studies for circuit optimization and energy management.

The recorder measures the following energy parameters on single or three phase systems: Voltage, Current, Real Power, Reactive Power, Apparent Power, Power Factor and Frequency. Energy is measured as active energy (import, export) and reactive energy (inductive, capacitive) and the kVA demand in block and thermal.

The software manages the communications between a PC and the recorder via the high speed RS232 port. It enables the user to edit the *PowerTrack* setup, do a real-time view on measured parameters, upload recorded data and prepare various reports.

The *PowerTrack* uses flash memory technology ensuring data retention in the absence of power. This will ensure that no data is lost during the period of moving the recorder from the site back to the office. No memory is used in the absence of power, therefore it does not matter how long the time between removing the recorder and the retrieval of data.

2 HARDWARE DESCRIPTION

2.1. Voltage and Current inputs

The voltage and current transducer inputs are located at the top of the recorder. Figure 1 shows the connections as viewed from the top. Note that the voltage inputs uses the shrouded type banana plugs while the current transducer inputs uses the open type banana plugs. This is a safety measure to prevent electric shock.

Important:

When connecting the recorder to VT's or a buss bar always plug in the leads at the recorder first before connecting to the active voltage source. When disconnecting always disconnect at the source before unplugging at the recorder.

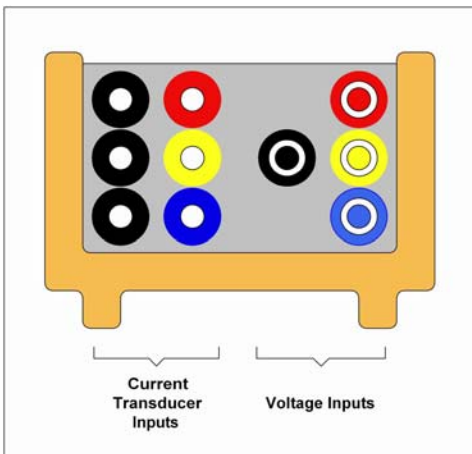


Figure 1 : PowerTrack voltage and current transducer inputs.

The current transducers used with the *PowerTrack* must have a full scale output of 200mV RMS. Do not connect any current transducers with a higher output voltage or with a current output to the *PowerTrack*. This will result in permanent damage to the recorder. **If not sure ask.**

2.2. RS232 communications port

The *PowerTrack* recorder features a high speed RS232 serial communications port using the ModBus RTU protocol. This port is used for communications to a computer to configure the recorder and to retrieve data from the recorder. It also serves as a communications interface for remote communications via a GSM cell modem. Only use communications cables supplied with the recorder.

2.3. LCD and keypad

2.3.1. Introduction

All setup's and parameters can be changed and viewed via the display and keypad. The menu structure and editing methods of the *PowerTrack* resembles modern day cellular phones. Note that the function of the four keys below the display changes according to the context on the screen. These keys will be referred to as SK1 to SK4 (soft keys) numbered from left to right. In many instances the function of the soft keys are duplicated by the special function keys. For example: The soft key named <SELECT> will be duplicated by the special function key <Enter> and <EXIT> by <Esc>. This duplication is for convenience and the choice of keys used is decided by the user. Below follows a brief discussion of each menu and submenu

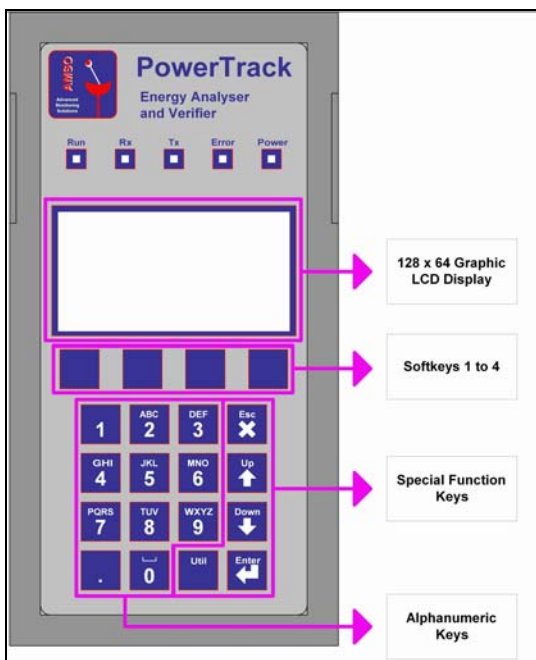


Figure 2 : *PowerTrack* LCD and Keypad Layout

2.3.2. Default view screens

The default screen of the *PowerTrack* is the real time view screen. This screen displays all the major measured parameters on one easy to read screen. This screen provides an easy overall glance of all the measured parameters and is very useful when connecting the recorder to verify correct installation. In the default view screens the user can select between the summary screen and per phase info. These screens can be selected by either using <View> (SK2) in conjunction with <Up> and <Down>, or by pressing <Up> or <Down> repeatedly. If the recorder is configured for 4 Wire connection the user can select between the following screens. Phase ABC, Phase A, Phase B, Phase C and Summed. When configured for 3 Wire connection the user can select between screens Summed, Wattmeter 1, Wattmeter 2.

