Futura+ Communicator 2.0 Professional Edition

User Manual and Reference Guide

This manual (with the exclusion of Power Graphs) also applies to Futura+ Communicator 1.0, Version 1.01.10c or higher.

Futura+ Communicator
User Manual and
Reference Guide
Version 2.0

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Customer Service and Support

Customer support is available 9:00 a.m. to 4:30 p.m., eastern standard time, Monday through Friday. Please have the model, serial number and a detailed problem description available. If the problem concerns a particular reading, please have all meter readings available. When returning any merchandise to EIG, a return authorization number is required. For customer or technical assistance, repair or calibration, phone 516-334-0870 or fax 516-338-4741.

Product Warranty

Electro Industries/GaugeTech warrants all products to be free of defects in material and workmanship for one year from the date of shipment. During the warranty period, we will, at our option, repair or replace any product that proves to be defective.

To exercise this warranty, fax or call our customer-service department. You will receive prompt assistance. Send the instrument, transportation prepaid, to EIG at 1800 Shames Drive, Westbury, NY 11590. Repairs will be made and the instrument will be returned.

Limitation of Warranty

This warranty does not apply to defects resulting from unauthorized modification, misuse, or use for any reason other than electrical power monitoring.

OUR PRODUCTS ARE NOT TO BE USED FOR PRIMARY OVER-CURRENT PROTECTION. ANY PROTECTION FEATURE IN OUR PRODUCTS ARE TO BE USED FOR ALARM OR SECONDARY PROTECTION ONLY.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ELECTRO INDUSTRIES/GAUGETECH SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING FROM ANY AUTHORIZED OR UNAUTHORIZED USE OF ANY ELECTRO INDUSTRIES/GAUGETECH PRODUCT. LIABILITY SHALL BE LIMITED TO THE ORIGINAL COST OF THE PRODUCT SOLD.

Statement of Calibration

Our instruments are inspected and tested in accordance with specifications published by Electro Industries/GaugeTech. The accuracy and a calibration of our instruments are traceable to the National Bureau of Standards through equipment which is calibrated at planned intervals by comparison to certified standards.

Disclaimer

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

Electro Industries/ GaugeTech

Electro Industries/GaugeTech was founded in 1973 by engineer and inventor Samuel Kagan. Dr. Kagan's first innovation, which revolutionized the power-monitoring field, was the development of an affordable, easy-to-use AC power meter. In the 1980s, Dr. Kagan and his team at EIG developed a digital multifunction monitor. This monitor, with its ability to measure every aspect of power, transformed AC power metering and power distribution.

Under Dr. Kagan's leadership, EIG again developed a product that surpassed everything else on the market: the Futura+ device. It supplied all the functionality of a fault recorder, an event recorder and a data logger in the configuration of a single meter.

Today, as a leader in the development and production of power-monitoring products, EIG aspires to attain zero-defect manufacturing.

Products

All of EIG's products are designed, manufactured, tested and calibrated at our facility in Westbury, New York. EIG manufactures the most sophisticated digital power monitors available. Our products handle such things as:

- Multifunction power monitoring
- Power-quality monitoring
- Onboard data logging for trending power usage and quality
- Disturbance analysis

EIG manufactures both single and multifunction digital power monitors. These utility-grade devices are highly reliable and sophisticated.

Futura+ Series

As the ultimate power-quality monitor, the Futura+ is widely used at automated substations. In addition to having nearly all of the capabilities of DM meters, it also handles:

- Power-quality monitoring
- High-accuracy AC metering
- Onboard data logging
- Onboard fault and voltage recording
- Ten channels of analog outputs

DM Series

This is the substation standard for many utilities and large industrial companies. These three-phase multifunction monitors measure *every* aspect of power.

- Wattage, voltage, amperage, var, VA, power factor, frequency and harmonics (%THD)
- Protocols: Modbus, Modbus Plus (with an MP1), DNP 3.0, TCP/IP (for Ethernet use) and EI (used by all of EIG's power monitors)
- Analog outputs (0-1 and 4-20mA)

Single-Function Meters

- AC voltage and amperage
- DC voltage and amperage
- AC wattage
- Single-phase monitoring with maximum and minimum demands
- Transducer readouts

Portable Analyzers

- Power-quality analysis
- Energy analysis

Futura+ Communicator

System Requirements

Hardware

- IBM-PC compatible, Pentium at 133Mhz (or better)
- 16Mb RAM
- 5Mb hard drive space for software; additional space for data files
- RS232 serial port and RS232 cable with appropriate terminal configurations
- Power monitors: Up to 32 local devices (accessed sequentially); up to 3,200 remote devices (accessed through Futura+ Communicator's Phone Book and Scripts)
  - Futura+ or PDA 1000, with communications (COMM) firmware version 3.9 or higher.

See *Appendix 2* to identify your power monitor's COMM and DSP firmware versions.

Please note that other publications may refer to the Futura+ only by its order number: CPU 1000.

— To access *all* Futura+ Communicator functions, your Futura+ must be equipped with an event I/O (relay and input) board, a DC analog output board and 1 megabyte of memory.

— With a PDA 1000, you can access all Futura+ Communicator functions except: polling the relay and input status, programming relays and inputs, programming limit relay links and event I/O features.

- DMMS 300+

See *Appendix 1* for a summary of Futura+ Communicator functions supported by the DMMS 300+.

Software and Windows Requirements

- Microsoft Windows 3.*x*, Windows 9*x* or Windows NT
- Futura+ Communicator, version 1.01.10 or higher

Installation

This procedure is for use only with the *stand-alone version* of Futura+ Communicator. Users of Power System Supervisor will already have Futura+ Communicator installed.

Windows 3.*x*

- Start Microsoft Windows 3.*x*.
- Put the Futura+ Communicator CD in your computer's CD drive.
- From the Program Manager File Menu, select Run.
- In the text box (after Open), type: *[CD drive letter]*:\SETUP and press [Enter].
- Follow the installation program instructions.

Windows 9*x* and NT

- Start Microsoft Windows 9*x* or NT.
- Put the Futura+ Communicator CD in your computer's CD drive.
- Click the Start button and then select Run.
- In the text box, (after Open), type: [*CD drive letter*]:\SETUP and press [Enter].
- Follow the installation program instructions.

Introduction

Overview

Configure and Interrogate Futura+s

Futura+ Communicator uploads programming to and downloads programming and stored data from the memory of Futura+ devices. These uploads and downloads can be conducted either over the phone (via a modem) or through a direct connection.

Automate Meter Reading and Data Collection

Futura+ Communicator can be programmed to connect to power monitors and download their readings at a specified interval. All the data stored on every Futura+ can be periodically downloaded to a central computer—entirely automatically.

Customize Historical Charts and Graphs

Futura+ Communicator displays and prints completely customizable charts and graphs of all logged data (except the maximum and minimum readings and hour counters). It even provides a unique circle chart-recorder format that mimics traditional analog chart recorders. Futura+ Communicator exports data in standard ASCII format, which means that it can be imported into almost any other software for custom analysis.

Power Quality: Subcycle Waveform Analysis

Use Futura+ Communicator to download and display waveform information when current faults and voltage disturbances occur. You can also use it to superimpose waveforms, and display the magnitude of voltage surges and sags, and the harmonics on the line.

Using Futura+ Communicator with Power System Supervisor

When used in conjunction with Power System Supervisor, Futura+ Communicator is used to handle a limited number of tasks. It is needed to:

- Create and edit programming and profiles.
- Display downloaded data logs, programming and profiles.
- Export data logs.

Quick Start: Using Futura+ Communicator

This is an outline of the sequence of steps involved in setting up and using Futura+ Communicator. (For details, refer to the relevant parts of this manual.)

- Installation
  - Install Futura+ Communicator. (See *Installation.*)
  - Connect the power monitor (Futura+, PDA 1000 or DMMS 300+) to the computer. (See the *Futura+ Installation and Operation Manual.*)
  - Run Futura+ Communicator. (See *Starting Up Futura+ Communicator.*)
  - Establish a connection between Futura+ Communicator and the power monitor. (See *Connecting to and Disconnecting from a Futura+.*)
- Initialization
  - Initialize the power monitor: Set its time to reflect your local date and time, adjusting for daylight savings time, if necessary. (See *Futura+'s Clock: Setting the Time.*)
  - Use the EIG Device Programmer to set full scales, limits and protocols. (See *Futura+ Device Programming.*)

- Program the power monitor to capture data by creating historical, event I/O and waveform profiles and uploading them to the monitor. (See *Historical Profile, Event I/O Profile* and *Waveform Profile.*)

■ Analysis

- Start logging data. (See *Starting, Stopping and Clearing an Historical Log*; *Starting, Stopping and Clearing an Event I/O Log*; and *Starting, Stopping and Clearing a Waveform Log*.)

- Retrieve (download) the data from the power monitor. (See *Downloading an Historical Log, Downloading an Event I/O Log* and *Downloading a Waveform Log*.)

- Display and analyze (tabulate, graph, print and/or export) the retrieved data . (See sections on displaying and printing data tables, graphing data and exporting logs.)

■ You will also want to know how to:

- Edit the data-capture programming (profiles). (See *Historical Profile, Event I/O Profile* and *Waveform Profile.*)

- Stop data logging and clear the data logs. (See *Starting, Stopping and Clearing an Historical Log*; *Starting, Stopping and Clearing an Event I/O Log*; and *Starting, Stopping and Clearing a Waveform Log*.)

- Automate procedures (using Scripts and the Scheduler). (See *Using Scripts and the Scheduler: Automated Meter Reading.*)

- Respond to and identify the causes of alarms.

- Verify the power monitor's time setting. (See *Futura+'s Clock: Viewing the Time.*)

Starting Up Futura+ Communicator

To run Futura+ Communicator, do *one* of the following:

■ From within PSS Viewer, on the menu bar select Tools, Futura+ Communicator.

■ Click the Futura+ Communicator shortcut icon.

■ From the Windows 95 Start button, select Programs, Futura+ Communicator, Futura+ Communicator.

Basic Screen Elements

Menu Bar

The following lists the selections available on Futura+ Communicator's menu bar, which is always displayed on the top line of the screen.

- File
  - **New**
    - — Text
    - — Profiles: Historical, Event I/O, Waveform
  - Open
    - — Profiles: Historical, Event I/O, Waveform
    - — Log Files: Historical, Event I/O, Waveform
    - — Script Log
    - — Max/Min and Hour Readings

- Upload
  - — Profiles: Historical, Event I/O, Waveform
- Download
  - — Profiles: Historical, Event I/O, Waveform
  - — Log Files: Historical, Event I/O, Waveform, All Available
  - — Max/Min and Hour Readings
- Print
- Set Up Printer
- Exit

■ Edit: Use these basic editing functions to manipulate text in a script log, maximum/minimum and hour readings log, etc.

- Undo
- Cut, Copy, Paste, Delete, Clear All

■ Meter

- Futura+ Device Time
  - — Retrieve
  - — Set
- Historical Log
  - — Start
  - — Stop
  - — Clear
- Event I/O Log
  - — Start
  - — Stop
  - — Clear

- Waveform Log
  - — Start
  - — Stop
  - — Clear
- All Logs
  - — Start
  - — Stop
  - — Clear

■ Connection

- Phone Book
- Manual
- Disconnect
- Change Address/Refresh Device Status

■ Graphs

- Toggle Global/Zoom
- Electric Consumption
- Watt and VA Demand
- Power-Factor Distribution
- Voltage Deviation
  - — Phase to Neutral
  - — Phase to Phase
- Current Distribution
- Total Harmonic Distortion
  - — Volts A, B and C

— Amps A, B and C

- Circular Data Graph

— Volts: V AN, V BN, V CN; V AB, V BC, V CA

— Amps: I A, I B, I C

— Watts

— Var

— VA

— Frequency

■ Script

- New
- Edit
- Run
- Abort Script
- Scheduler

■ Tools

- Low-Level Access
- Manual Relay
- Real-Time THD/Instantaneous Polling
- Instantaneous Polling with Phases
- Futura+ Log Status
- Limit and Relay Programmer
- File Exporter

— Historical Log

— Waveform Log

- Reset Max/Min and Hour Readings
- EIG Programmer

■ Options

- Historical View(er) Buffer Size
- Circle Graph Time
- Historical Viewer
  - — Reset
  - — Set Start
  - — Set End
  - — Rebuild

Tool Bar

The Futura+ Communicator's tool bar (the buttons on the second line of the screen) offers a quick way to access the program's most frequently used features. The nine selections are listed below, along with the their menu bar equivalents.

■ Historic(al): This is the same as selecting File, Open, Historical Log File (.HLG).

■ Event: This is the same as selecting File, Open, Event I/O Log File (.ELG).

■ Wavefm: This is the same as selecting File, Open, Waveform Log File (.WLG).

■ Phone Book: This is the same as selecting Connection, Phone Book.

■ Manual: This is the same as selecting Connection, Manual.

■ Disconnect: This is the same as selecting Connection, Disconnect.

■ Polling: This is the same as selecting Tools, Real-Time THD/Instantaneous Polling.

■ Print: This is the same as selecting File, Print.

■ Exit: This is the same as selecting File, Exit.

Status Bar

The status bar (at the bottom of the Futura+ Communicator screen) is divided into three sections.

- Connection Status (left box)
  - Type of Connection (Direct or Remote)
  - Port (COM1, COM2, COM3 or COM4)
  - Baud Rate (1200, 2400, 4800, 9600, 19200 or 38400)
  - Device Address (0001 through 9999)
  - Examples:

Direct:Com2:9600:0002	Direct connection on COM2 at 9600 baud with device at address 0002.
No Connection	No connection has been made.

- Device Status (center box)
  - Examples:

CPU1000 V4.0 250	
Script Run	A script is running.
No Device	No connection has been made.

- Log Status (right box): The status of the historical, event I/O and waveform logs.
  - The log types are represented by an H (historical), E (event I/O) and W (waveform). If all logs are running, the display would read: <H:LOG><E:LOG><W:LOG>.
  - Examples:

<H:N/A>	The historical log is not available.
<E:LOG>	The current event I/O profile is being used to log the event I/O data.
<W:STOP>	The logging of waveforms has been stopped.
<H:???>	Due to bad communications, the power monitor cannot be found.
No Status	No connection has been made.

Connecting to and Disconnecting from a Futura+

Manual Connection

- Direct: Make a direct (serial) connection when the power monitor is hardwired to the computer that is running Futura+ Communicator.
  - Do *either* of the following:
    - On the menu bar, select Connection, Manual.
    - On the button bar, select Manual.
  - In the Manual screen (under Link), select Direct Connection.
  - Enter the device address, and select the COM (communications) port and baud rate.

Unless requested otherwise, EIG ships Futura+ monitors set to a (default) device address of 0001 and a baud rate of 9600. DMMS monitors are shipped with a device address of 0001 and a baud rate of 1200.

  - Click OK.

The left side of the status bar (at the bottom of the screen) will now show the type of connection, the port, the baud rate and the device address.

