SEL-734P Portable Power Quality Meter

SEL-734P Operating Instructions

I. Capability Overview

Each SEL-734 Portable Power Quality Meter is preconfigured with the following capabilities:

➤ Front-panel LCD reports voltage, current, power factor, and THD.

➤ Load profile (LDP) recorders programmed for demand, energy, and numerous power quality reports.

➤ Voltage sag/swell/interruption (VSSI) recorder with CBEMA/ITIC analysis.

➤ Sequential Events Recorder (SER) reports of power quality and CBEMA/ITIC disturbances.

➤ Event report waveform capture on harmonic disturbances and VSSI.

➤ Time-of-use (TOU) reporting with daily self-reads and monthly demand resets.

II. Capability Details

The following sections describe each preconfigured capability in greater detail. To know more about basic SEL-734 and ACSELERATOR QuickSet® SEL-5030 Software functionality, please refer to the *SEL-734 Advanced Metering System Quick-Start Guide*, included with the SEL-734 Portable Power Quality Meter.

A. Front-Panel Display

The SEL-734 front-panel reports instantaneous voltage, current, power factor, and THD values.

To change the default values, please follow these steps.

Step 1. Read the SEL-734 settings into ACSELERATOR QuickSet.

Step 2. Open the Front-Panel Display Point Labels view in ACSELERATOR QuickSet.

Step 3. Change the values as required. The SEL-734 Instruction Manual lists each available value.

Step 4. After modifying the settings, send the new settings to the SEL-734.

    a. Click **File > Send**

    b. Click **OK**.

B. Load Profile (LDP) Recorders' Programmed Values

By default, the portable SEL-734 records the following variables in the LDP recorders.

Recorder 1, LDP1:
➤ Three-phase accumulated energy every 15 minutes
➤ Three-phase demand every 15 minutes

Recorder 2, LDP2:
➤ Maximum voltage every 15 minutes
➤ Maximum current every 15 minutes

Recorder 3, LDP3:
➤ Minimum voltage every 15 minutes
➤ Minimum power factor every 15 minutes
➤ Minimum frequency every 15 minutes

Recorder 4, LDP4:
➤ Average voltage every 15 minutes
➤ Average current every 15 minutes
➤ Average frequency every 15 minutes
➤ Average power factor every 15 minutes

Recorder 5, LDP5:
➤ Average total harmonic distortion every 15 minutes
➤ Average voltage and current imbalance every 15 minutes

Recorder 6, LDP6:
➤ End of Interval voltage flicker every 10 minutes

Follow the instructions below to retrieve and chart any LDP report.

Step 1. Open the ACSELERATOR QuickSet HMI.

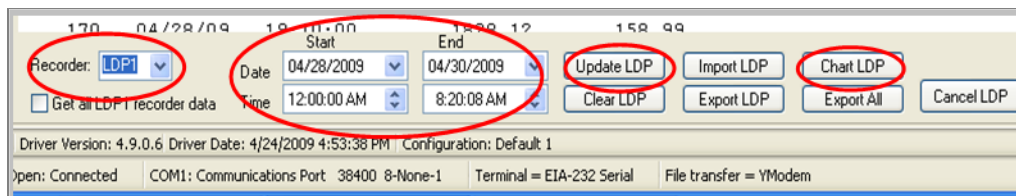Step 2. Navigate to the LDP view.
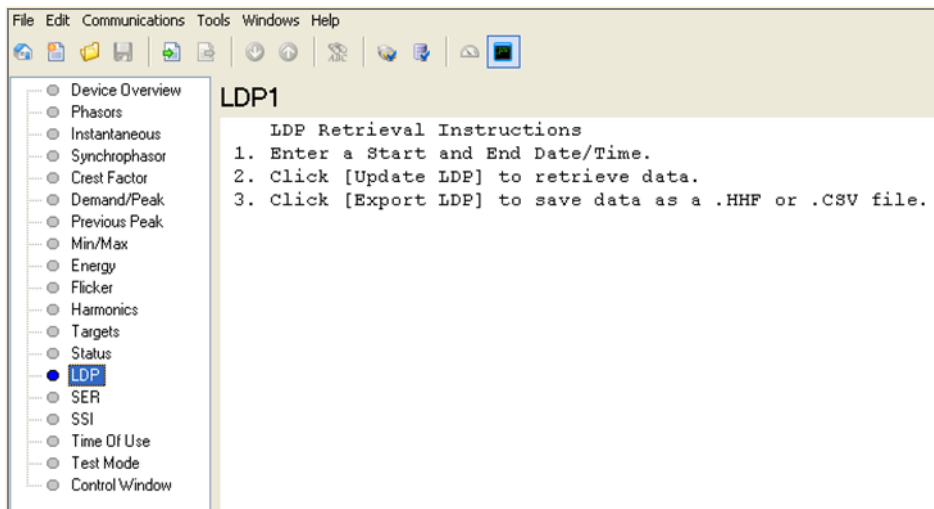
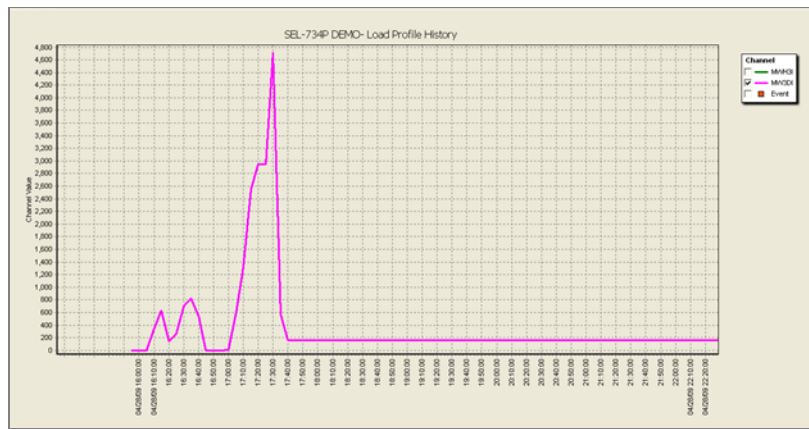Step 3. Select the LDP recorder that you wish to retrieve.