In all the default view screens <Hold> SK4 enables the user to freeze the displayed values. Although the values on the screen will not be updated the recorder will continue in the background with all other functions.

By pressing **<Hold>** the function of SK4 changes to **<Cont>**. By pressing **<Cont>** the recorder will resume updating the values to the screen and the function of SK4 will change to **<Hold>** again.

2.4. Menu Structure

The menu structure of the recorder is defined by five high level menus each with up to two lower level menu levels. The menu system is activated by pressing **<Menu>** SK1 from within any of the default view screens. Below follows a brief description of each menu option. The level of each menu or menu item is indicated by a number in brackets e.g. (1-2-2) shows the menu or item is 3 levels down starting at Level1 Menu 1. During navigation **<Select>** or **<Enter>** will always go to a lower level, while **<Exit>** or **<Esc>** will always go to a higher level. The user can use the summary Table 1 below as a quick reference guide to navigate through the various menu items.



2.4.1. Recording Menu (1)

This menu contains all the necessary settings and info regarding the profile recording function of the *PowerTrack*.

2.4.1.1. Setup Wizard (1-1)

This Wizard guides the user through all the settings for the profile recording. At the start of a recording the user must go through the wizard to ensure that all the settings are correct. At the end of the wizard the user must confirm the settings.

Note: Completion of the setup wizard will result in loss of all previously recorded profile data.

Description (1-1-1)

Provides a 20 character field where any description for the site or location can be typed in. This field is used for later identification of the recording.

Feeder Id (1-1-2)

Provides a 20 character field where a description for the feeder can be typed in. This field is used for later identification of the recording.

Connection (1-1-3)

The user can select between 3Wire/2Watt, 4Wire/3Watt and Single Phase.

Avg. Interval (1-1-4)

The user can select between 1, 2, 5, 10, 15, 30 or 60 seconds or minutes.

VT Ratio (1-1-5)

The user can select the appropriate ratio for the voltage transformer.

Clamp Type (1-1-6)

The user can select between 5A Clip On, 200A Clip On, Flexible Probe and 5A or 1A Output CT.

Note: Do not use the 5A or 1A output type CT directly on the recorder. An adapter is required if you want to use your existing clamp on CT's with the *PowerTrack*. The preferred current transducers to be used with the *PowerTrack* are the 5A clip on and the Flexible Probe.

Max Current (1-1-7)

When the Flexible Probe is selected the user can select between 1600, 800, 400 and 200A range.

CT Ratio (1-1-8)

When 5A Clip On or 5A output CT is selected the user can select an appropriate CT Ratio.

2.4.1.2. View Settings (1-2)

This menu option gives a quick summary of all the profile recording settings. The user must scroll through several screens to view all the settings.

2.4.1.3. View Info (1-3)

This screen gives a summary of the recording progress. It shows information like the amount of memory used, samples taken and total recording period before wrapping occurs.



2.4.2. Statistics (2)

All onboard statistical functions and settings are viewed and setup from this menu. Onboard statistics are gathered by the recorder during a recording session and must not be confused with the statistics generated by the *PowerTrack* software from the recorded data.

2.4.2.1. Settings (2-1)

Block Demand Time (2-1-1)

This setting determines the block demand period and is selectable as 15, 30 or 60 minutes. This gives the user the ability to record a maximum demand over a period different from the averaging interval. E.g. the averaging interval for the profile recording can be 1 minute while the maximum demand is calculated over a period of 30 minutes.

Thermal Demand Time (2-1-2)

The thermal demand algorithm simulates the demand calculation of older analog demand meters. This setting determines the thermal time constant of this algorithm and is selectable as 15, 30 or 60 minutes.

2.4.2.2. Demand (2-2)

This menu provides the facility to view and reset the Block and Thermal Demand.

2.4.2.3. Highest Current (2-3)

This menu provides the facility to view and reset the highest instantaneous and average currents recorded. The instantaneous currents are recorded over a 1 second period and the average currents are recorded over the profile average interval period.

2.4.2.4. Voltages (2-4)

This menu provides the facility to view and reset the highest and lowest instantaneous and average voltages recorded. Instantaneous voltages are recorded over a 1 second period and the average voltages are recorded over the profile average interval period.