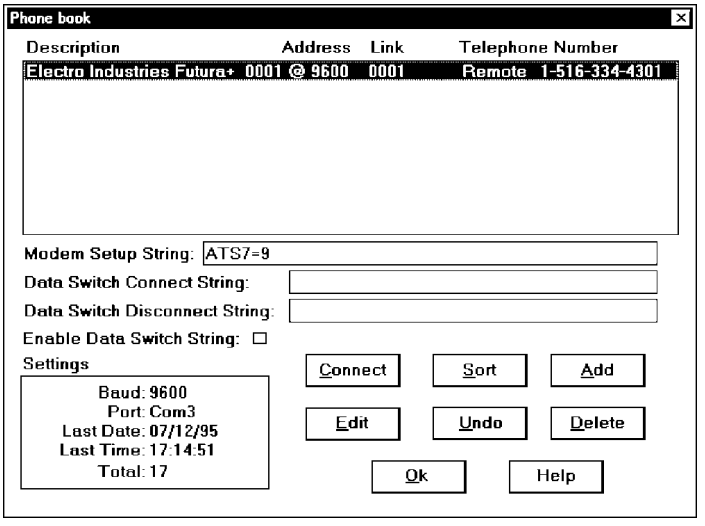
- Remote: Make a remote (modem) connection when the power monitor is accessible to Futura+ Communicator only over a phone line (or by radio wave).
  - Do *either* of the following:
    - On the menu bar, select Connection, Manual.
    - On the button bar, select Manual.
  - In the Manual screen (under Link), select Modem.
  - Optionally, enter the device's location.
  - Enter the telephone number.

- Enter the device address, and select the COM port and baud rate.
- Click OK.

The bottom left of the screen will now show the type of connection, the port, the baud rate and the device address. For example: Remote:Com3:9600:0007.

Phone Book Connection

Use the phone book to store connection information for future access. This is especially useful for interrogating a number of Futura+'s, either directly or over phone lines. To make entries in the phone book, see *Making Phone Book Entries* in *Using the Phone Book.*



Direct: Make a direct (serial) connection when the power monitor is hardwired to the computer that is running Futura+ Communicator.

- To connect to the Futura+, do *either* of the following:

  — On the menu bar select Connection, Phone Book.

  — On the button bar, select Phone Book.

- Highlight a listing to select it.

- Click the Connect button.

The left box of the status bar shows connection information, such as the type of connection, the port, the baud rate and the device address. If no connection has been made, the middle of the status bar will read "No Device.")

■ Remote: Make a remote (modem) connection when the power monitor is accessible to Futura+ Communicator only over a phone line (or by radio wave).

- To connect to the Futura+, do *either* of the following:

  — On the menu bar select Connection, Phone Book.

  — On the button bar, select Phone Book.

- Once phone book entries have been made (see *Using the Phone Book*), in the Phone Book screen, highlight a meter (in the top section).

- Click the Connect button.

- The message "Updating Device—Status/Info—Please Wait ..." will appear on screen once the connection has been made.

- In the Dialing screen, "CONNECT," followed by the baud rate of the connection will appear once the software has connected to the modem.

If no connection was made, an error message will appear. Before trying again, verify the telephone number, modem settings, baud rate and device address and check the wiring.

Disconnecting from a Futura+

■ Do *either* of the following:

- On the menu bar, select Connection, Disconnect.

- On the tool bar, select Disconnect.

■ In the Disconnect screen, click OK to terminate the connection or Cancel to maintain it.

Using the Phone Book

Using the Phone Book to Connect to a Futura+

Do *either* of the following:

- On the menu bar select Connection, Phone Book.
- On the button bar, select Phone Book.

Making Phone Book Entries

You *must* specify the proper baud rate, device address and COM port. (Much of this information may be omitted if you are using Modem Manager 1.)

- Top Section
  - Description (in-house meter, for example)
  - Device Address (four digits)
  - Link (direct or remote)
  - Telephone Number
- Modem Setup String: This optional string is used to set up the originating modem.
- Data Switch Connect and Disconnect Strings: These are needed only if you are using a digital switch. Refer to your data-switch manual; the strings vary from switch to switch.
  - Data-Switch String Control Characters
    , one-second pause
    | carriage return ([Shift][\])
    & linefeed
  - Sample Data-Switch Connect String (for an RFL 9660 digital switch)

    — To access the switch, press [Enter].
    Send a carriage return and pause 1 second for switch to acknowledge. |,

    — Enter a password and/or press [Enter].
    Send a carriage return and pause 1 second for switch to acknowledge. |,

— Clear the buffer.
Send a carriage return and pause 1 second for switch to acknowledge. |,

— Enter (the port) 1 and press [Enter].
Send 1, carriage return and pause 1 second for switch to acknowledge. 1|,

— Resulting data-switch connect string: |,|,|,1|,

- Sample Data-Switch Disconnect String (for an RFL 9660 digital switch)

— Generate a period of silence.
Pause 2 seconds. ,,

— Leave the port and return to command mode (use escape sequence).
Send BYE. BYE

— Generate a period of silence.
Pause 2 seconds. ,,

— Quit the session by pressing Q[Enter].
Send Q and then a carriage return. Q|

— Resulting data-switch disconnect string: ,,BYE,,Q|

■ Enable Data Switch String: Check to activate the data-switch string; uncheck to deactivate it.

■ Settings

- Baud (Rate): The speed (1200, 2400, 4800, 9600, 19200 or 38400) at which the device—*not the modem*—is communicating. If you are not using EIG's Modem Manager 1, the baud rate on the computer and the device *must* match.

- Port: The serial port (COM1, COM2, COM3 or COM4) to which the modem or device is connected.

- Last Connection (Date, Time and Total): This lists the date and time of the previous connection, as well as the total duration of all previous connections. (For a new entry, the date and time of the last connection will be set to 00/00/00 and 00:00:00.)

■ Buttons

- Connect: Select a meter in the top section and click the Connect button to initiate a connection.

- Sort: Performs an ASCII sort on the list of meters in the top section, by description.

- Add: Click the Add button to add numbers to the phone book. In the Add Entry screen:

  — Connection (Direct or Modem): Choose Direct if you're connecting directly to the Futura+ (using RS232 or RS485 communications). Choose Modem if you're communicating with a (remote) device over a modem.

  — Location: Assign a name to the site or device.

  — Telephone: For a modem connection, enter the telephone number to be dialed.

  — Last Connection (Date, Time and Total): This lists the date and time of the previous connection, as well as the total duration of previous connections. For a new entry, the date and time of the last connection will be set to 00/00/00 and 00:00:00.

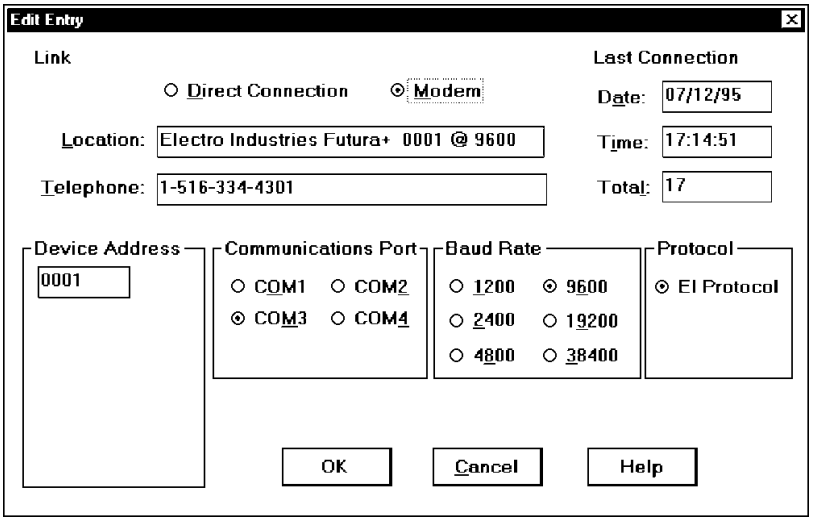
  — Device Address: Four-digit address (from 0001 to 9999).

  — Communications Port: Specify the serial port (COM1, COM2, COM3 or COM4) to which the modem or device is connected.

  — Baud Rate: Specify the speed (1200, 2400, 4800, 9600, 19200 or 38400) at which the device—*not the modem*—is communicating. If you are not using EIG's Modem Manager 1, the baud rate on the computer and the device *must* match.

  — Protocol: Currently, only EI protocol is supported.

- Edit: To change a device's connection settings, select it from the list and click the Edit button. The Edit Entry screen will allow you to change anything that was specified in the Add Entry screen.



- Undo: If Undo is enabled (not grayed out), it can be used to undo the previous action.
- Delete: Select a device in the list and click the Delete button. Click OK to confirm this decision or Cancel to ignore it.
- OK: Confirm your addition or changes and exit the Phone Book screen.
- Help: Display a related help screen.

Remote Connection:
Modem Setup Strings

Programming the Originating Modem

In most cases, the modem connected to your computer will work fine as is. But if you need to program it, use your modem manual to:

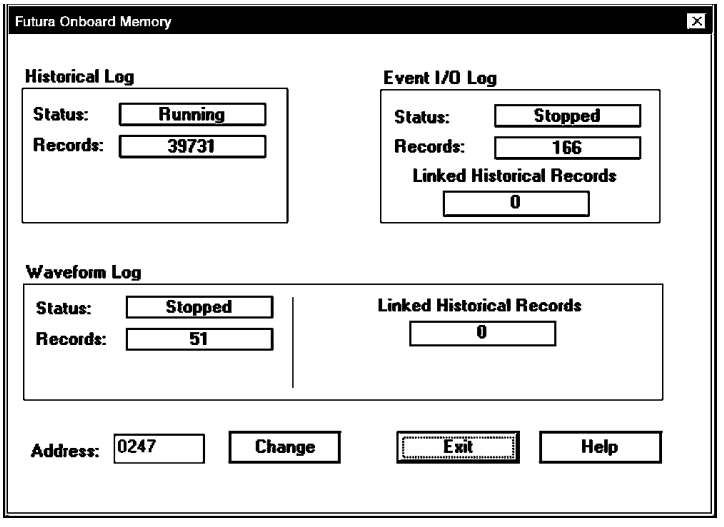
- Restore the modem to factory settings.
- Set the modem to:
  - Display result codes.
  - Verbal result code.
  - Ignore DTR signal.
  - Increase the carrier time-out to a minimum of 60 seconds.
  - Show modem-to-modem baud rate and connect baud rate.
- Save the settings to store them in the modem's nonvolatile memory.

Programming the Remote Modem

If you are not using Modem Manager 1, you will need to program the modem connected to the Futura+. Use the modem's manual to:

- Restore the modem to factory settings.
- Set the modem to:
  - Auto answer after *n* rings (where $n > 0$).
  - Enable auto negotiate.
  - Return numeric result codes. (The meter will misinterpret verbal results as valid commands or requests.)
  - Ignore DTR signal.
  - Disable flow control.

- Program the remote modem to send data to the Futura+ it is connected to at the rate the Futura+ is programmed to accept. For example, if the remote modem is connected to a Futura+ that is set to communicate at 9600 baud:
  - Set the baud rate of Windows Terminal (or an equivalent program) to 9600 baud.
  - Through the Terminal program, connect to the port to which the modem is attached (COM 1, 2, 3 or 4).
  - Type: AT&F[*enter any other settings*]&W[Enter].
- Save the settings to store them in the modem's nonvolatile memory.



When you are communicating with remote devices, the use of EIG's Modem Manager 1 (an RS485-to-RS232 converter) is highly recommended. Modem Manager 1 not only makes modem programming unnecessary, it also makes for successful communication, over even the worst lines.

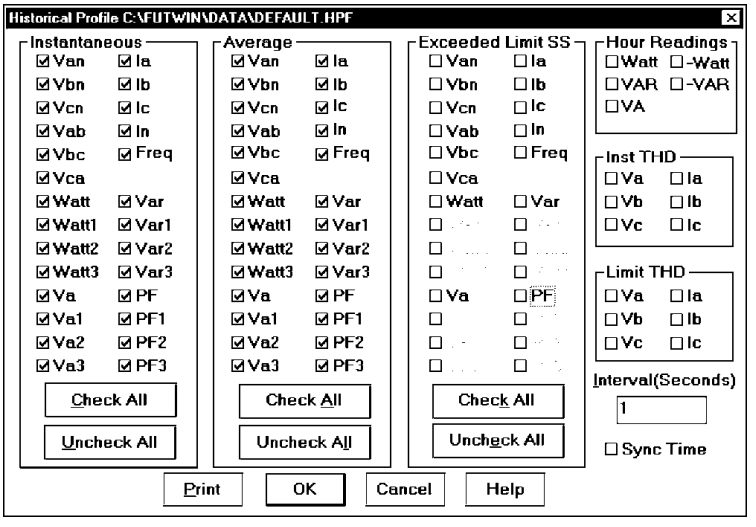
Futura+ Log Status

Log Status

Once you have used Futura+ Communicator to connect to a power monitor, the status of the monitor's three logs (historical, event I/O and waveform) will be displayed on the right side of the status bar (at the bottom of the screen). The possible statuses are listed below.

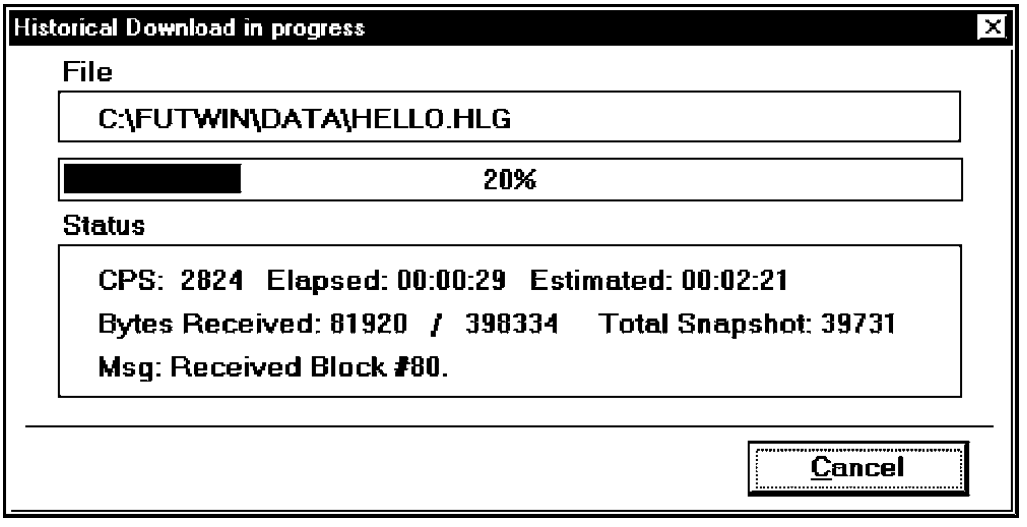
For the *L* below, substitute the log type (H for historical, E for event I/O or W for waveform).

<*L*:N/A>	Not Available	The power monitor, as configured, does not support this feature. (The log is unavailable.)
<*L*:LOG>	Running	The power monitor is using the current profile to log the specified data. (The log is logging.)
<*L*:STOP>	Stopped	The log is frozen: Logging has been stopped. (The log is not logging.)
<*L*:???>	Bad Communication	The power monitor cannot be found. (The log is unavailable.)



Log-Status Polling

- To display more log-status details, on the menu bar, select Tools, Futura+ Log Status.
- The Futura+ Onboard Memory screen will show:
  - The status of the historical, event I/O and waveform logs.
  - The number of records in each log.
  - The number of linked historical records (for both the event I/O and waveform logs).
  - The power monitor's address: To change the address, edit the number in the text box and click Change. (This will only be a temporary change. The address will revert to the original number once you exit this screen.)
- Exit: Click Exit to return to the main Futura+ Communicator screen.