Step 4. Select a start and end date and time.
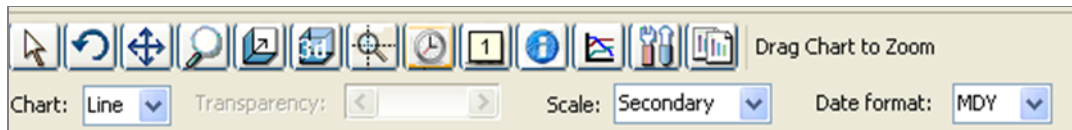
Step 5. Click **Update LDP**.

ACSELERATOR QuickSet will retrieve these LDP data from the SEL-734. When the transfer is complete, the LDP text report will display on the screen.

Step 6. To chart LDP data, click **Chart LDP**.

Step 7. Hover over the charting tools for a description of each capability.

C. Voltage Sag/Swell/Interruption (VSSI) Recorder With CBEMA/ITIC Analysis

The SEL-734 records any VSSI that deviates more than 10 percent from the nominal voltage of 120 V. To see whether the SEL-734 has recorded any voltage deviation, perform the following steps.

Step 1. Navigate to the VSSI view in ACSELERATOR QuickSet.

Step 2. Enter a VSSI date range.
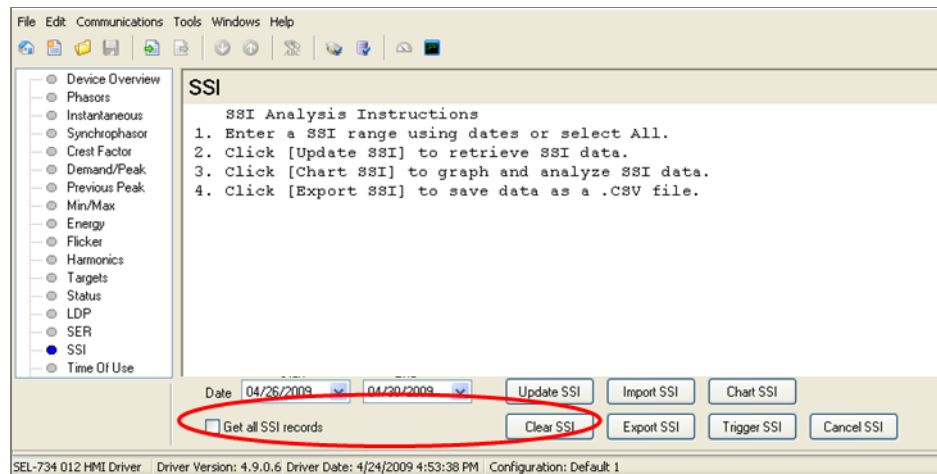
Step 3. Click **Update SSI**.

Step 4. Click **Chart SSI** to view a summary of any voltage disturbance in the ACSELERATOR QuickSet HMI.

Step 5. Select the check box of any voltage or current phases to view.

Anytime a current value drops to zero, the chart indicates that the load was lost because of a voltage disturbance.

D. Sequential Events Recorder (SER) Reports of Power Quality and CBEMA/ITIC Disturbances

The SER will report the date and time of the following power quality disturbances.