2.4.2.5. Energy (2-5)

This menu provides the facility to view and reset the energy over the recorded period. Energy is showed as active kWh (import and export) and reactive kVArh (capacitive and inductive).



2.4.3. Verify (3)

The verify option gives the user a powerful tool to determine the accuracy of any installed meter. Due to the accuracy and fine measuring resolution of the *PowerTrack* the user can verify a meter on site. This report can then be saved to memory to be retrieved at a later stage for report generation.

2.4.3.1. Setup Wizard (3-1)

This Wizard guides the user through all the settings to do a meter verification or CT ratio test. At the start of a test the user must go through the wizard to ensure that all the settings are correct. At the end of the wizard the user must confirm the settings.

Note: Completion of the setup wizard will result in loss of all previously recorded profile data.

Customer Name (3-1-1)

Provides a 20 character field where any description for the customer can be typed in. This field is used for later identification of the test.

Meter Number (3-1-2)

Provides a 20 character field where the meter serial number or reference number of the meter can be typed in. This field is used for later identification of the meter.

Description (3-1-3)

Provides a 20 character field where any description can be typed in. This field is used for later identification of the test.

PowerTrack Users Manual – Hardware Description

Test Type (3-1-4)

The user can select between kWh Pulse Test, Dial Test or CT Ratio Test. (See more under Test a Meter (3-3) on page 7)

Connection (3-1-5)

See Connection under Setup Wizard (1-1) on page 4.

VT Ratio (3-1-6)

See VT Ratio under Setup Wizard (1-1) on page 4.

Clamp Type (3-1-7)

See Clamp Type under Setup Wizard (1-1) on page 5.

Max Current (3-1-8)

See Max Current under Setup Wizard (1-1) on page 5.

CT Ratio (3-1-9)

See CT Ratio under Setup Wizard (1-1) on page 5.

Pulse Weight (3-1-10)

The weight of the pulse from the test meter can be typed in as Wh/Imp or Imp/Wh.

Pulses per Test (3-1-11)

Determines the number of pulses over which the test is done.

Meter K-Factor (3-1-12)

This option is used to provide the K-Factor of the test meter during a dial test.

2.4.3.2. View Settings (3-2)

This menu option gives a quick summary of all the verify settings. The user must scroll through several screens to view all the settings.

2.4.3.3. Test a Meter (3-3)

When selected this option provides the ability to perform a test on an installed meter or CT. The test sequence will be dependant on the type of test selected. To perform the test the user must follow the instructions on the screen.

Three types of tests can be performed.

kWh Pulse Test:

With this test an optical pick up or a handheld pulse generator is needed. This device is plugged into the DB9 port on the PowerTrack instrument. A pulse is generated either by hand or from the optical pick up, for each energy output pulse generated by the meter being tested. The PowerTrack compares the

amount of pulses multiplied by the weight per pulse (as specified in the set up wizard) with the actual energy consumed. A report on the accuracy of the meter is generated and can be stored on the PowerTrack instrument. The instrument can store thirty such reports. The reports are then erased on a first in first out basis.

Dial Test :

With this test the PowerTrack instrument will prompt you for a start reading. The kWh reading displayed on the meter being tested should be entered followed by the **<DONE>** key. The PowerTrack will start measuring the energy from the moment the **<DONE>** key is pressed. The test can be stopped by pressing the **<STOP>** key. The PowerTrack instrument will then prompt you for an end reading. Type in the reading displayed on the meter being tested followed by the **<DONE>** key. The PowerTrack instrument stopped measuring the energy the moment the **<DONE>** key is pressed. A report on the accuracy of the meter is generated and can be stored on the PowerTrack instrument. The instrument can store thirty such reports. The reports are then erased on a first in first out basis.

CT Ratio Test:

This test is used to determine the ratio of an installed Current transformer. To perform this test a Flexible probe and a 5Amp Clip On type of CT is needed. The flexible probe is placed around the primary conductor and plugged into the BLUE current terminal of the instrument. The 5Amp Clip On CT is placed around the secondary conductor of the Current transformer being tested, and plugged into the RED current terminal of the instrument. The PowerTrack instrument will determine the ratio of the Current transformer being tested.

Note: The test can only be performed if there is a current of more than 20 Amps and less than 1600 Amps flowing in the primary conductor. For tests outside this limits contact Advanced Monitoring Solutions for special input sensors.

2.4.3.4. View Reports (3-4)

The recorder can save up to 30 tests in memory. This option allows the user to scroll through the last 30 tests and view a summary of the test. For a more complete representation this info can also be downloaded to a PC via the *PowerTrack* software.

2.4.3.5. Delete Reports (3-5)

This option allows the user to scroll through the last 30 tests and delete a specific test.



2.4.4. Settings (4)

All global settings are changed from within this menu.