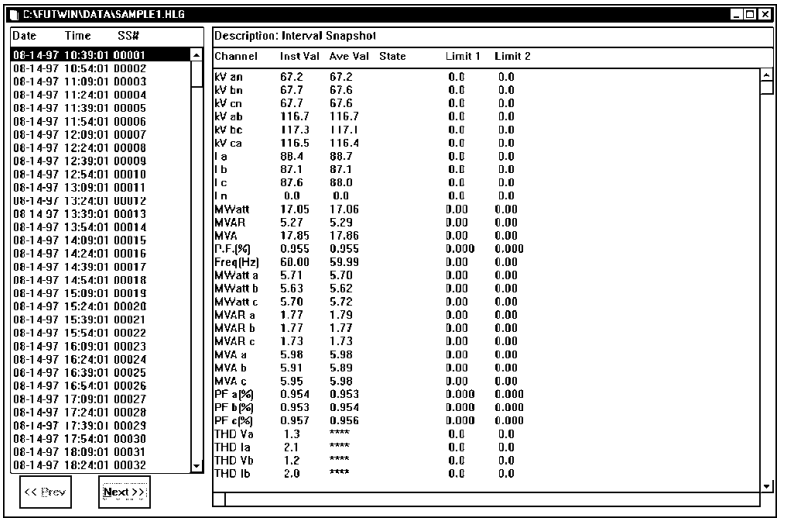


Historical Log

An historical log is used to track any parameter over time. (See the *Futura+ Installation and Operation Manual* for information about storage capacity.)

An historical log is a collection of time-stamped records. Each record contains up to 55 data items, which are recorded at a specified interval and stamped with the time of the recording. The following criteria determine when a record will be made (in other words, when a snapshot will be taken):

- The user-specified interval.
- A parameter's exceeding of a limit or a return to within limits.
- The capture of a waveform.
- An I/O event (the change of state of a relay or input).



Historical Profile

An historical profile is used to specify the readings a Futura+ device is to record and the intervals at which they are to be recorded. In this profile, you can also stipulate which channels' exceeded limits are to cause a recording of data (regardless of the specified interval).

- In order for data to be stored and retrieved, a valid profile must be stored in the Futura+ device. (See *Creating an Historical Profile.*)

- The Futura+ can be programmed to store average as well as instantaneous values in its historical log.

- In addition to storing data at a user-specified interval, the Futura+ can also take snapshots when a limit is exceeded and when the value returns to within the limit. So, if snapshots are scheduled to be taken at fifteen-minute intervals and a dip or surge occurs during the interim (the voltage drops five minutes after a scheduled recording was made), the Futura+ will also take a snapshot when the voltage drops below your set limit *and* when it returns to within limits.

For the snapshots discussed above to be taken, you must *also* have your limits set to trip. (See *EIG Programmer.*)

- A Futura+ stores up to 101,171 pieces of historical data in its mass memory. For example, if your historical profile has ten values logged every fifteen minutes, it would take *from three months to nearly a year* (depending on its memory option) to fill the Futura+ device's memory.

Creating an Historical Profile

- On the menu bar, select File, New, Historical Profile (.HPF).
- In the Historical Profile screen, use the check boxes next to the channel names to specify the recording (the taking of a snapshot) of instantaneous and/or average readings.
- In the Exceeded Limit SS column, check the box next to a channel name to have a snapshot stored when the channel's limit is exceeded. (See *EIG Programmer.*)
- Enable or disable the recording of hour counters, instantaneous THD and limit THD. (See *EIG Programmer.*)
- Specify the recording interval (in seconds) and enable or disable sync time.
  - Without sync time, the first recording will occur immediately, and recordings will continue to be made at the specified interval.
  - With sync time:
    - — The first recording will be made immediately.
    - — Subsequent recordings will be made starting at the next point in time that the end of an interval would have been reached *had recording started at the top of the current hour* (based on the meter's clock).
    - — Recordings will continue to be made at the specified interval *until the end of the hour.* The start of each new hour will trigger a recording and restart the interval counter.

As an example, if it is now 06:04 and the interval is 0900 seconds (or 15 minutes), recordings will be made at 06:04 (immediately), 06:15 (the first end of an interval, had recording started at 06:00), 06:30 and 06:45. Recordings will start on the hour at 07:00 and continue with 07:15, 07:30, 07:45, etc.

  - An event I/O (relay and input) profile is used to specify whether or not an historical recording will be made when a relay or input changes state. (See *Event I/O Profile*.)
- Once you've specified all your choices, click OK. In the Save As screen, name the file and click OK to save it.

- In a waveform profile, you can select a link to an historical recording if a particular limit is exceeded. (See *Waveform Profile.*)

To have the new profile put to use, remember to send it to the Futura+ device. (See *Uploading an Historical Profile to a Futura+.*)

Editing an Historical Profile

- On the menu bar, select File, Open, Historical Profile (.HPF).
- Select a file name from the list, or enter a path and file name and click OK.
- In the Historical Profile screen, use the check boxes next to the channel names to specify the recording (the taking of a snapshot) of instantaneous and/or average readings. (You may find it expedient to use the Check All or Uncheck All button.)
- In the Exceeded Limit SS column, check the box next to a channel name to have a snapshot stored when that channel's limit is exceeded. (You may find it expedient to make use of the Check All or Uncheck All button.)
- Enable or disable the recording of hour counters, instantaneous THD and limit THD. (See *EIG Programmer.*)
- Specify the recording interval (in seconds), and enable or disable sync time.
- Once you've specified all your choices, click OK to save the file.

To have the edited profile put to use, remember to send it to the Futura+ device. (See *Uploading an Historical Profile to a Futura+.*)

Uploading (Sending) an Historical Profile to a Futura+

- Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+.*)
- Verify that the Futura+ is not logging historical data (running an .HLG file):
  - On the menu bar, select Tools, Futura+ Log Status.

- In the Futura+ Onboard Memory screen, verify that the (device) address is correct and that the status of the historical log is "Stopped." If not, exit the Futura+ Onboard Memory screen and stop the historical log: On the menu bar, select Meter, Stop Historical Log. The message box will show "Result: Stopped." Once you click OK, the status bar on the bottom of the screen will read "<H:STOP>."

■ On the menu bar, select File, Upload, Historical Profile (.HPF).

- Select or enter a file name and click OK.
- When a message confirms that the upload was successful, click OK to continue.

Downloading (Retrieving) an Historical Profile from a Futura+

■ Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+.*)

■ On the menu bar, select File, Download, Historical Profile (.HPF).

- Select or enter a file name and click OK. (If the file already exists, you will be asked to confirm that you want to overwrite it.)
- When a message confirms that the download was successful, click OK to continue.

Printing an Historical Profile

To print out a list of all 38 channels, with an indication for each of which values will be recorded (instantaneous and/or average values, and whether an exceeded limit will trigger a snapshot), as well as the recording interval:

■ On the menu bar, select File, Open, Historical Profile (.HPF).

■ Select a file name from the list, or enter a path and file name and click OK.

■ In the Historical Profile screen, click the Print button (on the bottom right). In the Print screen, select your settings and click OK.

Starting, Stopping and Clearing an Historical Log

Starting an Historical Log

- On the menu bar, select Meter, Start Historical Log.
- Optionally, remove old data from the log by clearing it (see *Clearing an Historical Log,* below).
- When a message confirms that the Futura+ has started to log historical data, click OK. (The status bar will now read "<H:LOG>.")

Stopping an Historical Log

- On the menu bar, select Meter, Stop Historical Log.
- When a message confirms that the logging has stopped, click OK. (The status bar will now read "<H:STOP>.")

Clearing an Historical Log

You must stop the log before you can clear it.

Be sure to download the historical log file before you clear it. Clearing a log destroys all of its data.

- On the menu bar, select Meter, Clear Historical Log.
- You will be asked if you want to clear all the historical data in the Futura+ device's memory. Click OK to confirm (or Cancel to abort).
- When a message confirms that the log has been cleared, click OK.

Downloading (Retrieving) an Historical Log

To retrieve an historical log file from a Futura+:

- Connect to the Futura+.

This menu option will be inaccessible (grayed out) if the hardware or software connection to the meter is incomplete or incorrect. (See *Connecting to and Disconnecting from a Futura+.*)

- On the menu bar, select File, Download, Historical Log File (.HLG).
- Enter a file name for the retrieved log (or select a file name and opt to overwrite it).
- During retrieval, the progress and the total number of log entries will be displayed. When a message indicates that the retrieval was successful, click OK.
- You can now display the historical data table. (See *Historical Data Tables.)*

Historical Data Tables
(Time-Stamped Data)

Viewing an Historical Log

Once you have retrieved an historical log file from a Futura+ (see *Downloading an Historical Log File*), to display a table of its contents, do *either* of the following:

- On the menu bar: Select File, Open, Historical Log File (.HLG), enter or select a file name and click OK.
- On the tool bar: Select Historic, enter or select a file name and click OK.

Range Setting

- Specifying a range

  - Specify the start of the range. (Skip this step to have the start of the range default to the previous setting.)

    — Click a starting time and date in the list box to select it.

    — On the menu bar, select Options, Historical Viewer, Set Start.

  - Specify the end of the range. (Skip this step to have the end of the range default to the previous setting.)

    — Click an ending time and date in the list box to select it.

    — On the menu bar, select Options, Historical Viewer, Set End.

  - On the menu bar, select Options, Historical Viewer, Rebuild. The list box will now contain only the specified range.

- Resetting a range

  - Close and then reopen the file, and specify a new range (as discussed above).

  - Reset either the start or the end of the range (or both), as discussed above. Then, on the menu bar, select Options, Historical Viewer, Reset.

Viewing Snapshots

- Each point (date and time) at which data has been recorded is referred to as a snapshot. To select a snapshot and display all the information recorded at that date and time, scroll through the list on the left side of the table (where date, time and snapshot number are indicated) and click one to select it. The information collected at this date and time will be displayed on the right of the screen: Description (e.g., Interval Snapshot), Channel, Instantaneous Value, Average Value, State, Limit 1 and Limit 2.

- If an exceeded-limit snapshot occurs, a limit code will identify each channel for which limit(s) have been exceeded. If a scheduled snapshot was not taken, an explanation for its absence will appear here.

Note: In line and circular charts, the fact that a snapshot was missed is readily apparent. No point will have been plotted at the interval location and/or no line will have been drawn through the interval.

Limit Snapshot Codes

Use the following to interpret the state codes that appear in the descriptions of snapshots that have been recorded because limits were exceeded.

- General
  - i = instantaneous
  - a = average
  - L1 = limit 1
  - L2 = limit 2
- Specific
  - Instantaneous
    - i<L1 The instantaneous value is less than the limit 1 value.
    - i>L1 The instantaneous value is greater than the limit 1 value.
    - i<L2 The instantaneous value is less than the limit 2 value.
    - i>L2 The instantaneous value is greater than the limit 2 value.
  - Average
    - a<L1 The average value is less than the limit 1 value.
    - a>L1 The average value is greater than the limit 1 value.
    - a<L2 The average value is less than the limit 2 value.
    - a>L2 The average value is greater than the limit 2 value.

Printing an Historical Data Table

To print part or all of an historical data table:

- Open the pertinent historical log file.
- On the menu bar: Select File, Print.
- In the Print screen, select All or choose a time range by selecting options in the From and To scroll list boxes. Click OK. In the second print screen, make your selections and again click OK.

Graphing Historical Data

- On the menu bar, select File, Open, Historical Log File (.HLG).
- Select a file name in the list (or enter a path and file name) and click OK.
- Once the historical data table appears:
  - On the menu bar, select Options, Circle Graph Time. Specify the number of hours the chart is to cover and click OK.
  - In the historical data table, highlight a starting point (click on a date and time). On the menu bar, select Options, Historical Viewer, Set Start.
  - In the historical data table, highlight an ending point (click on a date and time that would fall on or just under the number of hours the chart is to cover—the circle graph time you specified). On the menu bar, select Options, Historical Viewer, Set End.
  - To regenerate the historical data table (so that it contains only the data within the range you specified): On the menu bar, select Options, Historical Viewer, Rebuild.
- To redisplay the originally opened table: On the menu bar, select Options, Historical Viewer, Reset.

Historical Line Graphs

- On the menu bar, select File, Open, Historical Log File (.HLG).
- Select a file name in the list and click OK.
- Once the historical data table appears, on the menu bar, select Graphs and choose a graph to display:
  - Electric Consumption
  - Watt and VA Demand
  - Power-Factor Distribution
  - Voltage Deviation (Neutral)
  - Voltage Deviation (Phase)
  - Current Distribution
    - — Total Harmonic Distortion: Select Volts A, Volts B, Volts C, Amps A, Amps B or Amps C.
- To print an historical line graph, do *either* of the following:
  - On the menu bar, select File, Print and make the appropriate selections.
  - On the tool bar, select Print and make the appropriate selections.

Printing in landscape rather than portrait mode will produce a much larger graph.

Historical Circle Graphs

- On the menu bar, select File, Open, Historical Log File (.HLG).
- Select a file name in the list and click OK.
- Once the historical data table appears:
  - Select the number of hours to be represented by 360 degrees: On the menu bar, select Options, Circle Graph Time. Enter the number of hours (1 to 168) to be represented by the graph circle and click OK.

The time period covered by a circle graph is determined by the settings in Options, Circle Graph Time. However, if you specify a *different* time range with Options, Historical Viewer, Set Start and Set End (as described above), the graph will use the *larger* of the two ranges.

- On the menu bar, select Graphs, Circular Data Graph. Choose the channel for the graph (V AN, V BN, V CN, V AB, V BC, V CA, I A, I B, I C, Watts, var, VA or Frequency).

- To zoom in on a graph on screen: On the menu bar, select Graphs, Toggle Global/ Zoom.

If any data is missing from a graph, go back to the historical data table and click the appropriate date-and-time stamp to display the cause.

■ To print an historical circle graph, do *either* of the following:

- On the menu bar, select File, Print and make the appropriate selections.

- On the tool bar, select Print and make the appropriate selections.

Printing in landscape rather than portrait mode will produce a much larger graph.

Historical Viewer Buffer

■ The buffer size is the maximum number of snapshots (entries) to be displayed in an historical data table *in one group.* (Note: Use the Next>> and <<Prev buttons to access the next or previous group *of this size*). If you have a large data file and a slow computer, shorten the load time by setting the buffer size to approximately 500. Increase the number if you're using a fast computer.

■ On the menu bar, select Options, Historical Viewer Buffer. Change the buffer size (enter a number from 250 to 2000) and click OK.

■ To change the buffer size while the historical data table is open (on display): On the menu bar, select Options, Historical Viewer Buffer. Change the buffer size and click OK. To have the change take effect, do *either* of the following:

- Close the file and reopen it.

- On the menu bar, select Options, Historical Viewer, Reset.

Historical Viewer

- Reset: Use Reset to implement a buffer size change made while the historical data table is open (on display). On the menu bar, select Options, Historical Viewer, Reset.

- Set Start: To specify a date and time as the first (earliest) snapshot to be displayed or graphed, display the historical data table and highlight a date and time. On the menu bar, select Options, Historical Viewer, Set Start. (The data table must be rebuilt once a new start and/or end has been specified. See *Rebuild,* below.)

- Set End: To specify a date and time as the last (latest) snapshot to be displayed or graphed, display the historical data table and highlight a date and time. On the menu bar, select Options, Historical Viewer, Set End. (The data table must be rebuilt once anew start and/or end has been specified. See *Rebuild,* below.)

- Rebuild: Use rebuild to generate a new historical data table after redefining its start and/or end date and time (see *Set Start* and *Set End* above), so that it contains only the specified range of data. On the menu bar, select Options, Historical Viewer, Rebuild.

Exporting an Historical Log

Futtura+ Communicator exports log files in standard tab-delimited ASCII format, which can be imported into virtually any other software on the market.

- On the menu bar, select Tools, File Exporter, Historical Log (.HLG).

- Select or enter the path and name of the historical log file you want to export and click OK.

- Assign a path and name to the exported file, and specify its type (.TXT, for example). When a message confirms that the export was successful, click OK.

Event I/O
(Relay and Input) Log

The Futura+ stamps I/O information (from its internal relays and input status contacts) with the date and time. This data is useful for monitoring the status of relays and breakers in a substation, for example. A Futura+ can store up to 256 of these events. You can also opt to have an historical snapshot taken when an I/O event occurs.