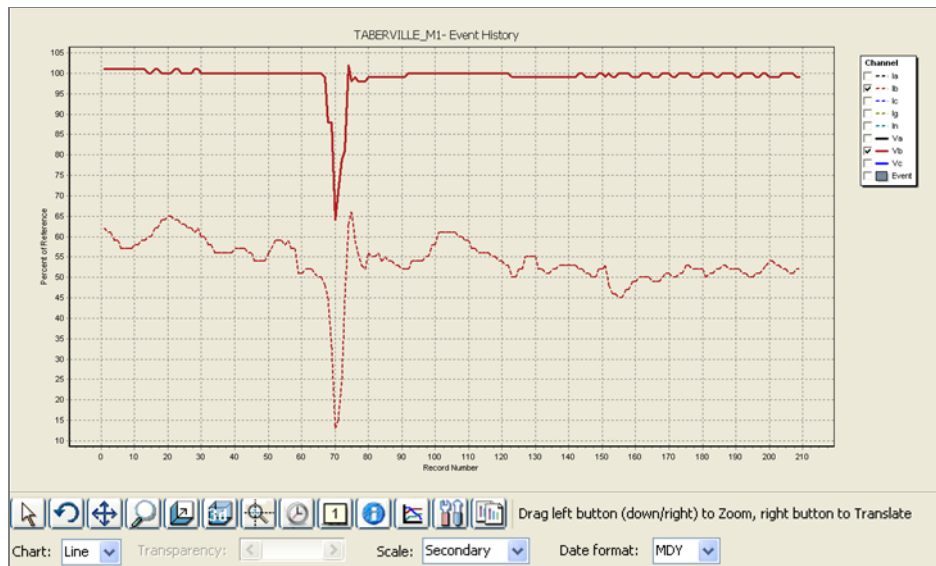➢ Harmonic disturbances greater than 20 percent.

➢ Voltage disturbances categorized by the industry-standard CBEMA/ITIC ratings.

To view the SER, perform the following steps.

Step 1.   Navigate to the SER view in ACSELERATOR QuickSet.

Step 2.   Enter a SER record range at the bottom of the page

Step 3.   Click **Update SER**.

This report will display any power quality disturbance that the SEL-734 has recorded.

E. Event Report Waveform Capture of Power Quality Disturbances

The SEL-734 will store a 1.0 second, 8 kHz sampled waveform capture during any of the following power quality disturbances.

➢ Harmonic disturbances greater than 20 percent.

➢ VSSI more than 10 percent from nominal.

Perform the following steps to retrieve and view waveform event reports.

Step 1.   To see whether the meter has captured waveform event reports, click **Tools > Events > Get Event Files**.
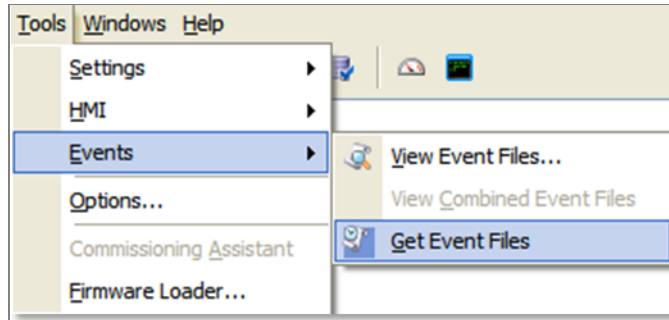
Step 2.   If events appear under the Event History list, do the following.

    a.   Select the most recent event

    b.   Click **Get Selected Event**.

        After a brief period, ACSELERATOR QuickSet will prompt you to save an event file.
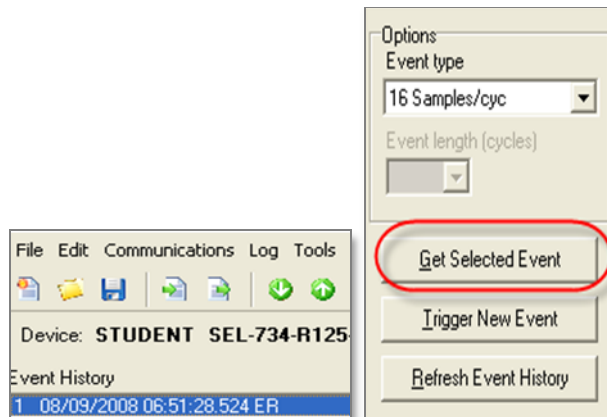
Step 3.   Select a location of your choice, and click **Save**.
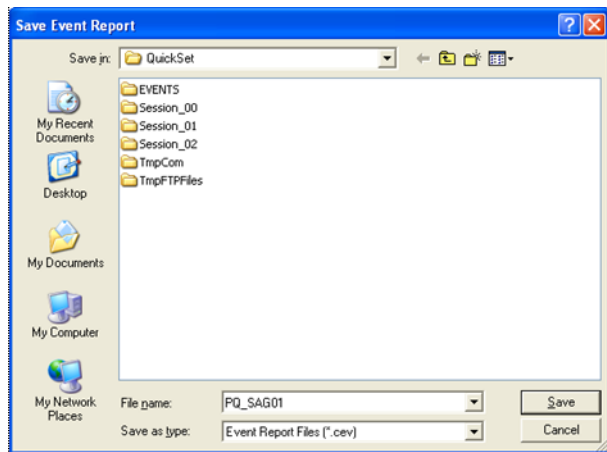
Step 4. To view the saved event report, click **Tools > Events > View Event Files**.

ACSELERATOR QuickSet will prompt you to open an event report.
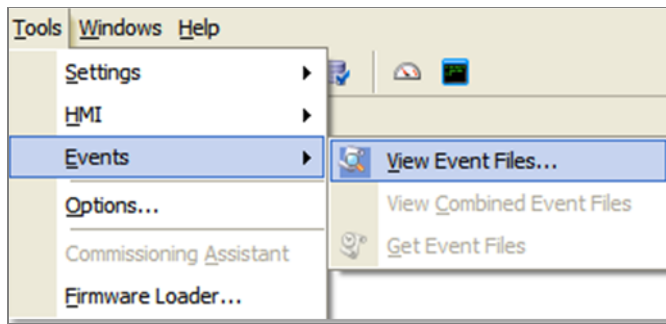
Step 5. Select the event report that you previously saved, and click **Open**.