2.4.4.1. Contrast (4-1)

The user can adjust the contrast of the screen which may vary depending on the temperature.

2.4.4.2. Communications (4-2)

Select the type of communications. Direct to PC or Via GSM Modem.

2.4.4.3. Backlight (4-3)

Select whether the backlight is Always On, Always Off or Auto. In the Auto mode the backlight will turn on after a key is pressed. If no key is pressed for 4 minutes the backlight will be turned off.

2.4.4.4. Security (4-4)

Select whether the security is Always Off or Always On. If the security is turned on the user will be prompted for a 4 digit password. This password must be confirmed before the security will be turned on. If no key is pressed for 10 minutes the recorder will default back to the view screen and the <Menu> soft key will be replaced by an icon showing a key. To enter the menu setup the user must first type in the 4 digit password before the menus will be activated. This feature can be turned off again after the 4 digit password is supplied.

2.4.4.5. Device Info (4-5)

This option displays the Firmware, Software Version and Serial Number of the meter.



2.4.5. Clock (5)

This option provides the facility to adjust the onboard real time clock.

3 POWERTRACK SOFTWARE

3.1. Installation

Run the setup program provided on the accompanying CD and follow the instructions.

3.2. Recorder Functions and Setup

3.2.1. Communications Link

A communications link to the meter is needed for the meter functions to operate successfully. The communications link is established via a RS232 cable from the PC to the recorder.



3.2.2. General Settings

Configure the global settings for the software by selecting the *Settings/General Settings* item in the main menu. This opens a window where the following settings can be configured:

3.2.2.1. Communications Setup

- Comms Type: The recorder can either be directly connected to your PC via an RS232 communications cable or via a GSM modem. Note that upon selecting the Via Modem option the Modem Setup becomes active. Use these settings to specify the modem number and the modem type.

- Communications Port: The Comport selection is made according to the hardware port used on the PC.

3.2.2.2. Data Paths

The recording and verify data path specifies the folder/directory where the data files are stored. The save and open file dialogs use this folder as their default start-up folder.

3.2.3. Recorder Information Functions



3.2.3.1. Information

Communications is established with the recorder and the information is read from the recorder and displayed in a window. The information includes the serial and device numbers as well as the meter identification and connection settings.

Description	Information
Recorder Information	Location : COM AREA TRAVERS HS
	Feeder : MAIN DB
	ModBus Device ID Code : 10006
	Internal Software Version : 5.137
	Device Serial Number : A0000000
Recorder Setup	Voltage Transformer Ratio : 400:400V
	Current Transformer Type : 5A/1V
	Current Transformer Ratio : 9760:5A
	Connection Method : 4 - Wire (3 Watt Meter Method)
	Averaging Interval : 15 Minute(s)
	Block Demand Interval : 30 Minutes
	Thermal Demand Interval : 30 Minutes



3.2.3.2. Sync Clock

The PC time and meter time is displayed and when the *Set Device* command is executed the meter's clock is synchronized with the clock of the computer.



3.2.3.3. Realtime View

The real-time view opens a window displaying the instantaneous measured parameters on the meter. The values are read from the meter and updated with a frequency of 1 second. The following parameters are displayed:

- Frequency
- Phase voltages
- Line voltages
- Currents per phase
- kVA, kW, kVAr and power-factor per phase and summated

3.2.4. Recorder Configuration



3.2.4.1. ID Configuration

The recorder has 2 identification character sets. The first (Description) are 20 characters that are used to identify the recorder. The second (Feeder Id), also 20 characters, identifies the feeder to be recorded. These characters are added to the data file name to generate a filename where the data is stored.



3.2.4.2. Recorder Configuration

This command reads the recording information and displays a window where the parameters can be edited. The *Ok* button reconfigures the recorder with the new parameters.

Recorder Parameters

- Clamp-On CT Type: 5 A/1V, 1V Output CT (Ex: 200A/1V), 5A/1A Output CT (Ex: 750A/5A), Flexible CT
- VT Ratio – The voltage transformer (VT) ratio is usually 1 for normal 380/230V application and is altered only when measuring on high voltage. On an 11000/110V VT connection the ratio would be 100.
- CT Ratio – This ratio is determined by the ratio of the secondary current transformer (CT).
- Current Range: This setting is applicable only when the flexible probe is used. Selection: 1600 A / 800 A / 400 A / 200 A
- Connection Method – The recorder can be connected in the 4-wire (3-watt) or 3-wire (2-watt) connection methods depending on the metering point.
- Logging Interval - 1,2,5,10,15,30,60 Second(s) or Minute(s)
- Block Demand Interval – The maximum demand is stored in an internal register and can be reset to 0 using the RTC (run time clock). MaxDem resets can be selected to be every 15/30/60 minutes.
- Thermal Demand Interval – The maximum demand is stored in an internal register and can be reset to 0 using the RTC (run time clock). MaxDem resets can be selected to be every 15/30/60 minutes.



