

ELITEpro™ Recording Poly-Phase Power Meter

DENT Instruments ELITEpro™ recording poly-phase power meter:

- collects data on AC power loads
- monitors up to 4 channels (3-phase 4-wire supply) kW and 600 V
- has internal memory capacity of 128kB (~25,000 records) for standard Elites and 512kB (~100,000 records) for Elites with extended memory
- monitors voltage (volts), current (amps), power (kW), kilovolt-amps (kVA), power factor (PF), kilovolt-amps reactive (kVAr), and energy (kWh).

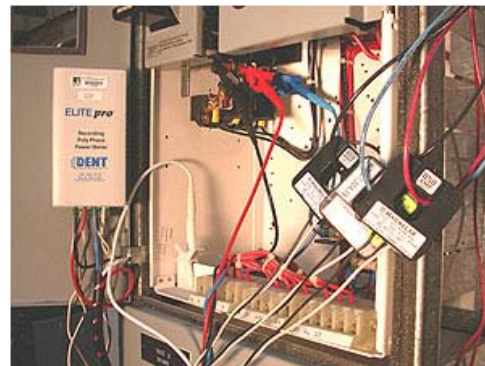


Figure 1 An ELITEpro Logger in the field

Below are detailed notes on the procedures for connecting to the logger, configuring the logger, physical set-up of the device, viewing real-time data, retrieving data, graphing data, and exporting data to a spreadsheet.



Connecting to the ELITEpro Logger

1. **Connect the ELITEpro logger to the computer serial port* with the communication cable.** *Note that some newer laptops do not have serial ports. If your computer does not have a serial port, use a high speed USB-to-serial adapter or connect via modem.
2. **Open the ELOG software.** Double click on the ELOG icon.
3. **Communicate with logger by pulling down the *Logger* menu heading and choosing *Communication, Direct Connect (Null Modem Cable)*.** If prompted to match the Baud rate of the PC with the logger click the *Match Baud Rates* button.
4. When the words; *Logger Connected*, *Logger description* and *ID#* appear in the status menu at the bottom left corner of the computer screen, the Elite is connected and ready to be configured.
5. **If a connection cannot be established, verify that the COM port corresponding to where the serial cable is connected on the PC is selected in the software by pulling down the *Tools* menu heading and choosing *PC Setup*....** Then, in the *Direct Connect* dialog box, pull down the *Port* menu and select the correct COM port. Click *Save Changes* and retry connecting as described in the previous steps.*

** Note that if there is software installed on the computer for a Palm Pilot, digital camera or other type of device that uses the COM port to communicate it may have to be disabled to free up the COM port to communicate with the Elite.*

Configuring the ELITEpro Logger

1. Choose **New** from the **File** menu heading. Select **Setup Table File** and click **OK**. Choose **ELITEpro. (4 channel)** for the **Select a Setup Table Type**.