ACSELERATOR QuickSet will display the waveform event report and present additional options for viewing and analysis.
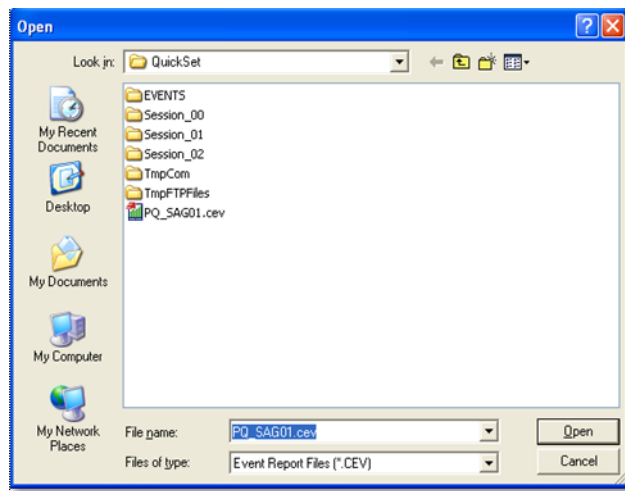
F. Time-Of-Use (TOU) Reporting With Daily Self-Reads and Monthly Demand Resets

The SEL-734 TOU report is programmed to highlight the self-read, automated demand reset, and rate-based tariff capabilities. Follow the steps below to view TOU data reports.

Step 1. Navigate to the Time Of Use view in the ACSELERATOR QuickSet HMI.

The software will automatically retrieve and display TOU data.

Step 2. To view these data in full detail, click **Export** and save the .xls file to your computer.

Step 3. Open the .xls file, and click the **Present Season** tab to view the most recent TOU report.
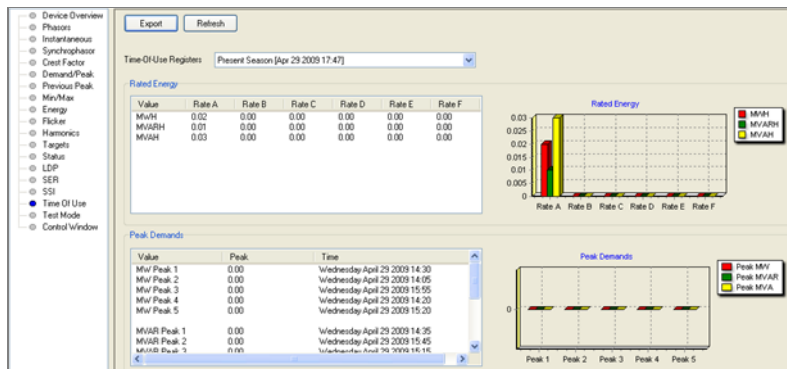
SEL-734 Advanced Metering System

Quick-Start Guide

I. Introduction

This *Quick-Start Guide* explains how to install, configure, test, and operate the SEL-734 Advanced Metering System. For detailed information on these topics, please refer to the *SEL-734 Advanced Metering System Instruction Manual* located at *www.selmeters.com*.

II. SEL-734 Overview

This section outlines essential installation information, including front-panel layout, rear-panel layout, labels, and dimensions.

A. Front-Panel Layout

The front-panel interface consists of three programmable LEDs, an LCD, a seven-button keypad, and an optical communications port.

Optical port, communications and test mode LED

Enable LED

Programmable local-control button

Potential LEDs

Programmable LEDs

Programmable LCD

User-defined site information

Menu pushbuttons for alternate display and settings

Figure 1   Front-Panel Layout

B. Rear-Panel Layout

Removable connectors allow easy wiring for PT circuits, I/O, communications, and the auxiliary power supply. The CT circuits require ring terminals for safety.

I/O board: 4 outputs (EM or SS), 4 inputs or 4 analog outputs, 4 SS outputs

PT board: VA, VB, VC, N

CT board: IA, IB, IC, IN

Communications board: EIA-485, telephone modem, EIA-232
Note: Functions as phone port