3.2.4.3. Upload Recorder Data

This command transfers the recorded data from the recorder to a file on the PC. The software communicates with the recorder extracting the information, displays a file save dialog where the data path and file name can be altered and then uploads the data from the meter to the specified file.



3.2.4.4. PowerTrack Stats

Reads the following statistics from the recorder:

Information	Parameter	Date & Time	Value	Unit
Description	COM AREA TRAVERS HS			

PowerTrack Users Manual – PowerTrack Software

Feeder	MAIN DB			
Block Demand	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Maximum Demand	2004/11/09 15:49:49	0	VA
	Reactive Power at MaxDem	2004/11/09 15:49:49	0	VAr
	PowerFactor at MaxDem	2004/11/09 15:49:49	1.000	pf
	Block Demand Interval		30	Minutes
Thermal Demand	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Maximum Demand	2004/11/09 15:49:49	0	VA
	Reactive Power at MaxDem	2004/11/09 15:49:49	0	VAr
	PowerFactor at MaxDem	2004/11/09 15:49:49	1.000	pf
	Thermal Demand Interval		30	Minutes
Energy Consumption	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Import Active Energy		0	kWh
	Export Active Energy		0	kWh
	Inductive Reactive Energy		0	kVArh
	Capacitive Reactive Energy		0	kVArh
Maximum Currents	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Phase A Instantaneous (Ia)	2004/11/09 14:50:19	0.000	Ampere
	Phase B Instantaneous (Ib)	2004/11/09 15:49:49	0.000	Ampere
	Phase C Instantaneous (Ic)	2004/11/09 15:49:49	0.000	Ampere
	Phase A Average (Ia)	2004/11/09 15:15:00	0.000	Ampere
	Phase B Average (Ib)	2004/11/09 15:49:49	0.000	Ampere
	Phase C Average (Ic)	2004/11/09 15:49:49	0.000	Ampere
Maximum Voltages	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Phase A Instantaneous (Va)	2004/11/09 15:49:49	0.001	Volts
	Phase B Instantaneous (Vb)	2004/11/09 15:49:49	0.001	Volts
	Phase C Instantaneous (Vc)	2004/11/09 15:49:49	0.001	Volts
	Phase A Average (Va)	2004/11/09 15:49:49	0.001	Volts
	Phase B Average (Vb)	2004/11/09 15:49:49	0.001	Volts
	Phase C Average (Vc)	2004/11/09 15:49:49	0.001	Volts
Minimum Voltages	Recording Start	2004/11/09 14:50:18		
	Recording End	2004/11/09 15:48:27		
	Phase A Instantaneous (Va)	2004/11/09 15:49:49	0.000	Volts
	Phase B Instantaneous (Vb)	2004/11/09 15:49:49	0.000	Volts
	Phase C Instantaneous (Vc)	2004/11/09 15:49:49	0.000	Volts
	Phase A Average (Va)	2004/11/09 15:49:49	0.000	Volts
	Phase B Average (Vb)	2004/11/09 15:49:49	0.000	Volts
	Phase C Average (Vc)	2004/11/09 15:49:49	0.000	Volts



3.2.4.5. Verify Setup

This command reads the verify information and displays a window where the parameters can be edited. The *Ok* button reconfigures the recorder with the new parameters.

Verify Parameters

- There are 3 identification character sets consisting of up to 20 characters each: Description, Meter Number, Customer Name

- The test setup can be set to kWh Pulses and Dial Test. When selecting the kWh Pulses the Pulse Weights, Pulses/Test and Pulse Type must be correctly configured. With the Dial Test the K-Factor needs to be specified.

- Clamp-On CT Type: 5 A/1V, 1V Output CT (Ex: 200A/1V), 5A/1A Output CT (Ex: 750A/5A), Flexible CT

- VT Ratio – The voltage transformer (VT) ratio is usually 1 for normal 380/230V application and is altered only when measuring on high voltage. On an 11000/110V VT connection the ratio would be 100.

- CT Ratio – This ratio is determined by the ratio of the secondary current transformer (CT). The meter inputs are 5A and therefore a secondary CT with ratio 250/5 would result in a CT Ratio of 50.

- Current Range: This setting is applicable only when the flexible probe is used. Selection: 1600 A / 800 A / 400 A / 200 A

- Connection Method – The recorder can be connected in the 4-wire (3-watt) or 3-wire (2-watt) connection methods depending on the metering point.



3.2.4.6. Upload Verify Tests

This command transfers the verify test results from the recorder to files on the PC. The software communicates with the recorder extracting the information, displays a file save dialog where the various tests can be selected to be saved. The filenames are constructed using the 3 identification character sets for each test. Up to 30 tests can be stored inside the recorder after which the oldest tests will be replaced.