Event I/O
(Relay and Input) Profile

The sole purpose of an event I/O profile is to specify whether instantaneous and/or average readings are to be recorded in the historical log when an I/O event occurs.

Creating an Event I/O Profile

- On the menu bar, select File, New, Event I/O Profile (.EPF).
- In the Event Profile screen, choose whether or not you want historical snapshots taken when an event occurs. (Enable "Take Historical Snapshot when Event I/O occurs" to have readings stored in the historical log when a relay or input changes state.) Click OK.

Data from *linked* snapshots will appear in *both* the event I/O log and the historical log. The reason the snapshot was taken will also be noted in the historical log.

- In the Save As screen, name the file and save it.

Editing an Event I/O Profile

- On the menu bar, select File, Open, Event I/O Profile (.EPF).
- Select a file name from the list, or enter a path and file name and click OK.
- In the Event Profile screen, enable or disable "Take Historical Snapshot when Event I/O occurs." Click OK or Cancel.

Uploading (Sending) an Event I/O Profile to a Futura+

- Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+*.)
- Verify that the Futura+ is not logging event I/O data (running an .ELG file.) Do this by refreshing and displaying the status of the event I/O log on the bottom line of the screen (also see *Futura+ Log Status*):
  - On the menu bar, select Connection, Change Address/Refresh Device Status... .
  - In the Address screen, click OK. (*Do not* enter a new device address.)
  - You will be asked to wait while the device status information is updated. Once the message disappears, the event I/O log's status will be up to date. If it shows "LOG," the Futura+ is logging event I/O data. If it shows "STOP," the Futura+ is not logging event I/O data.
  - To stop the logging of event I/O data: On the menu bar, select Meter, Stop Event I/O Log. The message box will show "Result: Stopped." Once you click OK, the status bar will read "STOP."
- On the menu bar, select File, Upload, Event I/O Profile (.EPF).
  - Select or enter a file name and click OK.
  - When a message confirms that the upload was successful, click OK to continue.

Downloading (Retrieving) an Event I/O Profile from a Futura+

- Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+.*)

- On the menu bar, select File, Download, Event I/O Profile (.EPF).

  - Select or enter a file name and click OK. (If the file already exists, you will be asked to confirm that you want to overwrite it.)

  - When a message confirms that the download was successful, click OK to continue.

Starting, Stopping and Clearing an Event I/O (Relay and Input) Log

Starting an Event I/O Log

- On the menu bar, select Meter, Start Event I/O Log.
- When a message confirms that the device has started to log event I/O data, click OK. (The status bar will show "LOG.")

Stopping an Event I/O Log

- On the menu bar, select Meter, Stop Event I/O Log.
- When a message confirms that logging has stopped, click OK. (The status bar will show "STOP.")

Clearing an Event I/O Log

You must stop the log before you can clear it.

Be sure to download the event I/O log file before you clear it: Clearing a log destroys all of its data.

- On the menu bar, select Meter, Clear Event I/O Log.
- You will be asked if you want to clear all the event data in the Futura+ device's memory. Click OK to confirm (or Cancel to abort).
- When a message confirms that the log has been cleared, click OK.

Downloading (Retrieving) an Event I/O Log

To retrieve an event I/O (relay and input) log file from a Futura+ device:

- Connect to the Futura+ device.

This menu option will be inaccessible (grayed out) if the hardware or software connection to the meter is incomplete or incorrect. (See *Connecting to and Disconnecting from a Futura+.*)

- On the menu bar, select File, Download, Event I/O Log File (.ELG).
- Enter a file name for the retrieved log (or select a file name and opt to overwrite it).
- During retrieval, the progress and the total number of log entries will be displayed. When a message indicates that the retrieval was successful, click OK.
- You can now display the event I/O data table. (See *Event I/O Data Tables.*)

Event I/O (Relay and Input) Data Table

Viewing an Event I/O Data Table

To display a table of the contents of an event I/O log file (relay and input data) that has been retrieved from an Futura+ device, do *either* of the following:

- On the menu bar: Select File, Open, Event I/O Log File (.ELG), enter or select a file name and click OK.
- On the tool bar: Select Event, enter or select a file name and click OK.

Instantaneous values will be available only if there is a link to a snapshot at that time stamp.

To select a snapshot and display all of the information recorded at that date and time, scroll through the list on the left side of the table (where the date, time and snapshot number are indicated) and click one to select it. The information collected at this date and time will be displayed on the right of the screen: Description (e.g., Interval Snapshot), Channel, Instantaneous Value, Average Value, State, Limit 1 and Limit 2.

Printing an Event I/O Data Table

To print part or all of an event I/O data table:

- Open the pertinent event I/O log file.
- On the menu bar: Select File, Print.

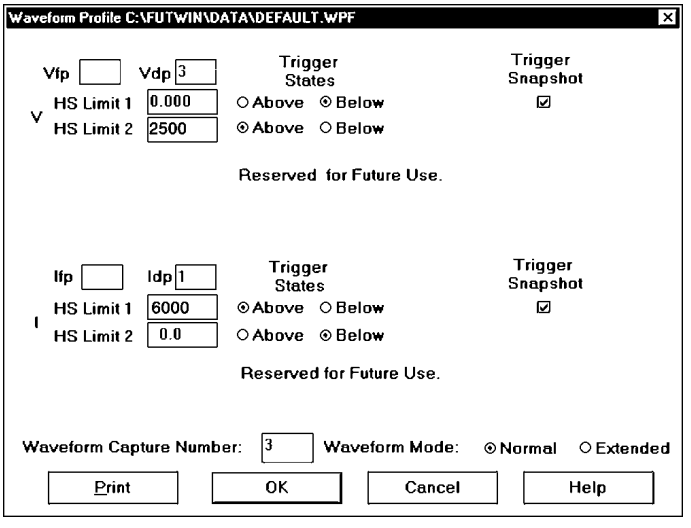
In the Print screen, select All or choose a time range by selecting options in the From and To scroll list boxes. Click OK. In the second print screen, make your selections and again click OK.

Waveform Log

The Futura+ stamps waveform information with the date and time. The waveform log file (.WLG) is a collection of time-stamped records. Each record contains six 960-point waveforms in Wye configuration or five 960-point waveforms in Delta configuration. Waveforms are captured when the RMS calculated over two cycles exceeds the high-speed limits set in the waveform profile. The voltage channels (V AN, V BN and V CN *or* V AB and V BC) share two limits and the current channels (I A, I B and I C) share two limits.

Waveform Profile

A waveform profile is used to specify the conditions that will trigger a waveform capture. The profile consists of two limits for voltage channels and two limits for current channels. Each limit can be set to trigger either below or above the limit value. (To disable a limit, set it to 0000 and below or 9999 and above.) You can also select a link to an historical recording.



Creating a Waveform Profile

- On the menu bar, select File, New, Waveform Profile (.WPF).
- Use the Waveform Profile screen to specify:
  - Voltage Limit 1, its trigger state (above or below) and whether a snapshot is to be taken if this limit is exceeded.
  - Voltage Limit 2, its trigger state (above or below) and whether a snapshot is to be taken if this limit is exceeded.
  - Current Limit 1, its trigger state (above or below) and whether a snapshot is to be taken if this limit is exceeded.
  - Current Limit 2, its trigger state (above or below) and whether a snapshot is to be taken if this limit is exceeded.
- The waveform capture number (the number of waveforms that will be stored, depending upon the waveform mode):
  - In normal mode, this specifies the *maximum* number of consecutive waveforms that will be captured while a given limit is being exceeded. (Fewer waveforms will be captured if the limit does not remain exceeded.)
  - In extended mode, this specifies the *absolute* number of consecutive waveforms that will be captured when a given limit is exceeded. (This number of captures is guaranteed, even if the limit does not remain exceeded.)
- The waveform mode:
  - In normal mode, waveforms will be captured for an exceeded limit only until *either:*
    - — The limit is no longer being exceeded.
    - — The number of captures specified in the waveform capture number have been made.
  - In extended mode, waveforms will be captured for an exceeded limit until the number of captures specified in the waveform capture number have been made.
- In the Save As screen, name the file and save it.

Remember to upload your new waveform profile to the Futura+. (See *Uploading a Waveform Profile to a Futura+.*)

Setting High-Speed Limits

These limits operate independently of the limits set in the EIG Programmer.

- One Exceeded Limit: When a limit is exceeded, the Futura+ device captures waveforms (for that limit) *up to* the number specified (in the waveform capture number). If the limit remains exceeded, no additional waveforms will be captured until that limit is no longer being exceeded.

- Two Exceeded Limits: If two limits (A and B) are exceeded, use the priority chart below to determine how it will be handled. If Limit A has been exceeded (and at least one waveform has been recorded for it) and Limit B is then exceeded, B's waveform will be captured *only if* Limit B has a higher priority than Limit A. (See the *Priority Chart* in the following section.)

- Priority: The lower the number, the higher the priority. Each channel has two limits which can be set up two different ways (above or below), for a total of four combinations per channel:

  - Below and below
  - Below and above
  - Above and above
  - Above and below

A channel's Limit 1 has a higher priority than its Limit 2.

Priority Chart

Priority	Channel	Limit
1	V AN	1
2	V BN	1
3	V CN	1
4	I A	1
5	I B	1
6	I C	1
7	V AN	2
8	V BN	2
9	V CN	2
10	I A	2
11	I B	2
12	I C	2

Editing a Waveform Profile

- On the menu bar, select File, Open, Waveform Profile (.WPF).
- Select a file name from the list, or enter a path and file name and click OK.
- In the Waveform Profile screen, make your changes (for details, see *Creating a Waveform Profile*) and click OK to save them.

Remember to upload the new waveform profile to the Futura+. (See *Uploading a Waveform Profile to a Futura+.*)

Uploading (Sending) a Waveform Profile to a Futura+

- Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+.*)
- Verify that the Futura+ is not logging waveform data (running an .WLG file.) Do this by refreshing and displaying the status of the waveform log (LOG, for example) on the bottom line of the screen:
  - On the menu bar, select Connection, Change Address/Refresh Device Status... .
  - In the Address screen, click OK. (Do not enter a new device address.)

- You will be asked to wait while the status is updated. Once the message disappears, the waveform log's status will be up to date. If it shows "<W:LOG>," the Futura+ is logging waveform data. If it shows "<W:STOP>," the Futura+ is not logging waveform data.

- To stop the logging of waveform data: On the menu bar, select Meter, Stop Waveform Log. The message box will show "Result: Stopped." Once you click OK, the status bar will read "<W:STOP>."

■ On the menu bar, select File, Upload, Waveform Profile (.WPF).

- Select or enter a file name and click OK.

- When a message confirms that the upload was successful, click OK to continue.

Downloading (Retrieving) a Waveform Profile from a Futura+

■ Establish a connection with the Futura+ device. (See *Connecting to and Disconnecting from a Futura+.*)

■ On the menu bar, select File, Download, Waveform Profile (.WPF).

- Select or enter a file name and click OK. (If the file already exists, you will be asked to confirm that you want to overwrite it.)

- When a message confirms that the download was successful, click OK to continue.

Printing a Waveform Profile

■ First, open a waveform profile:

- On the menu bar, select File, Open, Waveform Profile (.WPF).

- Select a file name from the list, or enter a path and file name and click OK.

■ In the Waveform Profile screen, click the Print button.

Starting, Stopping and Clearing a Waveform Log

Starting a Waveform Log

- On the menu bar, select Meter, Start Waveform Log.
- When a message confirms that the device has started to log waveform data, click OK. (The status bar will show "<W:LOG>.")

Stopping a Waveform Log

- On the menu bar, select Meter, Stop Waveform Log.
- When a message confirms that logging has stopped, click OK. (The status bar will show "<W:STOP>.")

Clearing a Waveform Log

You must stop the waveform log before you can clear it.

Be sure to download the waveform log file before you clear it: Clearing a log destroys all of its data.

- On the menu bar, select Meter, Clear Waveform Log.
- You will be asked if you want to clear all the waveform data in the Futura+ device's memory. Click OK to confirm (or Cancel to abort).
- When a message confirms that the log has been cleared, click OK.

Downloading (Retrieving) a Waveform Log from a Futura+

To retrieve a waveform log file (.WLG) from a Futura+ device:

- Connect to the Futura+ device.

This menu option will be inaccessible (grayed out) if the hardware or software connection to the meter is incomplete or incorrect. (See *Connecting to and Disconnecting from a Futura+.*)

- On the menu bar, select File, Download, Waveform Log File (.WLG).
- Enter a file name for the retrieved log (or select a file name and opt to overwrite it).
- During retrieval, the progress and the total number of log entries will be displayed. When a message indicates that the retrieval was successful, click OK.
- You can now display the waveform data table. (See *Waveform Data Table.*)

Waveform Data Table

Viewing a Waveform Data Table

To display a table of the contents of a waveform log file that has been retrieved from an Futura+ device, do *either* of the following:

- On the menu bar: Select File, Open, Waveform Log File (.WLG), enter or select a file name and click OK.
- On the tool bar: Select Wavefm, enter or select a file name and click OK.

Instantaneous values will be available only if there is a link to a snapshot at that time stamp.

To select a snapshot and display all of the information recorded at that date and time, scroll through the list on the left side of the table (where the date and time are indicated) and click one to select it. The information collected at this date and time will be displayed on the right of the screen. The top box will list the channel that triggered the waveform capture, followed by information about the internal relays (1 through 3) and status inputs (1 through 4). For each captured waveform, the bottom right scroll box will specify the channel, limits 1 and 2, the instantaneous value and the unit (kVolt, Amp, %, Hz, etc.).

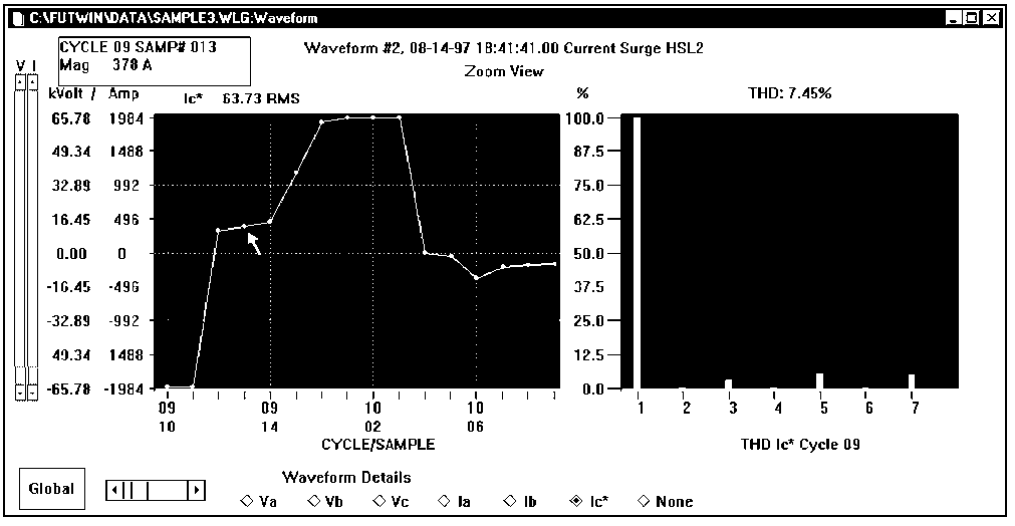
Printing a Waveform Data Table

To print part or all of a waveform data table:

- Open the pertinent waveform log file.
- On the menu bar: Select File, Print.
- In the Print screen, select All or choose a time range by selecting options in the From and To scroll list boxes. Click OK. In the second print screen, make your selections and again click OK.

Waveform Graphs

The waveform grapher displays six channels. Each contains 60 cycles of waveform data. The channel that triggered the waveform capture will be followed by an asterisk.