Ground terminal

Main board: Ethernet, IRIG-B, EIA-232

Power supply board: Auxiliary power supply inputs, 3 outputs, 2 inputs

Mechanical sealing mechanism
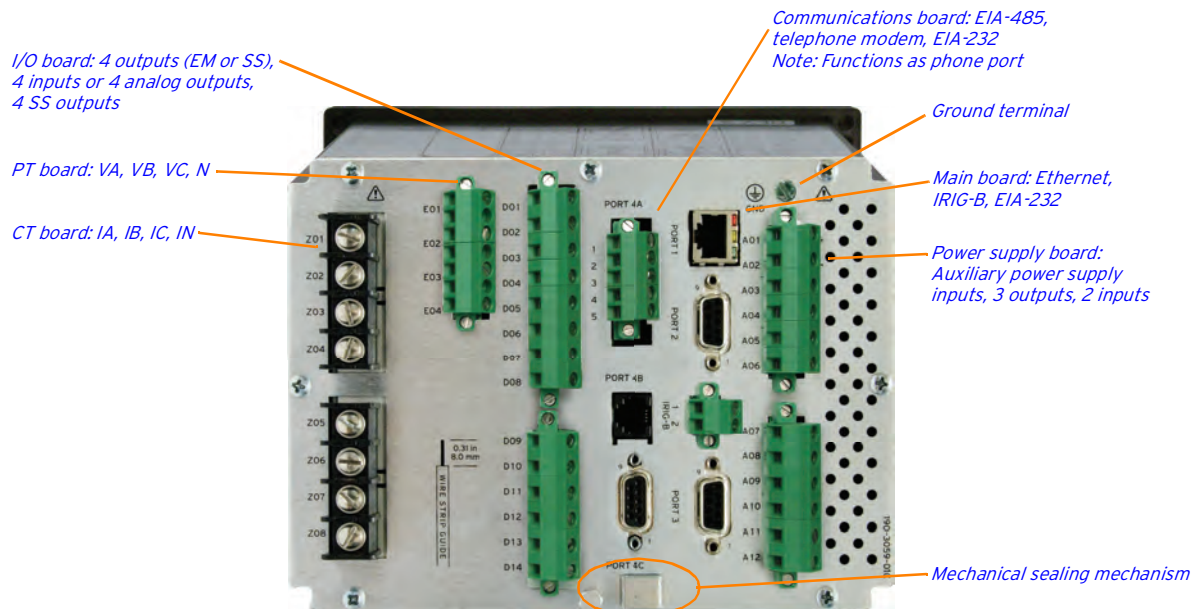
Figure 2   RearPanel Layout

C. Labels and Dimensions

The top and side labels depict important information, including auxiliary power supply input voltage.

The cutout dimensions for the horizontal and vertical meter chassis are identical. The vertical chassis is designed to fit into existing panel cutouts with an optional retrofit bezel.

Control input voltages

PANEL CUTOUT

139.0 mm (5.47 in)

187.0 mm (7.36 in)

Part number
Serial number
Auxiliary power supply input voltage

Compliance marks

ANSI Configuration Label
FM: Form designation
CL: Current class
V: Rated voltage
W: Wires
Hz: Frequency (hertz)
TA: Test amperes
Kh: Watt-hour meter constant
Kt: Watt-hour meter test constant
CA: Accuracy class

Figure 3   Labels and Dimensions

III. SEL-734 Installation and Wiring

This section outlines how to mount the SEL-734 and wire the power supply, PT, and CT connections.

A. Required Installation Tools

➤ 1/4-inch slotted-tip screwdriver for current inputs

➤ 5/32-inch x 1/32-inch slotted-tip screwdriver for Connectorized® terminal blocks

➤ #2 or #3 Phillips® screwdriver for panel mounting screws

➤ #6 ring terminals for CT connections
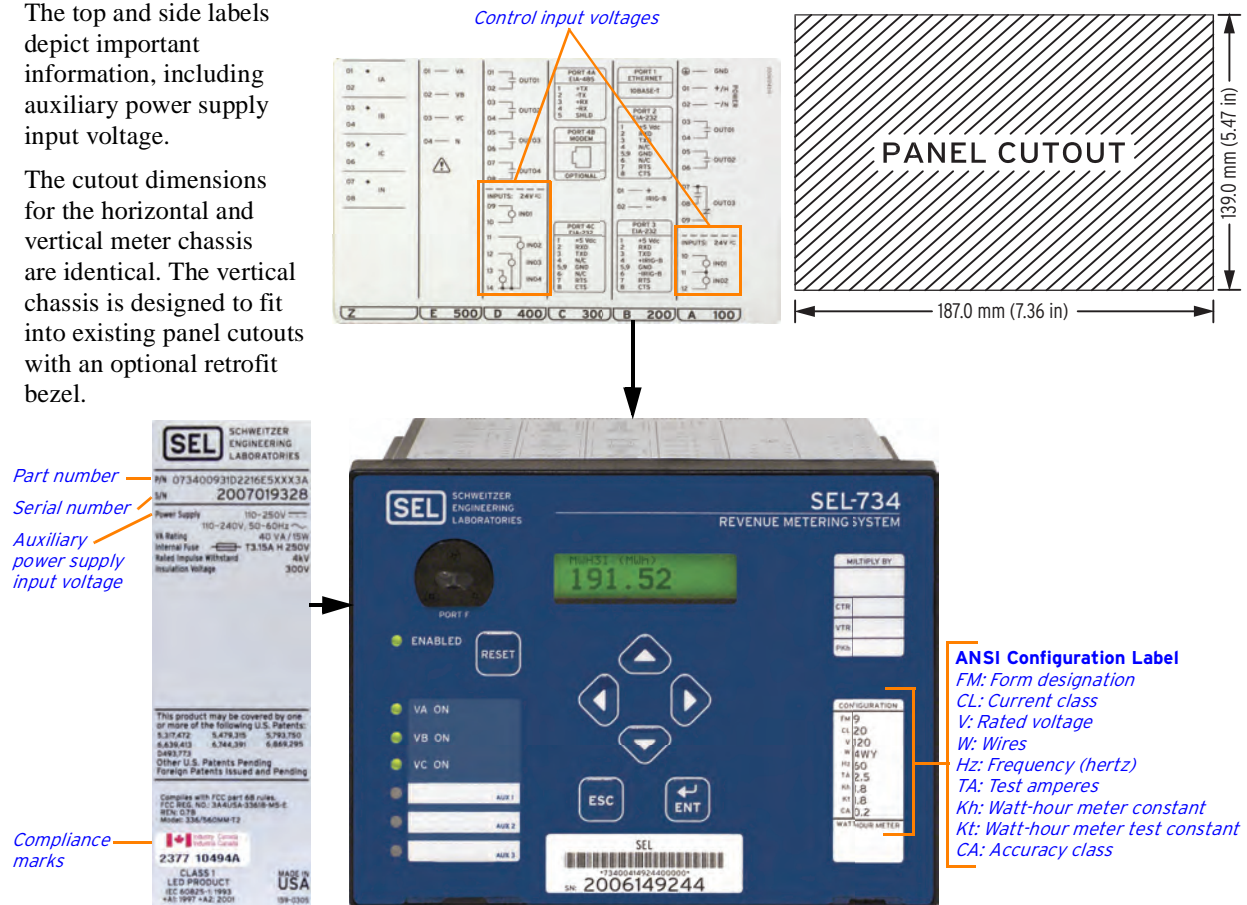
➤ Serial cable: SEL cable C234 or SEL cable C287, or ANSI optical probe (For more information, see *Table 1* or SEL serial-to-USB cable C662.)