3.3. Data



3.3.1. File Info

This command displays the information and detailed setup in the selected file.

Description	Information
Recorder Information	Description : Main Substation
	Feeder : Main Feed
	ModBus Device ID Code : 10006
	Internal Software Version : 5.077
	Device Serial Number : A0000000
Recorder Setup	Voltage Transformer Ratio : 400:400V
	Current Transformer Type : 5A/1V
	Current Transformer Ratio : 50:5A
	Connection Method : 4 - Wire (3 Watt Meter Method)
	Averaging Interval : 1 Minute(s)
	Block Demand Interval : 30 Minutes
	Thermal Demand Interval : 30 Minutes



3.3.2. Instrument Stats

This command displays the statistics as calculate by the instrument stored in a selected file.

Information	Parameter	Date & Time	Value	Unit
Description	Main Substation			
Feeder	Main Feed			
Block Demand	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Maximum Demand	2004/10/14 16:35:06	0	VA
	Reactive Power at MaxDem	2004/10/14 16:35:06	0	VAr
	PowerFactor at MaxDem	2004/10/14 16:35:06	1.000	pf
	Block Demand Interval			30
Thermal Demand	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Maximum Demand	2004/10/14 16:35:06	4.146	kVA
	Reactive Power at MaxDem	2004/10/14 16:35:06	40.92	VAr
	PowerFactor at MaxDem	2004/10/14 16:35:06	1.000	pf
	Thermal Demand Interval			30
Energy Consumption	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Import Active Energy		1	kWh
	Export Active Energy		0	kWh
	Inductive Reactive Energy		0	kVArh
	Capacitive Reactive Energy		0	kVArh
Maximum Currents	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Phase A Instantaneous (Ia)	2004/10/14 16:15:36	1.718	Ampere
	Phase B Instantaneous (Ib)	2004/10/14 16:35:07	0.001	Ampere
	Phase C Instantaneous (Ic)	2004/10/14 16:35:03	16.96	Ampere
	Phase A Average (Ia)	2004/10/14 16:16:00	1.712	Ampere
	Phase B Average (Ib)	2004/10/14 16:35:07	0.001	Ampere

	Phase C Average (Ic)	2004/10/14 16:16:00	16.92	Ampere
Maximum Voltages	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Phase A Instantaneous (Va)	2004/10/14 16:35:03	223.8	Volts
	Phase B Instantaneous (Vb)	2004/10/14 16:35:03	223.7	Volts
	Phase C Instantaneous (Vc)	2004/10/14 16:35:04	223.6	Volts
	Phase A Average (Va)	2004/10/14 16:16:00	223.0	Volts
	Phase B Average (Vb)	2004/10/14 16:16:00	223.0	Volts
	Phase C Average (Vc)	2004/10/14 16:16:00	223.0	Volts
Minimum Voltages	Recording Start	2004/10/14 16:11:26		
	Recording End	2004/10/14 16:35:06		
	Phase A Instantaneous (Va)	2004/10/14 16:21:57	221.5	Volts
	Phase B Instantaneous (Vb)	2004/10/14 16:21:57	221.4	Volts
	Phase C Instantaneous (Vc)	2004/10/14 16:21:57	221.4	Volts
	Phase A Average (Va)	2004/10/14 16:23:00	222.1	Volts
	Phase B Average (Vb)	2004/10/14 16:24:00	222.0	Volts
	Phase C Average (Vc)	2004/10/14 16:23:00	221.9	Volts



3.3.3. Graphs

The graph area displays the recorded data in a graphical format. Select the tabs at the bottom of the graph to display the desired graph.

- Zoom In - To zoom a chart area, hold the left mouse button and drag mouse toward down/right. You'll see a rectangle around the selected area. Release the left mouse button to Zoom. You can continue zooming again and again.
- Zoom Out - To RESTORE (or UNDO) the zoom, drag a rectangle in the opposite direction (up/left).
- Move Graph - The whole graph can be moved on the axis by depressing the right button of the mouse and moving the mouse cursor in a direction.

3.3.3.1. Zoom Settings

Click the *Zoom Settings* button to display the settings for manually zooming a graph.

3.3.3.2. Graph Settings

Click the *Graph Settings* button to display settings where graphs can be selected for display, colors for the lines can be selected and minimums and maximums specified. The graph labels can also be altered.

3.3.3.3. Custom Setup

The *Custom Setup* button opens a window where the various graphs and colors can be selected to be displayed when the *Custom* tab is selected.

3.3.3.4. Statistics

The *Statistics* button calculates the following values over the zoomed area.