2. The Setup Table consists of two screens that are accessed with the  or  buttons.

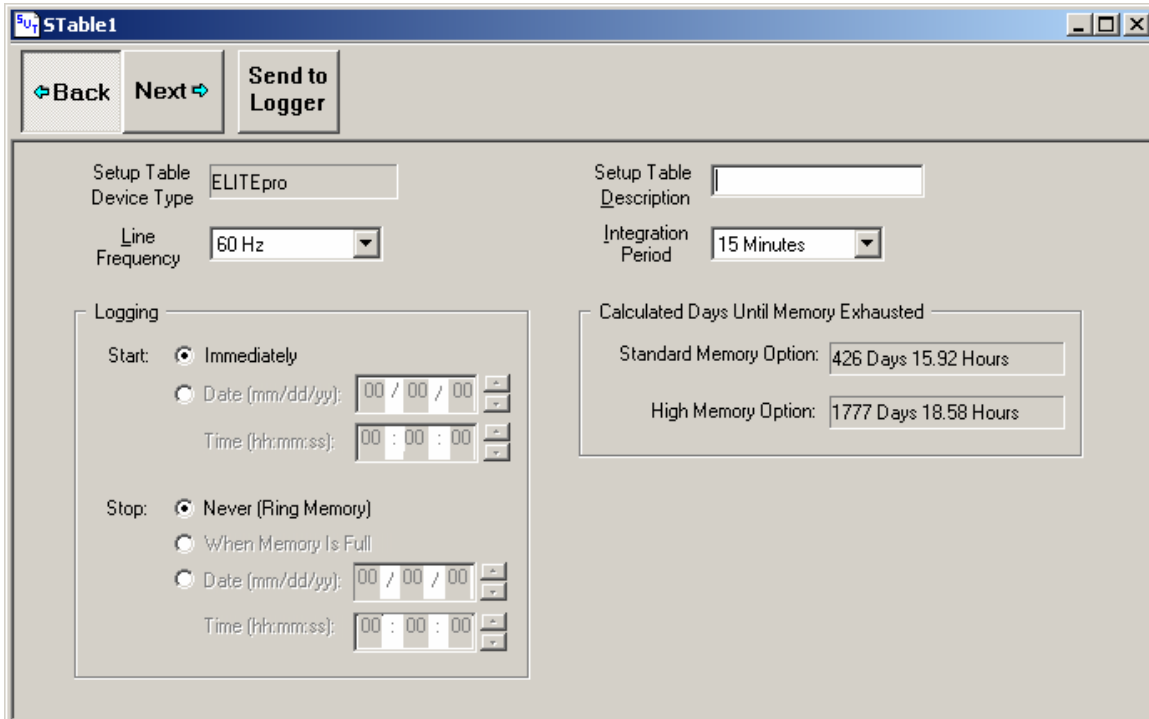



Figure 2 The first logger setup window.

3. **Enter a Setup Table Description.** (figure 2) This is an optional reference name for this particular setup table that can be saved and used in the future to avoid having to re-enter the same information.
4. **Set the *Line Frequency* (figure 2) to 60Hz.** (U.S. standard frequency)
5. **Configure the logging start time (figure 2).**
- Select *Immediately* to begin logging now.
 - Select *Date and Time* to start logging in the future. If the latter is selected, enter the *Date and Time* when logging will begin.
6. **Configure the Logging stop time (figure 2).**
- Select *Never* to set the logger in a “Ring” mode or a continuous loop. When the logger’s memory is full, the oldest records will be overwritten and replaced with the newest records.
 - Select *When Memory Is Full* to stop collecting data when the memory is full.
 - Select *Date and Time* to program logger to stop logging at a specific future date and time.

7. **Select an Integration Period for the study** (*figure 2*). The Integration Period indicates how often a time-stamped data record will be stored into memory.
8. **Verify the amount of available memory for the study** (*figure 2*). Refer to the *Standard Memory Option* for standard Elites and the *High Memory Option* for Elites with extended memory (indicated by the label on the front of the logger). *Note that the amount of memory available will change depending on how the channels are set up on the next page of the setup table.
9. Click on the  button. The second Setup Table window will appear (*figure 3*).