➤ ACSELERATOR QuickSet® SEL-5030 Software CD

PC System Requirements

➤ EIA-232 serial port or Ethernet connection to allow communication to SEL devices

➤ CD-ROM drive

➤ Microsoft® Windows® 2000 or Windows XP with 256 MB RAM

➤ 200 MB hard disk space

➤ Microsoft Windows administrative level privileges (required for installation)

B. Recommended Torque Values

➤ Current terminals: 12 in-lb

➤ Connectorized terminals (accept wire size 12–24 AWG):

  ➢ 7 in-lb for wire connections

  ➢ 2 in-lb for retaining screws

➤ Mounting screws: 12 in-lb

C. Mounting Options

SEL supplies each SEL-734 meter with four #8 screws for mounting the meter in a rectangular panel cutout shown in *Figure 3*. For detailed information on mounting options, communications cables, and other accessories, please refer to the *SEL-734 Metering Accessories* flyer, found at *www.selinc.com* or *www.selmeters.com*.

Mount the SEL-734 using one of the following options:

➤ Panel mount (standard)

➤ 19-inch rack-mount bracket

➤ Retrofit bezel

➤ Wall-mount bracket

➤ Indoor enclosure

➤ Outdoor enclosure

D. Power Supply Connections

Before powering the SEL-734, connect the SEL-734 ground terminal ⏚ (**GND**-to-earth ground). See *Figure 2* for the location of the chassis ground.

Choose one of the following methods to power the SEL-734.

1. Auxiliary Power Supply

Connect auxiliary power supply input voltages to terminals A01 and A02.

The SEL-734 meter supports two power supply options:

➢ High-voltage ac/dc supply (110–250 Vdc, 110–240 Vac)

➢ Low-voltage dc-only supply (24–48 Vdc)

2. PT Power

To power the SEL-734 from the PT circuit, connect terminals E01 to A01 and E04 to A02 using 12–24 AWG wire.

> **CAUTION:**
> *Review the auxiliary power supply input voltage label prior to applying voltage.*

E. Voltage and Current Connections

The SEL-734 supports both Form 9 (4-wire wye) and Form 5 (3-wire delta) connections.

Form 9, 4-wire wye connection

Voltages

Wire the phase to neutral voltages to terminals E01, E02, and E03. Connect the neutral wire to terminal E04.

Currents

Wire the currents to terminals Z01–Z02, Z03–Z04, and Z05–Z06.