Information	Parameter	Date & Time	Value	Unit
Description	Main Substation			
Feeder	Main Feeder			
Graph Statistics	Recording Start	2004/10/07 15:05:02		
	Recording End	2004/10/07 15:07:36		
Phase Voltage	Phase A Maximum Va	2004/10/07 15:07:35	0.000	V
	Phase B Maximum Vb	2004/10/07 15:07:36	0.000	V
	Phase C Maximum Vc	2004/10/07 15:05:35	0.000	V
	Phase A Minimum Va	2004/10/07 15:07:36	0.000	V
	Phase B Minimum Vb	2004/10/07 15:07:35	0.000	V
	Phase C Minimum Vc	2004/10/07 15:06:46	0.000	V
Line Voltage	Phase AB Maximum Vab	2004/10/07 15:07:36	0.000	V
	Phase BC Maximum Vbc	2004/10/07 15:06:46	0.000	V
	Phase CA Maximum Vca	2004/10/07 15:05:35	0.000	V
	Phase AB Minimum Vab	2004/10/07 15:07:35	0.000	V
	Phase BC Minimum Vbc	2004/10/07 15:05:35	0.000	V
	Phase CA Minimum Vca	2004/10/07 15:07:36	0.000	V
Current	Phase A Ia	2004/10/07 15:07:36	1.000	A
	Phase B Ib	2004/10/07 15:07:35	1.000	A
	Phase C Ic	2004/10/07 15:06:46	1.000	A
	Phase A Ia	2004/10/07 15:07:35	1.000	A
	Phase B Ib	2004/10/07 15:07:36	1.000	A
	Phase C Ic	2004/10/07 15:05:35	1.000	A
Active Power	Phase A Maximum	2004/10/07 15:07:36	0.001	kW
	Phase B Maximum	2004/10/07 15:07:36	0.001	kW
	Phase C Maximum	2004/10/07 15:07:36	0.001	kW
	Phase A Minimum	2004/10/07 15:07:36	0.001	kW
	Phase B Minimum	2004/10/07 15:07:36	0.001	kW
	Phase C Minimum	2004/10/07 15:07:36	0.001	kW
Reactive Power	Phase A Maximum	2004/10/07 15:07:36	0.001	kVAr
	Phase B Maximum	2004/10/07 15:07:36	0.001	kVAr
	Phase C Maximum	2004/10/07 15:07:36	0.001	kVAr
	Phase A Minimum	2004/10/07 15:07:36	0.001	kVAr
	Phase B Minimum	2004/10/07 15:07:36	0.001	kVAr
	Phase C Minimum	2004/10/07 15:07:36	0.001	kVAr
Apparent Power	Phase A Maximum	2004/10/07 15:07:35	0.000	kVA
	Phase B Maximum	2004/10/07 15:07:36	0.000	kVA
	Phase C Maximum	2004/10/07 15:05:35	0.000	kVA

	Phase A Minimum	2004/10/07 15:07:36	0.000	kVA
	Phase B Minimum	2004/10/07 15:07:35	0.000	kVA
	Phase C Minimum	2004/10/07 15:06:46	0.000	kVA
Maximum Demand kW	Active Power	2004/10/07 15:07:36	0.000	kW
	Reactive Power		0.000	kVAr
	Apparent Power		0.000	kVA
	Power Factor		0.000	
Maximum Demand kVA	Active Power	2004/10/07 15:05:02	0.000	kW
	Reactive Power		0.000	kVAr
	Apparent Power		0.000	kVA
	Power Factor		0.000	
Energy	Import Active Energy		0.000	kWh
	Export Active Energy		0.000	kWh
	Inductive Reactive Energy		0.000	kVArh
	Capacitive Reactive Energy		0.000	kVArh
Load Factor kW	(Avg kW)/(Max kW)		0.500	
Load Factor kVA	(Avg kVA)/(Max kVA)		0.500	

3.3.3.5. View Values

Displays the actual values as represented on the graph area.

3.3.3.6. Print

Prints the graph to the selected printer.

3.3.3.7. Copy Graph

Copies the graph to the clipboard from where it can be copied to a spreadsheet or word processing package.



3.3.4. View Verify Data

Select the desired verify data file in the *Open File Dialog* to display the following information:

Information	Parameter	Value
Description	Main Meter	
Meter Number	ZAP03 1234	
Customer Name	Main Substation	
Start Date/Time	2004/09/23 17:04:34	
End Date/Time	2004/09/23 18:13:55	
Test Result	Pulse Test Energy Consumption	100.000Wh
	True Energy Consumption	100.230Wh
	Error Percentage	-0.23%
Recorder Setup	Test Type	Wh Pulses
	Pulse Type	Wh/Impulse

PowerTrack Users Manual – PowerTrack Software

	Pulse Weight	1
	Pulses/Test	100
	Voltage Transformer Ratio	400:400V
	Current Transformer Type	5A/1V
	Current Transformer Ratio	5:1A
	Connection Method	4 - Wire (3 Watt Meter Method)

This information can be exported to incorporate the results with your report.