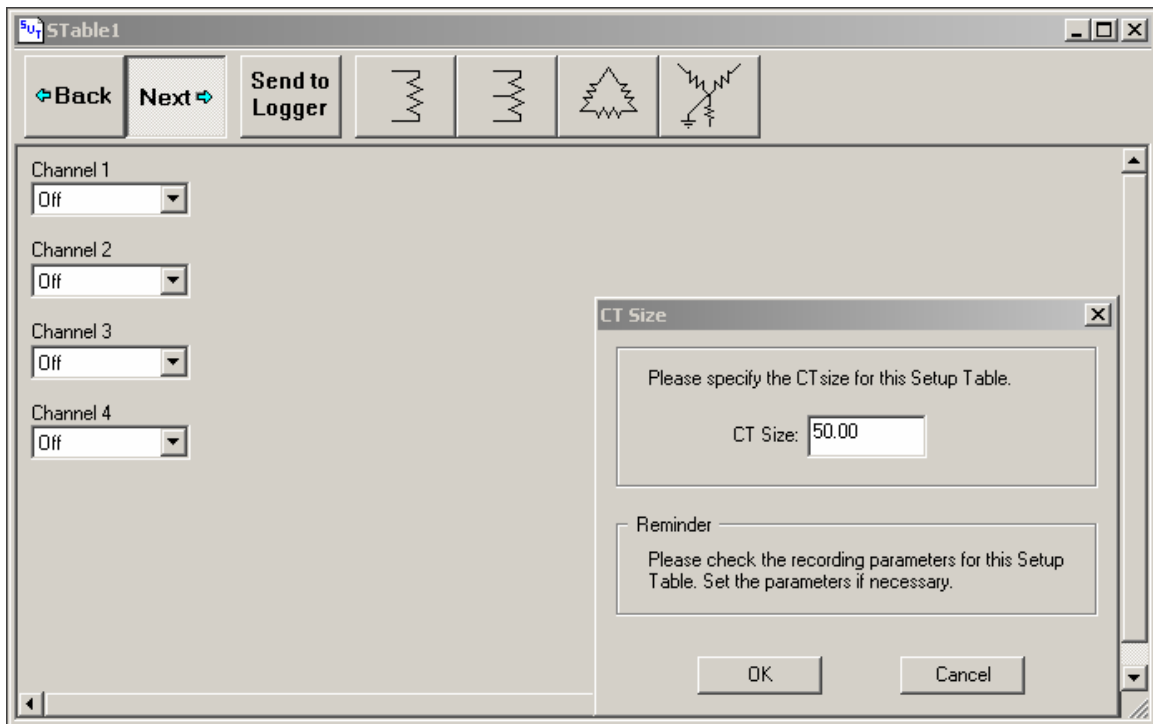






Figure 3 The second logger setup window; the channel setup window with the CT Size dialog box.

10. **Enter the current transducer (CT) size in the CT Size dialog box.** This value will be printed on the current transducer. The setup table above (*figure 3*) is configured for 50 Amp current transducers. The ELITEpro is compatible with current transducers with a 333 millivolt output.
11. **Choose the correct channel set-up button for the type of load and supply being monitored.** Four common types represented by the buttons at the top of the setup table include:

-  single-phase load with two-wire supply (1-phase 2-wire)
-  1-phase 3-wire
-  3-phase 3-wire (Delta)
-  3-phase 4-wire (Wye)

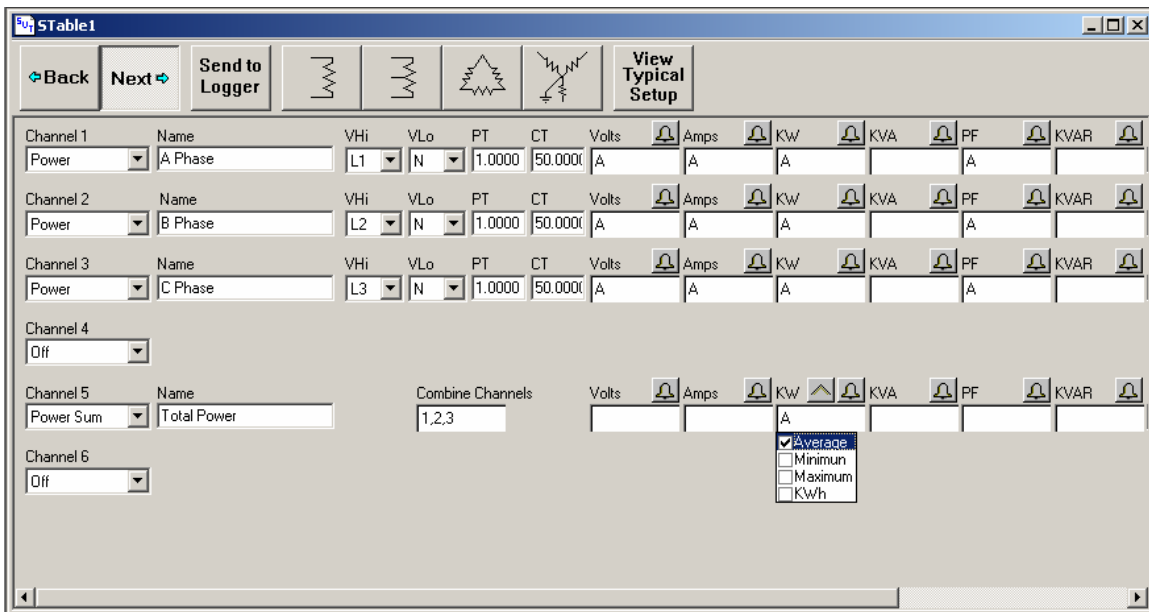



Figure 4 The second logger setup window; the channel setup window. This setup is for a 3-phase 4-wire supply. 50 amp CTs are being used.