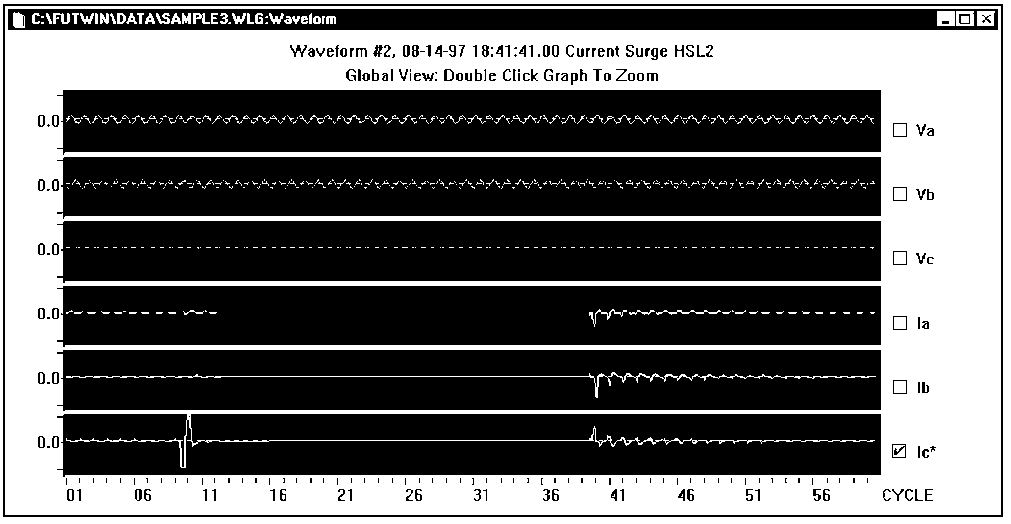


Viewing Waveform Graphs

- To open a waveform log file (.WLG), do *one* of the following:
  - On the tool bar, select Waveform.
  - On the menu bar, select File, Open, Waveform Log File (.WLG).
- Select a file name in the list and click OK.
- Double click a listed date and time, or on the menu bar, select Graphs, Waveform Graph.

Zooming Waveform Graphs

While the waveform graph is on display, double click to switch to zoom mode, or on the menu bar, choose Graphs, Toggle Global/Zoom. You can also zoom in on a highlighted or checked waveform by adjusting the scroll bars that appear to the left of a zoomed graph.



Printing Waveform Graphs

- First, open a waveform log file:
  - On the menu bar, select File, Open, Waveform Log File (.WLG).
  - Select a file name in the list and click OK.
- On the menu bar, select Graphs, Waveform Graph.
- With either a global or a zoomed graph on screen, on the menu bar, select File, Print. In the Print screen, make your selections and click OK.

Exporting a Waveform Log

- On the menu bar, select Tools, File Exporter, Waveform Log (.WLG).
- Select or enter the path and name of the waveform log file you want to export and click OK.
- Assign a path and name to the exported file, and specify its type (*.CSV, for example).
- When a message confirms that the export was successful, click OK.

Maximum/Minimum and Hour Readings

Resetting Maximum/Minimum and Hour Readings

To reset all the maximum/minimum and hour readings stored in a Futura+ device:

- On the menu bar, select Tools, Reset Max/Min and Hour Readings.
- In the Choose Items to Reset screen, check off the readings you want reset (or load a max/min hour reset profile) and click OK. (You may find it expedient to use the Check all and Uncheck all buttons.)
- Any readings that were not successfully reset will remain checked. Click OK to try again to reset them, or click Cancel to exit.
- Once all the checks have been cleared, click OK to exit. (See also *Script Commands:* CLEAR Max/Min Values and CLEAR Hour Values.)

Max/Min Hour Reset Profiles

With Futura+ Communicator, it's easy to routinely reset the same maximum and minimum and hour readings. Just save (and reload) a max/min hour reset profile.

Storing a Max/Min and Hour Reset Profile

- In the Choose Items to Reset screen, check off the readings you want to reset and click Save.
- Enter a file name (or choose to overwrite an existing one).

- Under Save as type, select Reset Max/Min Hour Profile. (The necessary .MMH extension will automatically be appended to the file name, unless you specify otherwise.)

Loading a Max/Min and Hour Reset Profile

- In the Choose Items to Reset screen, click Load.
- Select the name of the max/min hour reset profile and click OK.

Downloading (Retrieving) Maximum/Minimum Readings and Hour Counters from a Futura+

To download Maximum/Minimum and Hour Readings from a Futura+:

- On the menu bar, select File, Download, Max/Min and Hour Readings.
- Select or create a file name to use to store the downloaded readings. (See also *Script Commands:* GET Max/Min-Hr Values.)
- Once the download is completed, to view the log:
  - On the menu bar, select File, Open, Max/Min and Hour Readings.
  - Click the file name to display its contents.
- System Reset Protection: Enable system reset protection to require a password to be entered to reset maximum/minimum and hour readings through the Futura+'s keypad.

Viewing Maximum/Minimum Readings and Hour Counters

To open a maximum/minimum and hour readings log:

- On the menu bar, select File, Open, Max/Min and Hour Readings.
- In the Open screen, select a Max/Min Log (.HMM) file and click OK.

Printing Maximum/Minimum Readings and Hour Counters (from Notepad)

- First, open an .HMM file. (See *Viewing Maximum/Minimum Readings and Hour Counters.*)
- With the file open, use your mouse to select the text you want to print. On the Futura+ Communicator menu bar, select Edit, Copy.
- On the Windows Start button, select Programs, Accessories, Notepad.
- On the Windows Notepad menu bar, select Edit, Paste.
- To print the text (in Notepad), select File, Print.

Exporting Maximum/Minimum Readings and Hour Counters

Futura+ Communicator stores Maximum/Minimum Readings and Hour Counters (.HMM files) in standard, tab-delimited ASCII format. To import these files into virtually any other program (including Windows Notepad), just open the .HMM file in (or import it into) that application. You may need to identify the file type as .TXT, ASCII, or something similar.

All Logs

Starting, Stopping and Clearing All Logs

Starting All Logs

- On the menu bar, select Meter, Start All Logs.
- This causes the Futura+ to start making historical, event I/O and waveform log entries.

Stopping All Logs

- On the menu bar, select Meter, Stop All Logs.
- This causes the Futura+ to stop making historical, event I/O and waveform log entries.

Clearing All Logs

- On the menu bar, select Meter, Clear All Logs.
- This erases all of the Futura+'s logs (historical, event I/O and waveform).

Before clearing logs, you must stop them:
On the menu bar, select Meter, Stop All Logs.

Be sure to download the log files before you clear them: Clearing a log destroys all of its data.

Downloading (Retrieving) All Logs from a Futura+

You can download a Futura+'s logs individually or as a group, either directly or by way of a scheduled script.

To download all of a Futura+'s logs (*.HLG, *.ELG and *.WLG) at the same time:

- On the menu bar, select File, Download, All Available Logs.
- Enter a file name (or opt to overwrite one) and click OK. (The filename you enter will be used for all three log files—historical, event I/O and waveform—and the appropriate extension will be appended to each.)

The top of a Download in Progress screen shows the path and name of the file being downloaded, as well as the percentage of completion. The Status block at the bottom of the screen indicates:

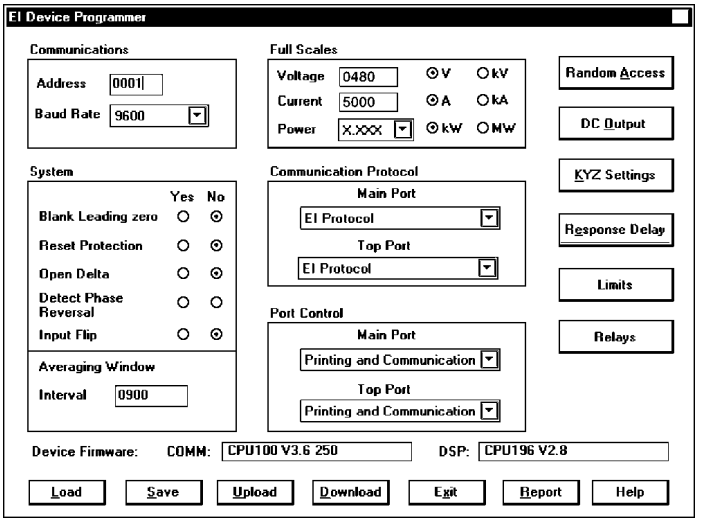
- CPS: characters per second
- Elapsed (Time): Length of time download has taken so far.
- Estimated (Time): Estimated total length of time for download.
- Bytes Received: number received / total number
- Depending on the log type:
  - Historical: Total Snapshots: Total number of snapshots in the log.
  - Event I/O: Total E:*nn*/H:*n*: Total number of event records and linked historical records.
  - Waveform: Total W:*nnn*/H:*nn*n: Total number of waveform records and linked historical records.
- Msg (Message): Received Block *#nnn.*
- When you receive a message stating that the historical, event I/O and waveform downloads have been successful, click OK.

Futura+
Device Programming

EIG Device Programmer

To program the EIG device, on the menu bar select Tools, EIG Programmer.

- Selections you make in this screen *will not* take effect until you click the Upload button to send the settings to the Futura+ (after you have already connected to the Futura+).
- Warning: It is possible to make mistakes here that can only be rectified by reprogram- ming the Futura+ through the optional P34 display (which is standard on the PDA 1000).



Communications

- Address: The Futura+ can be programmed with a unique four-digit address (0001 through 9999). Futura+ monitors are shipped with address 0001 and a baud rate of 9600, unless otherwise specified. To change the Futura+'s address, establish a connection (using the current address) and upload the new address to the device. In a Modbus RTU or ASCII system, valid addresses are limited to 0001 through 0247.

- Baud Rate: From the scroll list, select the device baud rate (1200, 2400, 4800, 9600, 19200 or 38400).

The maximum baud rate of a PDA 1000 is 9600.

Communication Protocols

- Main Port: Side Download Port (Futura+ and PDA 1000)

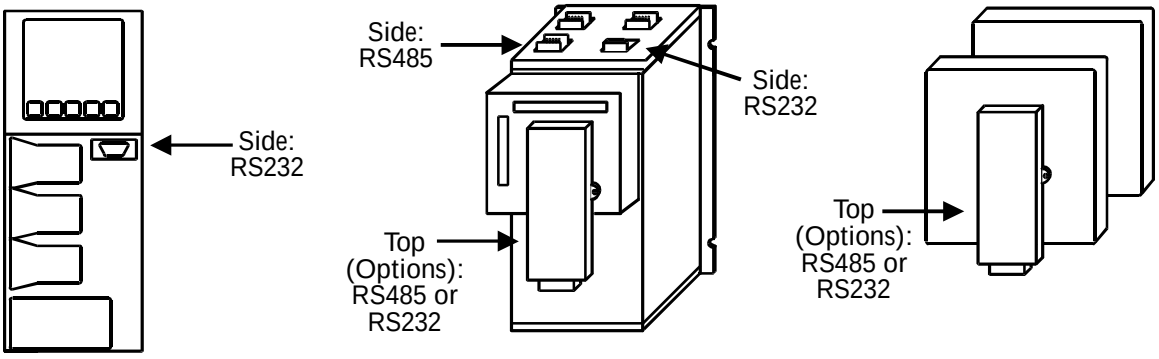
  - This port only supports EI protocol, which is used by all EIG software.

  - The maximum baud rate is 38400.

  - The interfaces to this port are labeled J2-1 (RS232) or J2-2 (RS485). (Both access the same port; only one can be used at a time.)

  - This port handles downloading, uploading and programming.

PDA 1000 **FUTURA+** **DMMS 300**



■ Polling Port: Top Port

The top (polling) port is an option for the Futura+ and DMMS 300. For this port to function, the monitor must also be equipped with the appropriate RS232 or RS485 communications interface.

- Select from the following protocols:

  — DNP 3.0

  — EI Protocol: Used by all EIG software, such as Futura+ Communicator and Power System Supervisor.

  — Modbus (ASCII): Modicon ASCII protocol.

  — Modbus (RTU): Modicon binary protocol.

- The maximum baud rate is 9600.

If the baud rate of the main port is set at 9600 or greater, the baud rate of the top port will default to 9600.

- In a Futura+, this port handles only real-time data polling. (With either Modbus protocol, some programming functions can be handled.) In a DMMS 300+, this port handles real-time data downloading and programming.

Port Control (for Main and Top Ports)

For either port, select Printing and Communication or Communication Only.

■ Communication Only: Prevents (accidental) meter keypad input from interfering with communications.

■ Printing and Communication: Used for troubleshooting. (See *Troubleshooting: Low-Level Access.*)

System

- Toggle the following options on and off by selecting Yes or No. If you select *Yes:*

  - Blank Leading Zero: Leading zeros will appear as blanks (on the Futura+'s display).

  - Reset Protection: A password must be entered (through the keypad) before it will be possible to use the keypad to reset maximum/minimum and hour readings. (This password will not affect software resets.)

  - Open Delta: If you are using an open-delta connection (between the meter and the PTs and CTs), check Yes to disable the phase-to-neutral readings on the Futura+ display. (For more information, see the *Futura+ Installation and Operation Manual.*)

  - Detect Phase Reversal: If a phase reversal is detected, the Limit 1 (LM1) light on the Futura+'s optional display will blink. If you select Yes, you can then use the Current Set Points screen to link the occurrence of a phase reversal to the tripping of a relay output.

  - Input Flip: This will change the contact-sensing status from N.O. (normally open) to N.C. (normally closed).

	L100 Contact Sensing		L200 (All) and L100 DC Sensing	
Setting	N.O.	N.C.	N.O.	N.C.
Yes	on	off	off	on
No	off	on	on	off

- Averaging Window Interval: This is the four-digit interval (in seconds) over which average readings are to be calculated for volts, amps and power functions.

Full Scales

The Futura+ uses a scaling factor to convert secondary measurements to primary readings. To set full scales, you must know the PT and CT ratios relative to the full-scale secondary values of 120V (or 75V or 300V) and 5A.

For a table of full-scale settings for typical voltages, see *Appendix 3.* For more detailed information, refer to the *Futura+ Installation and Operation Manual.*

If the PT ratio is 4:1, the CT ratio is 100:1 and the Futura+ is calibrated for 120V and 5A:

(PT Ratio)(V) = Full-Scale V	(CT Ratio)(A) = Full-Scale A
(4/1)(120V) = 480V = 0480V	(100/1)(5) = 500A = 0500A

- Programming Full Scales for Voltage, Current and Power

  Because the Futura+ bases its power calculation on the full scales of the voltage and current, you may need to adjust the resolution (decimal-point placement) of the power.

  For example, if the PT=480/120, the CT=500/5 and there are 3 phases:
  (PT)(CT)(number of phases)=power
  (480)(500)(3)= 720 kilowatts = 0720kW (full scale)
  Therefore, you would select XXXX kW

- Resolution: 2000 Counts

  - Where the load is normally very low, increase the watt resolution by moving the decimal point to the left.

  - If the FSW is too small a value for a megawatt meter, move the decimal point (1.440MW = 1440kW): Change X.XXX MW to XXXX kW.

  - If the FSW is too large a value for a kilowatt meter (the range is 0000 to 2000 *with the decimal point omitted*), change it to a megawatt meter (43200kW = 043.2MW).

The labels on your Futura+'s display should reflect the selected scales.

  - FSW (full-scale wattage) is the product of FSV (full-scale voltage), FSA (full-scale amperage and the number of phases: FSW=(FSV)(FSA)(number of phases).

Device Firmware

Each power monitor has two types of firmware:

- COMM: The version of the connected power monitor's communications firmware (CPU1000 V4.0 250, for example).