4 TECHNICAL SPECIFICATIONS

4.1.1. General

Dimensions	120x80x240mm
Weight	1.05kg (Excluding Transducers)
Voltage Input Ratio	85Vac - 250Vac (Phase to Neutral)
Current Transformers Supported	5A Clip On 200A Clip On Flexible Passive Current Probe(1600,800,400,200A) 1000/500/250:5A Clamp On (Optional Adapter Needed)
Communications Interface	1 X RS232 Port
Baud Rates	115200 Baud (Direct To PC) 9600 Baud (GSM Modem)
Display	128x64 Graphic With Backlight & Contrast Control
Keypad	20 Key Alphanumeric
Accuracy Class	Class 1
Power Consumption	3.5VA
Clock Accuracy	+ - 1 Minute Per Month
Expected Data Retention	Minimum 5 Years

4.1.2. Recording

Standard Memory Capacity	4MB
Recording Intervals	1,2,5,10,15,30,60 Second(s) or Minute(s)
Recording Method	Average Over Recording Interval
Recording Buffer	Continuous Rotation Buffer (FIFO)
Parameters Recorded	V, I, P, Q, S, pf (Per Phase And Summed)
Typical Recording Periods	22Hours 45Minutes @ 1 Second 9 Days 11Hours 35Minutes @ 10 Seconds 8Weeks @ 1Minute 2Years 17Weeks @ 15Minutes

4.1.3. Onboard Statistics

Parameters Recorded	Highest And Lowest Voltage Per Phase Highest Current Per Phase Thermal and Block Demand (15,30 or 60 min) Active (Imp & Exp) Reactive (Ind & Cap) Energy
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4.1.4. Verify Function

Tests Supported	Pulse & Dial Test
Pulse Pickup Methods	Optical Pickup For Electronic Meters Laser Pickup For Rotating Disk Meters Manual Pulse Generator
Maximum Pulses Per Test	1000
Pulse Type Supported	Wh/Imp & Imp/Wh
Max. Tests Saved Onboard	30
Tests Download To PC	Yes

4.1.5. Optional Extras

External 12V Wide Input Range Power Supply For Desktop Use
Optical Pickup For Electronic Meters

PowerTrack Users Manual – Technical Specifications

Laser Pickup For Rotating Disk Meters
GSM Modem Kit (Modem, Antenna, Power Supply & Communications Cable)
Additional Voltage and Current Transformer Leads
USB To RS232 Converter

5 MENU STRUCTURE LAYOUT



- Recording (1)
 - Setup Wizard (1-1)
 - Description (1-1-1)
 - Feeder Id (1-1-2)
 - Connection (1-1-3)
 - Avg. Interval (1-1-4)
 - VT Ratio (1-1-5)
 - Clamp Type (1-1-6)
 - Max Current (1-1-7) (2)
 - CT Ratio (1-1-8) (3)
 - View Settings (1-2)
 - View Info (1-3)



- Statistics (2)
 - Settings (2-1)
 - Block Demand Time (2-1-1)
 - Thermal Demand Time (2-1-2)
 - Demand (2-2)
 - Reset, Date, Block, Thermal (2-2-1)
 - Highest Current (2-3)
 - Reset (2-3-1)
 - Voltages (2-4)
 - Reset, Low, High (2-4-1)
 - Energy (2-5)
 - Reset (2-5-1)



- Verify (3)
 - Setup Wizard (3-1)
 - Customer Name (3-1-1)
 - Meter Number (3-1-2)
 - Description (3-1-3)
 - Test Type (3-1-4)
 - Connection (3-1-5) (1)
 - VT Ratio (3-1-6) (1)
 - Clamp Type (3-1-7) (1)
 - Max Current (3-1-8) (2)
 - CT Ratio (3-1-9) (3)
 - Pulse Weight (3-1-10) (4)
 - Pulses per Test (3-1-11) (4)
 - Meter K-Factor (3-1-12) (5)
 - View Settings (3-2)
 - Test A Meter (3-3)
 - View Reports (3-4)
 - Delete Reports (3-5)



- Settings (4)
 - Contrast (4-1)
 - Communications (4-2)

PowerTrack Users Manual – Menu Structure Layout


Direct to PC, GSM Modem	(4-2-1)
Backlight	(4-3)
Always On, Always Off, Auto	(4-3-1)
Security	(4-4)
Always Off, Always On	(4-5)
Device Info	(4-5)
 Clock	(5)

Table 1 : Menu structure table