12. Custom configurations can also be entered. Channels 1 through 4 are measurement channels for measuring volts, amps, power (kW), kilovolt-amps (KVA), power factor (PF) and kilovolt-amps-reactive (KVAR). Channels 5 and 6 are calculated channels used for combining measured data from two or more of the first four channels. The drop down arrow in the Channel box is used for enabling and disabling channels.

13. In figure 4 the 3-phase 4-wire (Wye) button was pressed.  This option turns on 3 measurement channels (channels 1, 2 and 3) and one calculated channel (channel 5). *Note it is recommended that the 3-phase 4-wire setup be used with all 3-phase loads, including delta loads. When there is no neutral, connect the neutral (white) voltage clip to good ground.

14. Enter the phase names for each channel. (figure 4) For example; A Phase, B Phase, C Phase and Total Power for a 3 phase 4 –wire load or A Phase only if monitoring a single phase 2-wire load.

15. Select the variables (volts, amps, kW, KVA, PF, kVAR) and the values (Average, Minimum, Maximum, kWh) to be recorded by clicking in the field under each variable name and checking the appropriate box. (figure 4) Average volts, amps and power factor have been selected in the setup table in figure 4.

- With **Average** selected and with the logger connected to external DC power the logger will average samples every three seconds and record one data point per integration period. With the internal battery only, without external DC power, the logger goes into an energy conservation mode and samples only once minute and records a data point per integration.
- With **Maximum** or **Minimum** selected the logger will record the maximum or minimum value for the chosen parameter once per integration period. Again the logger will sample once every 3 seconds with external DC power and once every minute without external DC power.
- With **Instantaneous** selected the logger will sample once and record one reading per integration period.

16. If a standard setup table is created using one of the radio buttons, the View Typical Setup button will become available. When clicked, this button will produce a schematic of the physical installation of the ELITEpro.
17. **Check the amount of memory available after measurement variables have been selected.**
Click on the  button to return to the first logger setup table window and refer to the *Calculated Days Until Memory Exhausted* field.
18. **Save the setup table.** (Optional) Select Save from the File menu to save this setup table.
19. **Send the setup to the logger.** Click on the  button to send the setup table to the logger. This will configure the logger with the specified settings.
20. **Choose to overwrite the logger's existing setup table by clicking Overwrite ACTIVE Table.** This will change the logger's configuration, delete the logger's existing configuration and clear all data previously stored on the logger.

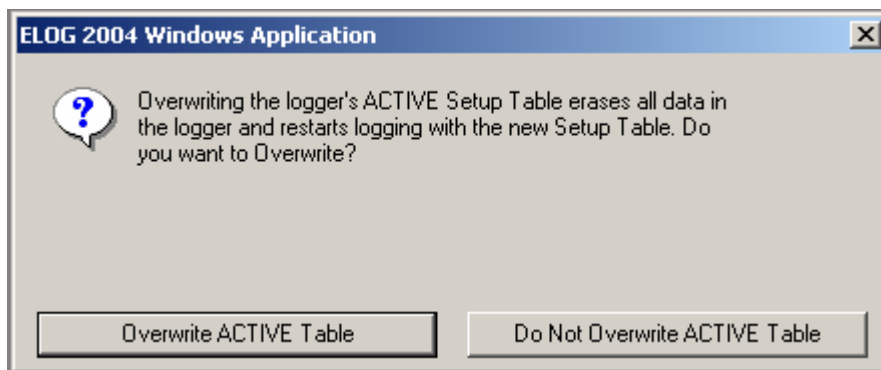


Figure 5 Overwrite ACTIVE Table.