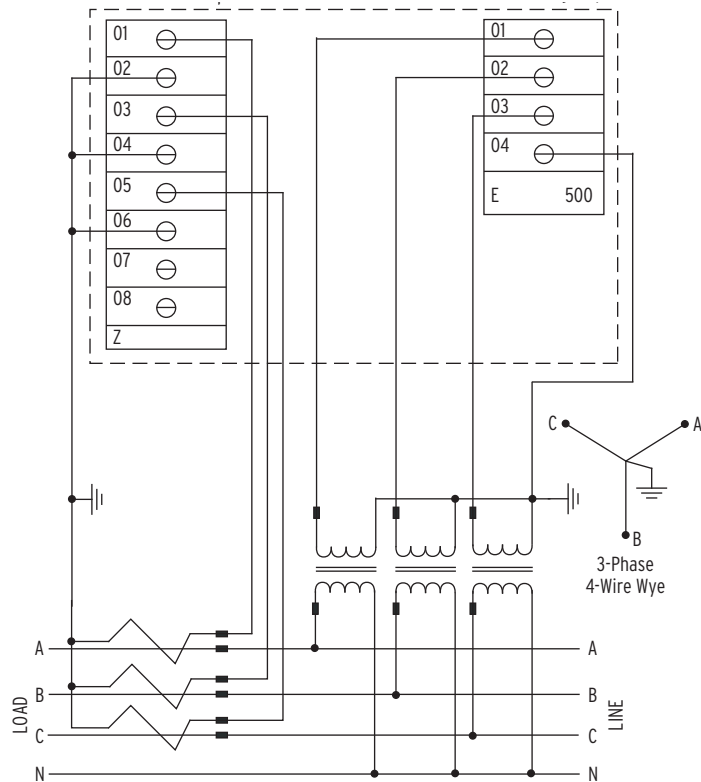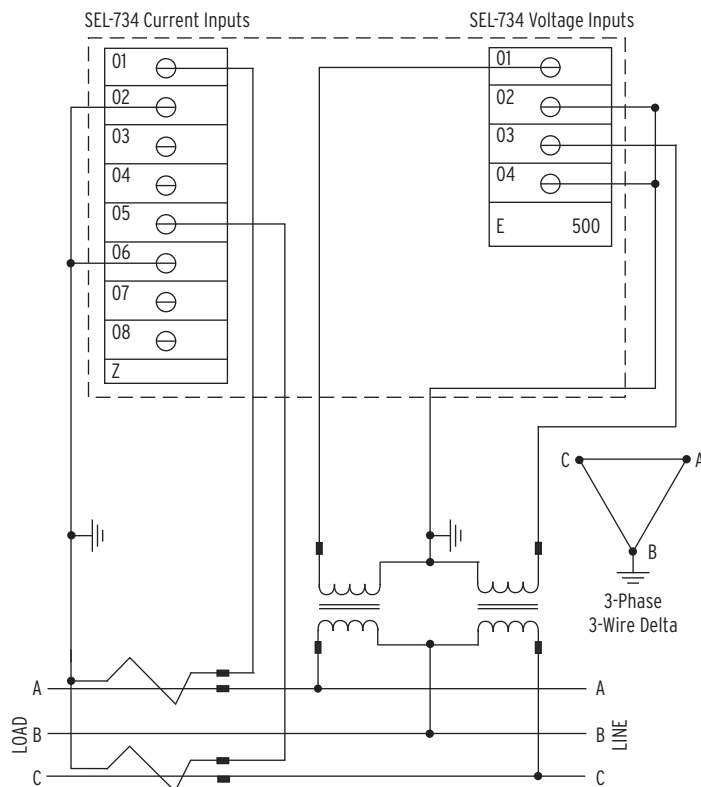**Form 5, 3-wire delta connection**

Voltages

Wire the phase-to-phase voltages to terminals E01 and E03. Connect the neutral wire to terminals E02 and E04.

Currents

Wire the currents to terminals Z01–Z02 and Z05–Z06.

IV. AcSELerator QuickSet SEL-5030 Software

A. Overview

SEL ships all SEL-734 meters with AcSELerator QuickSet Software. Use AcSELerator QuickSet to perform the following tasks:

➤ Read and send configuration settings with an SEL-734.

➤ Save and open configuration settings on a PC.

➤ Monitor real-time power system data.

➤ Control the meter remotely.

➤ Configure the communications ports.

➤ Retrieve the LDP, SER, and VSSI reports.

➤ Display waveforms from event reports.
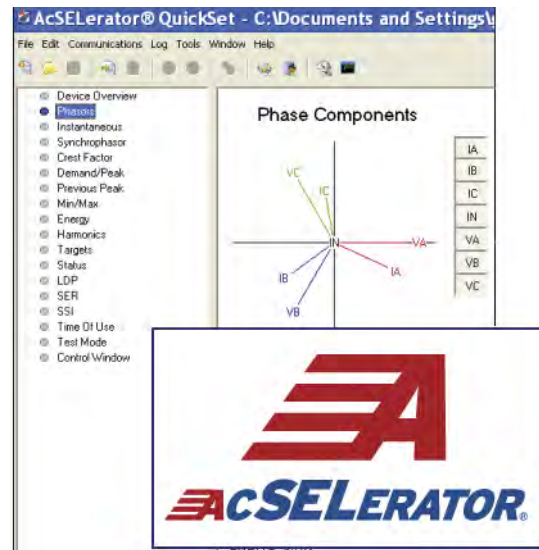
B. Install AcSELerator QuickSet

Install AcSELerator QuickSet Software with the enclosed CD, or download from *www.selinc.com*. On the SEL website, click on **Products > Software Solutions > Settings Software > SEL-5030 AcSELerator QuickSet**, click on **Download**, save, and then run SEL-5030.exe. A wizard will guide an installation or an upgrade of AcSELerator QuickSet Software.