- DSP: The version of the connected power monitor's digital signal processing firmware (CPU 196 V2.8, for example).

Storing and Retrieving Device Programming

- Load: To load programming information from disk into the EIG Device Programmer screen, click Load. In the Open screen, select a device programming (.PRG) file and click OK.

- Save: To save the information displayed in the EIG Device Programmer screen to disk, click Save. In the Save As screen, enter a file name with a .PRG extension (or select one and opt to overwrite it) and click OK.

- Upload: To send the information displayed in the EIG Device Programmer screen to the Futura+, click Upload.

  - In the Programming EIG Device screen, you will be asked to confirm (or change) the address of the device you want to program (which you may or may not be changing in the Address box in the Communications section). Click OK to verify that you want to reprogram the Futura+.

  - Once the Upload screen reads "Device Programmed," click OK to continue. (If the error message "No device at this address" appears, click OK. Then click Upload and correct the device address.)

- Download: To retrieve device programming from the (connected) Futura+, click Download. In the Programming EIG Device screen, you will be asked to confirm (or change) the CURRENT device address. Click OK to verify that you want to retrieve (download) programming from the Futura+. (If the error message "No device at this address" appears, click OK. Click Download again and check that the device address is correct.)

- Exit: To leave programming mode (the EIG Device Programmer screen), click Exit.

- Report: To generate a text file version of the programming data, click Report. In the Save As screen, enter a file name with a .TXT extension (or opt to overwrite an existing one) and click OK. This exports the programming data in a format that is readily accepted by other software.

Random Access

WARNING: Random Access is not required for normal operation and is designed to be used *only* with the direction and supervision of an EIG engineer or technician. *Inappropriate use of this feature, which makes otherwise inaccessible areas of the programming block available, may disable communications or render a meter inoperable.*

DC (Analog) Output

This feature is for use only with a Futura+ equipped with a 0-1 or 4-20mA analog output board. (It cannot be used with DMMS 300+ analog outputs; the PDA 1000 does not have an analog output option).

After connecting to the Futura+ device, on the menu bar, select Tools, EIG Programmer and click the DC (Analog) Output button. Use the DC Output Calibration screen to assign channels to analog outputs and calibrate and test analog outputs. (For more information, see the *Futura+ Installation and Operations Manual.*) The procedure is to:

- Select a port (or channel).
- Assign a function to the port (using the Change Port Function button).
- Save the setting. You will receive a message that the command has been sent successfully.
- Using an ammeter, calibrate (adjust) the port.
- Verify the calibration (an external portable DC ammeter must be correctly connected to the port to view the results):
  - Select a port to test.
  - Select the test type from the test mode list box. (This selection will be used by all ports until another test mode is selected. In other words, if you select Low-End Output, all channels will output the low end of the scale):

    Low-End Output (–1 or 4mA)
    bidirectional, –1mA (Ports 0 through 2)
    unidirectional, 0mA (Ports 3 through 9)

    Midpoint Output (0 or 12mA)
    bidirectional, 0mA (Ports 0 through 2)
    bidirectional, .5mA (Ports 3 through 9)

    High-End Output (1 or 20mA)

Warning: The Futura+ will not leave test mode until you terminate it by selecting another option (Save or Port), or exiting.

Ports and Functions

The function assigned to each port is indicated on the left side of the screen. To alter the function of a port:

- Select a port (P0 through P9).
- Select a function (Volts AN, BN, CN, AB, BC, or CA; Amps A, B, C, or N; Watts Unidirectional or Bidirectional; Var Unidirectional or Bidirectional; VA; Power Factor; or Frequency 60Hz or 50Hz).
- Click the Change Port Function button.

Only one frequency (either 50 *or* 60Hz) can be assigned at any given time.

Be sure to assign the Power Factor and Frequency functions to bidirectional ports (Ports 0 through 2).

Adjustments (Calibration)

- High End (Coarse and Fine) and Low End (Coarse and Fine) adjustments are usually done on a bench using a calibrated DC ammeter.
- The adjustment buttons are arranged in two sets (high and low end) of Up and Down arrows.
  - The high end = 1mA (or 20mA).
  - The low end = 0mA (unidirectional), –1mA (bidirectional), or 4mA.
- Each set of adjustment buttons has coarse and fine adjustments.
  - Click Up to increase the adjustment or Down to decrease it.
  - Alternatively, use the PgUp/PgDn and Up and Down arrows on the keyboard to make these adjustments.
- Once you have made an adjustment, you will receive the message: “Coarse (or Fine) increase (or decrease) at High (or Low) End. Command sent successfully.”

Once you have finished calibrating the port, be sure to save the settings.

Auto Program

From the list box, select 10 channels (1 or 20mA) to recalibrate the Futura+ to factory values. (Before you use this function, please contact EIG for more information.)

Volt Setting (Back Module)

Match this setting to the label on the DSP (power) module connected to the Futura+. From the list box, select 75V (Suffix L), 120V (Suffix 120) or 300V (Suffix G).

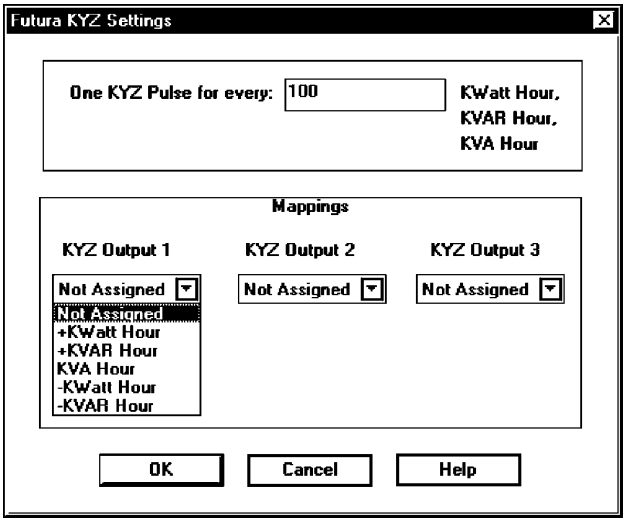
Editing and Saving Calibration Settings

- Undo All: If you have made changes to this screen but not yet sent the changes to the Futura+ (by clicking Save), click Undo All to revert to the previously saved settings.
- Save: Click Save to upload the settings and adjustments to the Futura+. Once you receive the message "Command sent successfully," click Exit.
- Exit: Click Exit to leave the DC Output Calibration screen. When you are prompted to save any changes before you exit, click OK. (If you neglected to save the new settings, click Cancel. When you're back in the EIG Device Programmer screen, click Save.)

KYZ Settings

Use this screen to set or change the KYZ output settings of a Futura+ that has been equipped with the optional KYZ board (and set for KYZ). Once you have connected to the Futura+ device, on the menu bar, select Tools, EIG Programmer and click the KYZ Settings button. This allows you to set the pulse scale and map the function for each channel. Accept modifications by clicking OK; ignore them by clicking Cancel.

The Futura+ will not be programmed with these settings until you upload the programming to it by clicking Upload in the EIG Programmer screen. (See *EIG Device Programmer.*)



Pulse Scale

The pulse scale represents the magnitude of each transition of the KYZ relay. Select the number of hours each KYZ pulse will represent for the three KYZ outputs: One KYZ pulse for every (enter number) kwatt-hour, kvar-hour, or kVA-hour.

Example:

Scaling:	One KYZ pulse for every 20 kwatt-hours
KYZ Output 1:	Mapped to kwatt-hour
KYZ Output 2:	Mapped to –kwatt-hour
KYZ Output 3:	Mapped to kVA-hour

If, over the course of an hour, +kwatt-hours increased by 400, –kwatt-hours increased by 20 and kVA-hours increased by 1200, during that hour: Output 1 would have pulsed 20 times (400/20), Output 2 would have pulsed once (20/20) and Output 3 would have pulsed 60 times (1200/20).

A pulse is *one* change of state: from N.O. (normally open) to N.C. (normally closed) *or* from N.C. to N.O.

Mappings

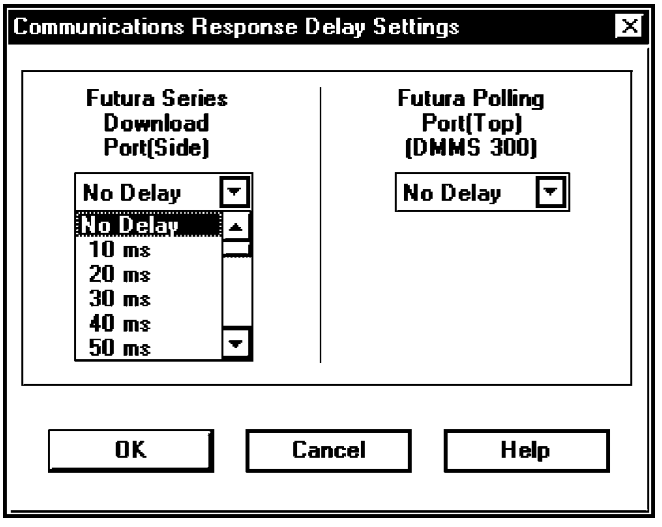
Use mappings to assign hour function to relays. Each KYZ output (1, 2 and 3) can be assigned to output any of the following:

- Kwatt-hour
- Kvar-hour
- KVA-hour
- –Kwatt-hour
- –Kvar-hour
- Nothing (not assigned)

Response Delay

Click Response Delay to display the Communications Response Delay Settings screen. Use this to specify the delay the Futura+ is to use before responding to queries. When operating an EIG device over a two-wire RS485 (half-duplex) connection, the RS485 converter (or card) may require a delay before it can receive information. If you do not program a delay, the Futura+ will respond as quickly as possible, and data may be lost (due to the two-wire converter's delay in changeover from transmit to receive mode).

The required delay will depend on your equipment and/or the software that is conducting the polling. If you are losing information, enter a long delay.



- Download Port: From the scroll list on the left, select a delay of from None (or 0) to 400ms (available in 10ms increments) for the download port (of a Futura+ or PDA 1000).

- Polling Port: From the scroll list on the right, select a delay for the polling port (which is an option for Futura+ and DM series power monitors).

Limit Programmer

Limits

Use the Limit Programmer to program the limits and establish links between the limits and relays. Each set point can be linked to any combination of relays (1 through 3) on your Futura+.

If your Futura+ is set up to generate KYZ pulses, the linked relays will not respond to exceeded set points.

- Limits (or set points) are divided into four groups (voltage, current, power and THD), each of which can be set to be triggered by instantaneous or average readings.
- Previous and Next: Use the <<Previous and Next>> buttons to cycle through the four set-point screens.
  - Exit: Click Exit to save your changes, leave the Limit Programmer module (the four set-point screens) and return to the main EIG Device Programmer screen.

Warning: Make sure that full scales are set for the device (in the EIG Programmer) before you establish limits; the limits are dependent on the full scales. If you change a full scale after you set up limits, the results may be unpredictable. The labels and decimal-point placement on the set-point screens will reflect your full-scale settings.

Set-Point Groups

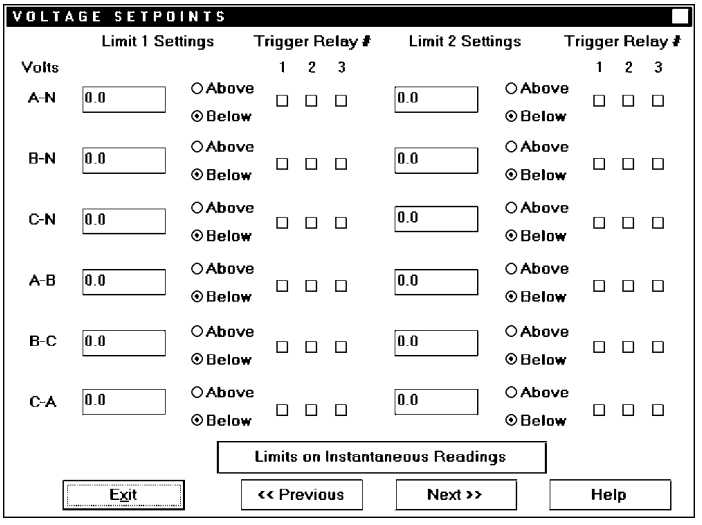
The Limit Programmer is divided into four groups of set points.

- Voltage

  - This consists of six voltage phase-to-neutral limits (two limits each for V AN, V BN and V CN) and six voltage phase-to-phase limits (two limits each for V AB, V BC, V CA).

  - For each limit, specify whether it is above or below, and, optionally, select any combination of trigger relays (1, 2 and 3).

  - Click the large button near the bottom to toggle "Limits on Instantaneous Readings" and "Limits on Average Readings."



  - To access other set points or exit:

    — Click Next > > to display the Current Set Points.

    — Click < < Previous to display the Total Harmonic Distortion Set Points.

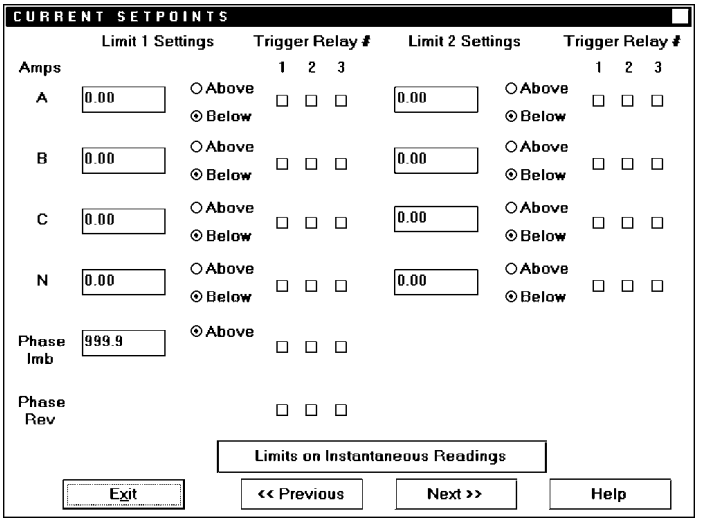
    — Click Exit to return to the main EIG Device Programmer screen.

■ Current

- This consists of eight current limits (two limits each for Amps A, Amps B, Amps C and Amps N) and one phase-imbalance limit.

- For each current limit, specify whether it is above or below, and, optionally, select any combination of trigger relays (1, 2 and 3). (You can also have a phase reversal trigger a relay. See *EIG Programmer.*)

- Click the large button near the bottom to toggle "Limits on Instantaneous Readings" and "Limits on Average Readings."



- To access other set points or exit:

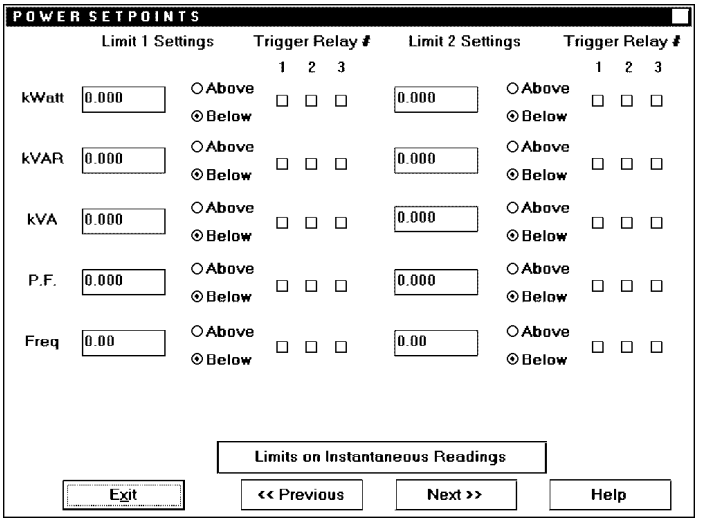
  — Click Next > > to display the Power Set Points.