21. **Allow several seconds for the setup to be sent to the logger.** When the next window appears, choose to continue logging by clicking on ***Continue Logging***. Alternatively, when the loggers are being configured prior to the scheduled installation and a laptop will be used at the site, click ***Stop Logging***. To turn the logging on at the site; choose ***Logging On/Off*** from the Logger menu and choose ***Start Logging***.
22. **Locate the green LED between the words LOG and ON next to the communication port on the logger.** The LED blinks when the ELITEpro is logging.

Physical Set-up

The ELITEpro data logger **must** be installed in an electrical panel by a **licensed, qualified electrician**. The installer should consult the manual for installation guidelines.

Some important details that the installer should note:

- 1. Connect the current transducer (CT) to the green Phoenix screw-in terminal connector on the logger end panel.** The white or white-banded lead on each CT is the (+) lead.
- 2. The current transducers (CTs) are directional.** On some CTs, the side that faces the power coming into the load is labeled "Source"; the side that faces the load being monitored is labeled "Load". If there is an arrow on the CT it should be pointed toward the load. If the CTs are installed backwards, the power (kW) readings on the individual measurement channels will be negative.
- 3. Verify that each CT is installed so that it corresponds correctly with the voltage reference on the same phase.** In the set up table shown above, Channel 1 corresponds to the A Phase, Channel 2 to B Phase and Channel 3 to C Phase. If the voltage reference and the CT are mismatched the power factor will be unreasonable and the power (kW) readings for the individual channels and the calculated total power will be incorrect.

We highly recommend using a laptop computer to verify the physical set-up after the logger is connected to the panel! Verification is performed with the logger's Real-Time Data feature.

Viewing Real-Time Data

1. **Establish a connection between the computer and logger.** This procedure is described in the first two steps in the first section of this application note; “*Connecting to the ELITEpro Logger.*”
2. **Under the *Logger* menu heading, choose *Display Present Readings and Show As Text.***
3. **With the text format chosen, present readings appear in a table in a new window.** A few readings are displayed (Display Update will say **ON**) and then the screen freezes the readings (Display Update will say **OFF**). To refresh the screen and display the present readings click on the **Display Update** button at the lower right section of the window.
4. **The Instantaneous Channel Values window in which present readings are displayed also includes information about the logger’s setup, remaining memory, and battery status.** The fields will be shaded green for the parameters being recorded by the logger.

CH	Channel Type	Channel Values					
1	POWER	120.5 V	18.86 A	1.524 kW	2.272 kVA	0.67 PF	0.122 kVAR
2	POWER	120.7 V	18.31 A	1.471 kW	2.211 kVA	-0.67 PF	-0.018 kVAR
3	POWER	121.4 V	17.71 A	1.384 kW	2.149 kVA	0.64 PF	0.115 kVAR
4	OFF						
5	POWER SUM	120.9 V	54.88 A	4.379 kW	6.632 kVA	0.66 PF	0.219 kVAR
6	OFF						

■ = Parameter Logged ■ = Parameter Alarm Display Update: **OFF**

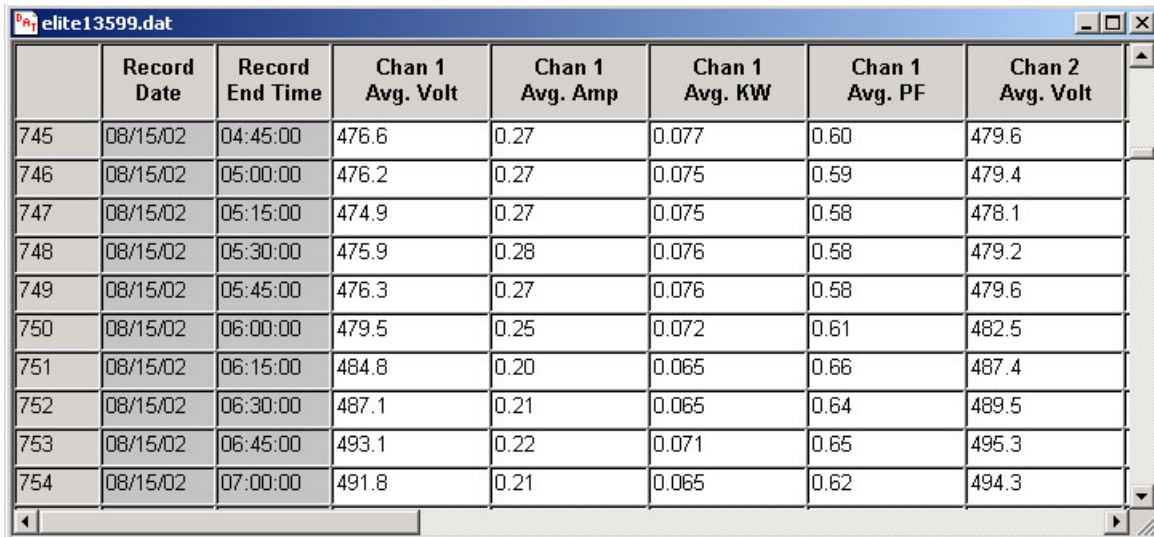
Memory Left	Battery State	Logger Date	Logging Is	Modem Bat Volts	Update Count
27.28 Days	Ext Power	03/26/03	ON	Ext Power	
Memory Used	Battery Volts	Logger Time	Memory Type	Integration Period	Exit
82.2%	Ext Power	17:58:42	Linear	15 Minutes	

Figure 6 Real-time readings from the ELITE logger displayed as text

5. **To verify that the logger setup is correct, check that all the readings seem reasonable.**
 - **Note whether the power readings are positive or negative.** If power readings on any channel are negative, check the direction in which the CT is installed and the polarity of the leads at the terminal block. The white or white banded CT lead is positive (+).
 - **Note whether the power factor seems reasonable.** A common error is to switch the A Phase CT with the C Phase CT (meaning channel 1 is corresponding to the C Phase and channel 3 to the A Phase). If the Channel 2 power factor looks reasonable but the power factor for Channels 1 and 3 are significantly lower, the installer probably needs to swap the A and C Phase CTs.

Retrieving Data from the ELITE Logger

1. Establish a connection between the computer and the logger as described in the first two steps under "Launching the Elite Logger".
2. Pull down the *Logger* menu heading and select *Retrieve Data*. In the window that appears, name the data file and indicate where it is to be saved. Click **Save**. The downloading process will take a few moments.
3. After the data has been downloaded, view the data by selecting *Open* from the *File* menu. Select *Data File* at the *File Type* window prompt and press **OK**. In the next window, choose the name of the file downloaded from the logger and press **OK**. A data chart like the one shown below will appear. In this chart, the numbers that appear in the far left column represent the record number of each data point. Scroll right and left to see data for different variables and channels. Scroll up and down to view data from different times.



	Record Date	Record End Time	Chan 1 Avg. Volt	Chan 1 Avg. Amp	Chan 1 Avg. KW	Chan 1 Avg. PF	Chan 2 Avg. Volt
745	08/15/02	04:45:00	476.6	0.27	0.077	0.60	479.6
746	08/15/02	05:00:00	476.2	0.27	0.075	0.59	479.4
747	08/15/02	05:15:00	474.9	0.27	0.075	0.58	478.1
748	08/15/02	05:30:00	475.9	0.28	0.076	0.58	479.2
749	08/15/02	05:45:00	476.3	0.27	0.076	0.58	479.6
750	08/15/02	06:00:00	479.5	0.25	0.072	0.61	482.5
751	08/15/02	06:15:00	484.8	0.20	0.065	0.66	487.4
752	08/15/02	06:30:00	487.1	0.21	0.065	0.64	489.5
753	08/15/02	06:45:00	493.1	0.22	0.071	0.65	495.3
754	08/15/02	07:00:00	491.8	0.21	0.065	0.62	494.3

Figure 8 A data chart downloaded from the logger.

4. A graph of the data can be created within the ELOG software by selecting *Create New Graph* under the *Data* menu.

Exporting Data to a Spreadsheet

1. To view data in a spreadsheet program such as Microsoft Excel, pull down the *Data* menu heading, and choose *Export Data File*.
2. In the window that appears, select the data file to be exported and choose where the exported data is to be saved. Then click *Open* to export the raw, binary DAT file to a CSV format (Comma Separated Variable) file that can be brought into a spreadsheet or database program.