  — Click < < Previous to display the Voltage Set Points.

  — Click Exit to return to the main EIG Device Programmer screen.

■ Power

- This consists of two limits each for watt (Mwatt), var (Mvar), VA (MVA), power factor and frequency.
- For each limit, specify whether it is above or below, and, optionally, select any combination of trigger relays (1, 2 and 3).
- Click the large button near the bottom to toggle "Limits on Instantaneous Readings" and "Limits on Average Readings."



- To access other set points or exit:

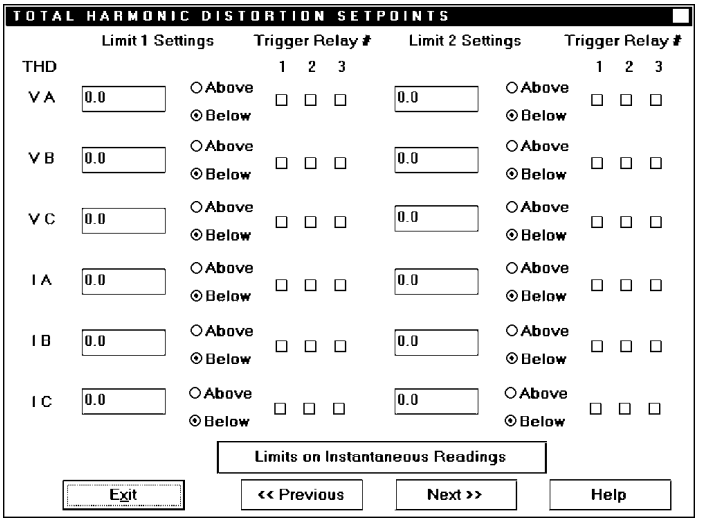
  — Click Next > > to display the Total Harmonic Distortion Set Points.

  — Click < < Previous to display the Current Set Points.

  — Click Exit to return to the main EIG Device Programmer screen.

■ Total Harmonic Distortion

- This consists of six limits for voltage (two each for Volts A, B and C) and six for current (two each for I A, B and C).
- For each limit, specify whether it is above or below, and, optionally, select any combination of trigger relays (1, 2 and 3).
- Click the large button near the bottom to toggle "Limits on Instantaneous Readings" and "Limits on Average Readings."



- To access other set points or exit:

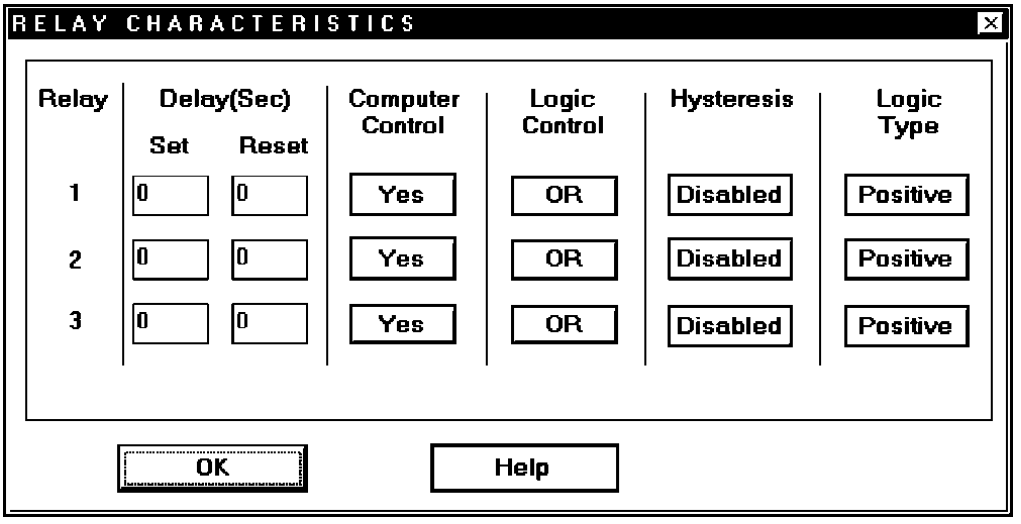
  — Click Next > > to display the Voltage Set Points.

  — Click < < Previous to display the Power Set Points.

  — Click Exit to return to the main EIG Device Programmer screen.

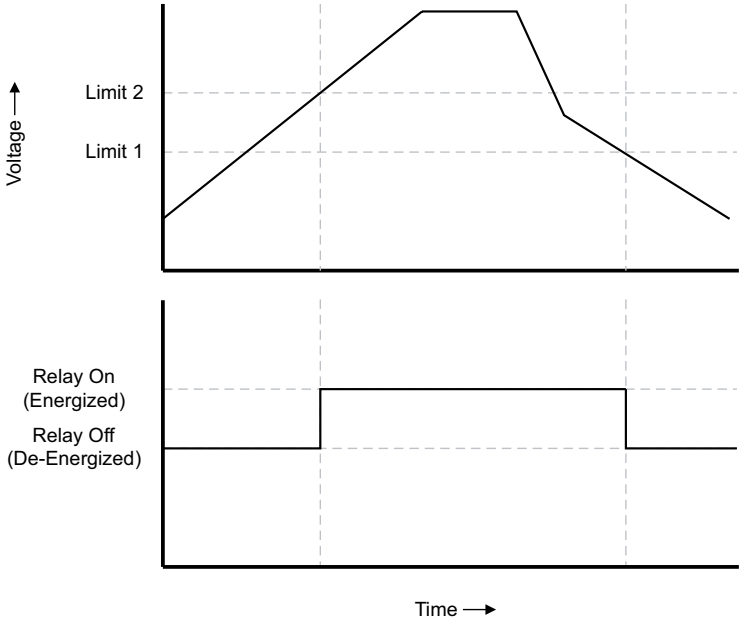
Relays

Use this to set or change the characteristics of relays. Each of a Futura+'s three relays (1, 2 and 3) can be programmed individually.



- Delay (in seconds):
  - Set: Delay before setting (energizing) the relay when the linked limit is exceeded.
  - Reset: Delay before resetting (de-energizing) the relay when the linked limit is no longer being exceeded.
- Computer Control: Use this Yes/No toggle to enable or disable the control of relays through the software.
- Logic Control: Use this AND/OR toggle for logic control.
  - AND: For the relay to set, all limits linked to this relay must be exceeded.
  - OR: For the relay to set, at least one limit linked to relay must be exceeded.

- Hysteresis: This Enabled/Disabled toggle uses two limits to determine whether the relay will be turned on or off. When hysteresis is enabled (and two limits are set), the relay will not be turned on until the value of the parameter exceeds the *higher* limit. The relay will not be turned off until the value of the parameter falls below the *lower* limit.



- Logic Type: This is a Negative/Positive toggle.

  - Positive

    — Relay Reset Position: Continuity between the common and N.C. (Normally Closed) pins.

    — Relay Set Position: Continuity between the common and N.O. (Normally Open) pins.

  - Negative

    — Relay Reset Position: Continuity between the common and N.O. (normally open) pins.

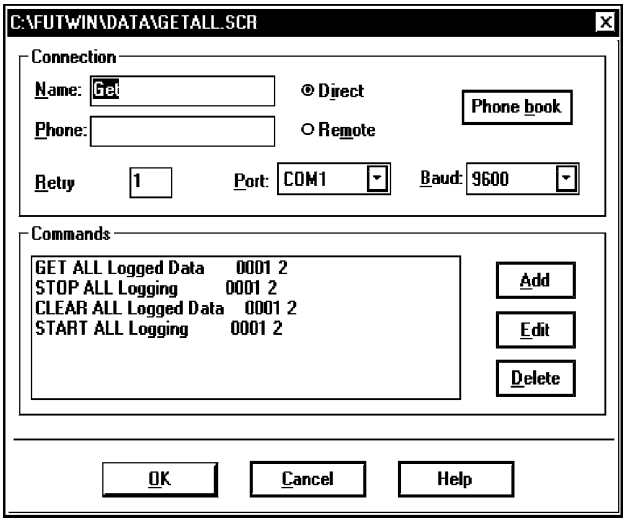
    — Relay Set Position: Continuity between the common and N.C. (normally closed) pins.

  - OK: Click OK to return to the EIG Device Programmer screen.

Using Scripts and the Scheduler

Scripts

Scripts automate the retrieval of data from Futura+ devices. Each script may use only one COM port connection (location or phone number), but may contain up to 100 commands. Up to thirty scripts can be assigned to each schedule (see *Scheduler,* below).



Creating a Script

- On the menu bar, select Script, New.
- Enter a name for the script. (The default is *New.*)

- In the Script:*noname.scr* screen, enter the following (or click Phone Book to have it copied from the phone book):
  - Connection: Choose the type of connection (Direct or Remote).
  - Phone: If applicable, enter a phone number.
  - Retry Count: The maximum number of attempts to make a connection.
  - Port: Select a port (COM1, COM2, COM3, or COM4).
  - Baud Rate: Select a baud rate (1200, 2400, 4800, 9600, 19200, or 38400).
- To add commands to a script:
  - Click Add.
  - In the Script Add Command screen:
    - Choose a command from the list box. (See *Script Commands.*)
    - Meter Address: Enter the device address.
    - Retry Count: Enter the maximum number of times the command is to be retried (which may be necessary if there are communication interruptions, phone-line problems, etc.)
    - Click OK to add the command or Cancel to omit it.
  - One you have added all the commands to the script, click OK. In the Save As screen, enter a file name for the script (using an .SCR extension), or opt to overwrite an existing script. Click OK.

Editing a Script

- If the script *is not* on screen:
  - On the menu bar, select Script, Edit.
  - In the Open screen, select or enter the file name of the script and click OK.
- Once you have the script on screen:
  - Edit: To edit a command in a script, highlight the command and click Edit. In the Script Edit Command screen, you can then alter the command, meter address or retry count.

- Delete: To delete a command in a script, highlight the command and click Delete.
- Add: Click Add to add another command to the script.
- OK: When you're done editing the script, click OK to save your edits (or Cancel to have them ignored).

Running a Script

- On the menu bar, select Script, Run.
- In the Open screen, select or enter the file name of the script and click OK.

Canceling a Script

To cancel a script, just click Cancel. (It may take some time to take effect.)

Aborting a Script

To abort a script that is in progress, on the menu bar, select: Script, Abort Script. (It may take some time to take effect.)

Script Log

To determine whether a script has run successfully, and if not, why not, on the menu bar, select: File, Open, Script Log. Highlight a script log (*.SLG) file name and click OK. The script log also lists the date and time the script was initiated.

Script Commands

CLEAR	All Logged Data	Erases all historical, event I/O and waveform data from the Futura+.
	Event Logging	Clears the Futura+'s event I/O log.
	Historical Logging	Clears the Futura+'s historical log.
	Hour Values	Resets all of the Futura+'s hour readings.
	Max/Min Values	Resets all of the Futura+'s maximum and minimum values.
	Waveform Logging	Clears the Futura+'s waveform log.
GET	All Logged Data	Retrieves the historical, event I/O and waveform data logs from the Futura+.
	Event Logging	Retrieves the event data log from the Futura+.
	Historical Logging	Retrieves the historical data log from the Futura+.
	Max/Mix and Hour Readings	Retrieves the maximum/minimum and hour readings from the Futura+.
	Waveform Logging	Retrieves the waveform data log from the Futura+.
START	All Logging	Starts the logging of historical, event I/O and waveform data by the Futura+.
	Event Logging	Starts the logging of event I/O data by the Futura+.
	Historical Logging	Starts the logging of historical data by the Futura+.
	Waveform Logging	Starts the logging of waveform data by the Futura+.
STOP	All Logging	Stops the logging of historical, event I/O and waveform data by the Futura+.
	Event Logging	Stops the logging of event I/O data by the Futura+.
	Historical Logging	Stops the logging of historical data by the Futura+.
	Waveform Logging	Stops the logging of waveform data by the Futura+.

Scheduler

The Futura+ Communicator's Scheduler automatically runs a script or scripts at specified times or intervals.

For the Scheduler to work, Futura+ Communicator must be running.

Starting and Stopping the Scheduler

The Scheduler is normally Off.

- To start the Scheduler:
  - On the menu bar, select Script, Scheduler.
  - In the lower-left corner of the Scheduler screen, select On.
  - To edit a script's frequency, select the script and click Edit. (Clicking Edit *without* selecting a script is the equivalent of selecting Add script. See *Adding Scripts to the Scheduler,* below.)
- To stop the Scheduler:
  - On the menu bar, select Script, Scheduler.
  - In the lower-left corner of the Scheduler screen, select Off.

Adding Scripts to the Scheduler

- On the menu bar, select Script, Scheduler. In the Scheduler screen, click Add.
- In the Script Run-Time screen:
  - Select the Frequency with which the script is to be run, and set the frequency value in the edit box to the right:
    - — Monthly by Date: Once a month, on the *n*th day of the month. From the scroll list, choose the date (01 to 28).
    - — Monthly by Day: Once a month, on the *n*th week and selected day of the week. From the scroll list, choose the week (1st through 4th) and day (Sun through Sat) combination.
    - — Date Once: In the box to the right, enter the year, month and day (*yy-mm-dd*). (Please note that the *year* is listed first.)
    - — Weekly: Once a week on the specified day. From the scroll list, choose the day (Sun through Sat).
    - — Interval (*hh*:*mm*): Every *hh* hours and *mm* minutes. In the box to the right, enter the interval (00:01 through 99:99).
  - Run Time: Enter the first run time in the edit box (time to start for Interval selection; time of day for all the other selections).
  - Script: Enter a name for the script (*.SCR) or choose to overwrite an existing one. (Note: Be careful. It is possible to enter an invalid path.)
  - OK: Click OK to accept the settings.

Adding the Scheduler to Windows 95 Startup

- In Windows Explorer, find C:\WINDOWS\Start Menu\Programs\StartUp (or equivalent).
- Right click on the Contents area and select New, Shortcut.
  - In the Create Shortcut screen, click Browse.
  - Highlight the FUTWIN directory and click Open.
  - Highlight FUT.EXE and click Open. Click Next.

- In the Select a Title for the Program screen, enter a name for the program in the text box ("Futura+ Communicator," for example.)

- Click Finish.

■ Back in Windows Explorer, right click the name of the new shortcut and select Properties.

- In the Shortcut tab, in the Target text box, after C:\FUTWIN\FUT.EXE insert a space and -S (or \S).

- Click Apply, then OK.

■ To test, restart Windows. Futura+ Communicator should start automatically and the Scheduler should be running.

Removing the Scheduler from Windows 95 Startup

■ In Windows Explorer, highlight the Scheduler's shortcut name and hit the Delete key.

■ Click Yes to verify that you want to send it to the Recycle Bin.

Other Windows 95 Options

■ Command Line Options

Direct Connection FUT.EXE /VS A1 [device address] [baud rate] [port]
Device Address: 0001 through 9999
Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400
Port: COM1, COM2, COM3 or COM4

Example: **FUT.EXE** /VS A1 0001 9600 COM2

■ Log File Association: Associate a log file with FUT.EXE to have that file automatically loaded when you start Futura+ Communicator. In Windows Explorer, drag an *.HLG, *.ELG or *.WLG file to FUT.EXE to have that file automatically opened when Futura+ Communicator is started up.

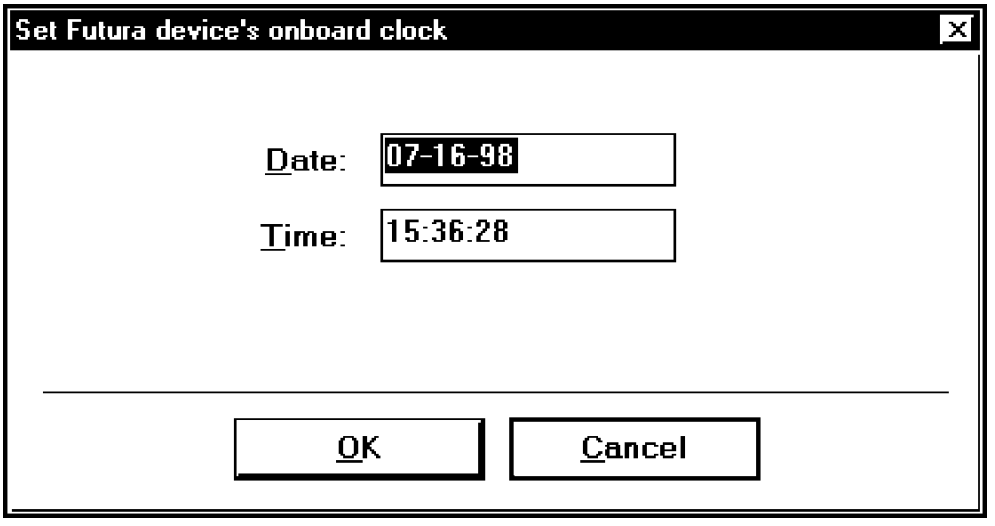
Real-Time Readings

Futura+'s Clock

Setting a Futura+'s Date and Time

Once you have established a connection with the Futura+:

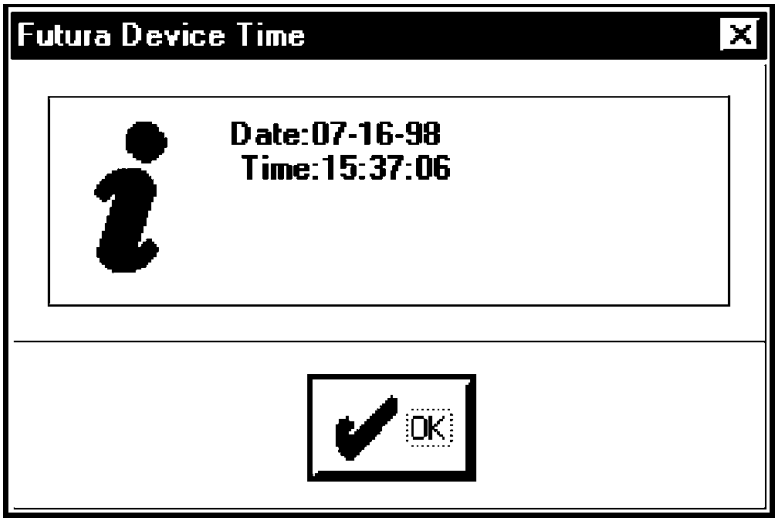
- On the menu bar, select Meter, Set Futura+ Device Time.
- When you are warned that setting the time will clear the Futura+'s historical log, click OK to proceed (or Cancel to abort).
- In the Set Futura+ Device's Onboard Clock screen, enter a date (*mm-dd-yy*) and/or time (*hh*:*mm*:*ss*) and click OK (or Cancel.)



Viewing a Futura+'s Date and Time Settings

Once you have established a connection with the Futura+:

- On the menu bar, select Meter, Retrieve Futura+ Device Time.
- The date (*mm-dd-yy*) and time (*hh*:*mm*:*ss*) used by the Futura+ will be displayed. Click OK to continue.



Data Polling

Harmonics (Real-Time THD and Instantaneous Polling)

- On the menu bar, select Tools, Real-Time THD/Instantaneous Polling.
- Use the Real-Time THD/Instantaneous Polling screen to poll the connected meter and display:
  - Instantaneous Values (V_{AN}, V_{BN}, V_{CN}, V_{AB}, V_{BC}, V_{CA}, Frequency, Power Factor, I_A, I_B, I_C, I_N, Watt, Var and VA)
  - Maximum Demand (Watt, Var, I_A, I_B, I_C)
  - Total Hours (Watt and VA): Watt-hour and VA-hour counters.
  - THD Graphs: Select a graph type.
    - — Spectrum (THD bar graph)
    - — Waveform (THD waveform graph)
    - — Harmonic Values (actual THD values and phase angles)
  - Maximum and minimum values for a selected channel (THD, Max, Min)
  - Face Plates: Units assigned to measurements. (See *EIG Device Programmer.*)
  - Select a channel (V_{AN}, V_{BN}, V_{CN}, I_A, I_B, or I_C) by clicking the corresponding radio button.
- If you are using an RS485 bus with multiple Futura+ devices, you can change the device address to poll other Futura+ devices: Edit the Address edit box and click Change to have the new address take effect.

Once you exit this screen, the device address will revert to the address in use before you began polling.

During polling, the Done button will be inaccessible (grayed out). You will be unable to exit the screen until the Futura+'s response has been fully processed.

- Print: Click Print to send a copy (a screen capture) of the Real-Time THD/ Instantaneous Polling screen to the printer.

- Done: Click Done to exit the Real-Time THD/Instantaneous Polling screen.

Hour Counters (Instantaneous Polling with Phases)

- Select Tools, Instantaneous Polling with Phases.

- The Instantaneous Polling with Phases screen displays:

  - Instantaneous values (V_{AN}, V_{BN}, V_{CN}, V_{AB}, V_{BC}, V_{CA}, I_A, I_B, I_C, I_N and frequency)

  - THD (V_{AN}, V_{BN}, V_{CN}, I_A, I_B, I_C)

  - Maximum (I_A, I_B and I_C)

  - Phases A, B and C (watt, var, power factor, VA)

  - Maximum Demand (watt, –watt, var, –var)

  - Total Hours (watt, –watt, var, –var and VA).

The hour-counter resolution is 12 digits (5.5 on the display).

- If you are using an RS485 bus with multiple Futura+ devices, you can change the device address to poll other Futura+ devices: Edit the Address edit box and click Change to have the new address take effect. (Once you exit this screen, the device address will revert to the address in use before you began polling.)

During polling, the Done button will be inaccessible (grayed out). You will be unable to exit the screen until the Futura+'s response has been fully processed.
Print: Click Print to send a copy (a screen capture) of the Instantaneous Polling with Phases screen to the printer.

- Done: Click Done to exit the Instantaneous Polling with Phases screen.

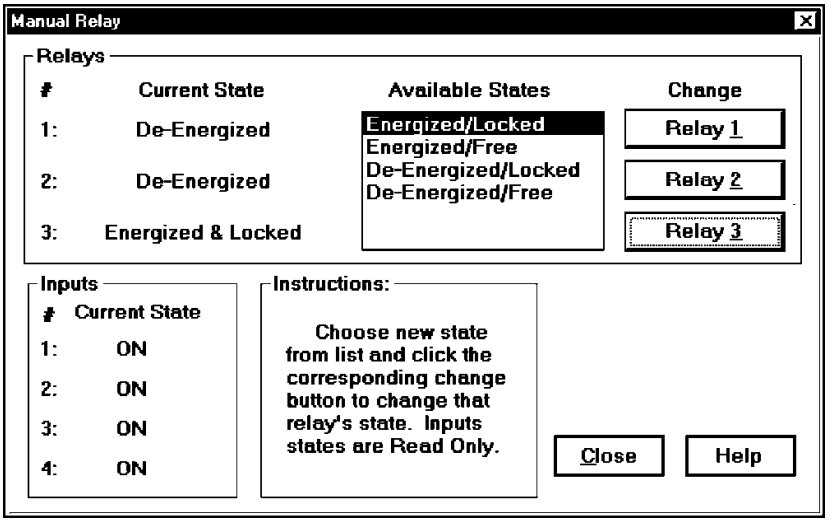
Relay Control and Input Status (Manual Relay)

Relay Control

If your Futura+ is equipped with an event I/O board, you can use the Manual Relay Control screen to display and change the current relay settings and display the state of external inputs.

To manually change the relay settings:

- On the menu bar, select Tools, Manual Relay.
- The Manual Relay screen will display the current states (energized and locked, energized and free, de-energized and locked, or de-energized and free) of the three relays. To change a relay's setting, highlight a state and in the Change column and select Relay 1, 2 or 3.



Input Status

The Manual Relay screen also displays the state of inputs (1 through 4)

- On the menu bar, select Tools, Manual Relay.
- The bottom left of the screen will list the four inputs and their current states (OFF, ON or N/A).

The state of inputs can only be viewed from this screen; they cannot be altered.

This feature is not available for the DMMS 300, which does not accept inputs.

Troubleshooting:
Low-Level Access

Low-Level Access is a tool for testing communications and solving communication problems. To use this tool: On the menu bar, select Tools, Low-Level Access.

EI Protocol Commands

ASCII EI protocol commands start with the letter "R," followed by a four-digit address (0001-9999). The last two characters comprise the command and subcommand.

For example, to request an ASCII dump from an EIG device with an address of 3:

R0003S1	R	command start
	0003	device address
	S	command: ASCII dump
	1	subcommand: Page 1 (of ASCII dump)

Global Address

There is a global address that all EIG devices respond to: +-*/. To use the global address to request an ASCII dump from *any* EIG device:

R+-*/S1	R	command start
	+-*/	device address (global)
	S	command: ASCII dump
	1	subcommand: Page 1 (of ASCII dump)

Power Graphs: Advanced Tools for Reporting and Analysis

If you have an historical log on screen in Futura+ Communicator, to immediately display a Power Graph of that log: On the menu bar, select Graphs, Power Graphs.

Preparation for Graphing

- If you have a Power Graph on screen, first close the file: On the menu bar, select File, Close.
- If you haven't done so already, download an historical log file.
- Convert the historical log file into a data-log file (.MDB): On the Power Graphs menu bar, select File, Open, Historical Log File. (This may take a couple of minutes.) The Select Parameter to Graph screen will then appear.

Once an historical log had been converted into a data log, you can open the data log directly: If you have a data file open, close it. Then, on the Power Graphs menu bar, select File, Open, Data Log File.

Selecting Items for Graphing

- Choose the Instantaneous or Average Readings tab.
- Select a category (Current, Frequency, or Apparent Power, for example).
- Within the category, check off the elements (phases and/or total) you want to graph.
- Click the Circle or XY Graph button.

To change the graphed items, on the Power Graphs menu bar, select New Graph and again select the items you want to graph.

Circle and XY Graphs

In the Circle or XY Graph screen:

- Optionally, change any of the following and click Redraw:
  - Specify the number of days (from 1 to 32) the graph is to span: Edit the field to the right of Number of Days to View.
  - Set the starting point of the graph by selecting a starting Date and Time from the list box.
  - Magnitude: Adjust the Maximum and/or Minimum values.
- Use the Forward and Reverse buttons to move ahead or back a day at a time. (Enable Move by Sample to have Forward and Reverse move a record at a time.)

Options

- Select Colors: You can customize the colors of circle and XY graphs independently.
  - To change the colors, on the Power Graphs menu bar, select Options, Colors.
  - In the Circle (or XY) Graph Color Assignments screen, select an item to change (1 through 6, background or foreground) and use the three sliders to select a color.

To save a color scheme as the default, click Set as Default.

  - Once you've finished selecting colors, click Close. In the Power Graphs screen, click Redraw to apply these changes to the graph.
- Select Labels: Use this to apply a descriptive or informative label to a graph. To make these labels (for Lines 1 and 2) available for later use, click Set Default.

Printing

To print a Power Graph you have on screen, click Print.

- Color Printout: Enable Color Printout if you're using a color printer (or want to print shades of gray on a black-and-white printer).

If gray scale makes the graph difficult to read, disable Color Printout.

- Use Symbols: Enable Use Symbols if you're using a black-and-white printer or want to use symbols (rather than colors) to distinguish graphed items.

Appendices

Appendix 1:
Using Futura+ Communicator with a DMMS 300+

The following functions are supported by Futura+ Communicator when it is used to communicate with and control a DMMS 300+.

Maximum and Minimum Readings

- Resetting
- Retrieving
- Viewing
- Printing
- Exporting

Hour Counters

All DMMS meters have +watt-hour and –watt-hour counters. The DMMS 300+ also has a +VA-hour counter; the DMMS 300+R also has +var-hour and –var-hour counters.

- Resetting
- Retrieving
- Viewing
- Printing
- Exporting

DMMS 300+ Device Programming

Use the EIG Device Programmer instead of the Limit and Relay Programmer.

- Communications
  - Device Address
  - Baud Rate (maximum of 9600)
  - Protocol (”top” port only)
  - Response Delay (limited to “top” port)
- Limits and Set Points (limited to Relays 1 and 2)
- Full Scales

Communicating with the DMMS 300+

- Manual Connection (Direct or Remote)
- Phone-Book Connection (Direct or Remote)

Using Scripts and the Scheduler: Automated Meter Reading

- Scripts (limited to Maximum/Minimum and Hour Counter Readings)
  - Creating and Editing
  - Running
  - Canceling

DMMS 300+ Device Programming

Use the EIG Device Programmer instead of the Limit and Relay Programmer.

- Communications
  - Device Address
  - Baud Rate (maximum of 9600)
  - Protocol (”top” port only)
  - Response Delay (limited to “top” port)
- Limits and Set Points (limited to Relays 1 and 2)
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Communicating with the DMMS 300+

- Manual Connection (Direct or Remote)
- Phone-Book Connection (Direct or Remote)

Using Scripts and the Scheduler: Automated Meter Reading

- Scripts (limited to Maximum/Minimum and Hour Counter Readings)
  - Creating and Editing
  - Running
  - Canceling

- Scheduler
  - Starting
  - Stopping
  - Adding Scripts
  - Removing Scripts
  - Windows Startup: Starting on or Removing From

Real-Time Readings: Data Polling

- Harmonics (Real-Time THD/Instantaneous Polling) (if the meter is equipped with an "H" option, which gives it harmonic capability)
- Hour Counters (Instantaneous Polling with Phases)

All DMMS meters have +watt-hour and –watt-hour counters. The DMMS 300+ also has a +VA-hour counter. *With a DMMS 300+R, +var-hour readings appear in the +VA-hour section.*

- Relay Control (limited to Relays 1 and 2)

Appendix 2:
Identifying the Firmware Versions of a Futura+, PDA 1000 or DMMS 300+

Standard Procedure

- Establish a connection with the power monitor.

If the bottom of the main screen shows "No Device," a valid connection to the power monitor has *not* been made.

- On the menu bar, select Tools, EIG Programmer.

  - The bottom left of the EIG Device Programmer screen (next to "Device Firmware: COMM:") will indicate the version of the connected power monitor's communication firmware (CPU1000 V4.0 250, for example).

  - The bottom right of the EIG Device Programmer screen (next to "DSP:") will indicate the version of the connected power monitor's digital signal processing firmware (CPU198 V3.8, for example).

Alternative Procedure

If you cannot establish communications with your power monitor, see its *Installation and Operation and Programming* manual for an alternative way to identify its firmware versions.

Appendix 3:
Common Full-Scale Settings

Be sure use the same decimal-point position and unit when setting limits.

The actual relationship of the primary to secondary voltages (and/or amperages) is dependent on the power monitor's PT and CT ratios.

Secondary Voltage of 75, 120 or 300V

Primary Voltage	Full Scale	Unit
120	120.0	V
277	0300	V
480	0480	V
4,160	04.16	kV
7,200	07.20	kV
14,400	14.40	kV
38,000	038.0	kV
72,000	072.0	kV
138,000	138.0	kV
345,000	0345	kV

Secondary Current of 1 or 5A

Primary Amperage	Full Scale	Unit
100	100.0	A
200	0200	A
800	0800	A
2,000	2000	A *or*
2,000	02.00	kA
3,000	03.00	kA
4,000	04.00	kA