C. Configure AcSELerator QuickSet Communications

From a Windows PC, open AcSELerator QuickSet Software by clicking **Start > Programs > SEL Applications > AcSELerator QuickSet** or by double-clicking the AcSELerator QuickSet icon. For initial communications, connect any available serial or optical port on the meter to the PC using an ANSI optical probe, or a C234 or C287 serial cable or a C662 serial-to-USB cable.

The SEL-734 supports various optical probes. *Table 1* lists compatible probes and any special requirements.

Table 1 Optical Part Probes

SEL-734 Compatible Optical Probes	Connector	Special Instructions
ABACUS ELECTRICS A6Z (SEL part number C660)	DB-9	None
ABACUS ELECTRICS A7Z	DB-9	DTR Off
ABACUS ELECTRICS A9U (SEL part number C661)	USB	DTR Off; requires software driver
ELSTER/ABB UNICOM™ III	DB-9	DTR Off
GE SmartCoupler SC-1A	DB-9	DTR Off
Microtex Electronics FR3	USB	Maximum 19200 bps rate; requires software driver
P+E Tecnik K01-USB	USB	Requires software driver; cannot use to upgrade firmware
uData Net PM500-300	DB-9	DTR Off; requires power from ac adapter or connector for mouse or keyboard

To access the communications parameters in AcSELerator QuickSet Software, select **Communications > Parameters**. *Figure 4* shows the default serial port parameters for the SEL-734.
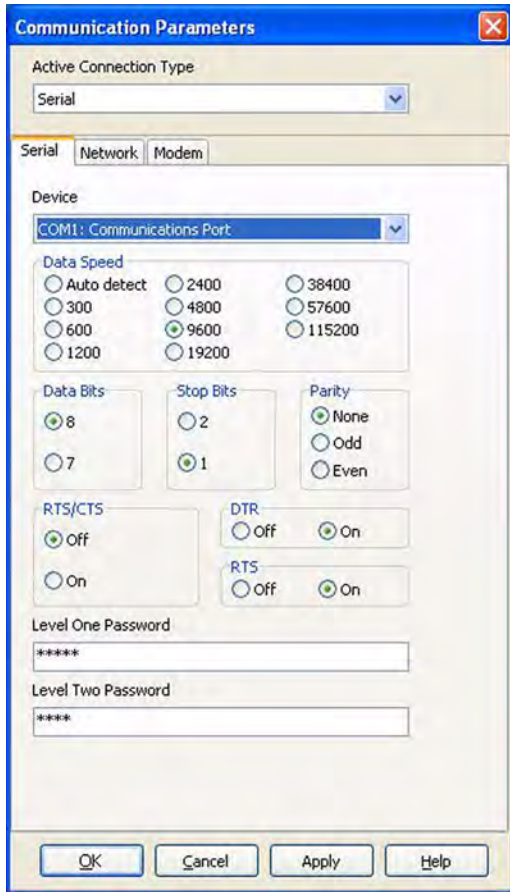

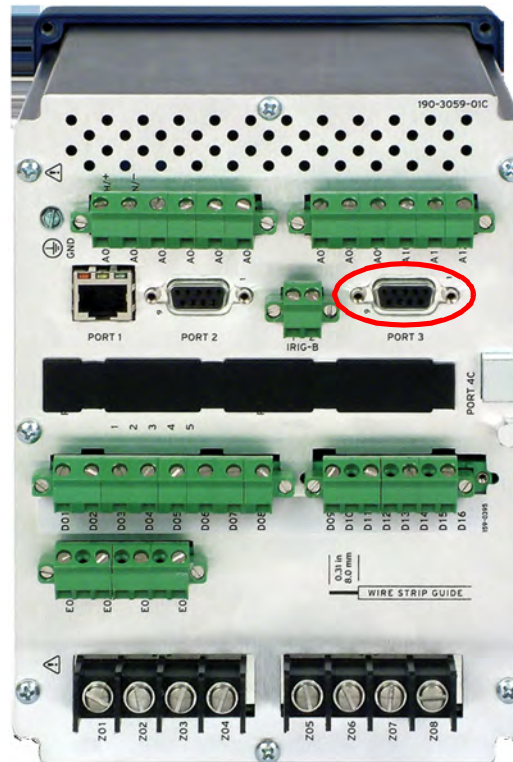**Figure 4   Default Communications Parameters**

Figure 5   SEL-734 Serial Port 3

Figure 6   Cables for the SEL-734

D. Settings Editor

This section discusses how to read, modify, save, and send configuration settings within AcSELerator QuickSet Software.

1. Toolbar and Icon Functions

AcSELerator QuickSet Software allows access to features through both menus and icons. This document describes how to access features using the menu structure. *Figure 7* illustrates the icon functions in the AcSELerator QuickSet toolbar.

Quick Tip:
Hover over icons to view the title and function.

Quick Tip:
Press F1 in AcSELerator for help.

New settings editor (Ctrl+N)
Save settings to database (Ctrl+S)
Send active settings
Back up one settings screen
Back up one settings screen
Human-machine interface

Getting started with QuickSet
Open settings (Ctrl+O)
Read settings from device
Go to next settings screen
Search for a setting or element (Ctrl+F)
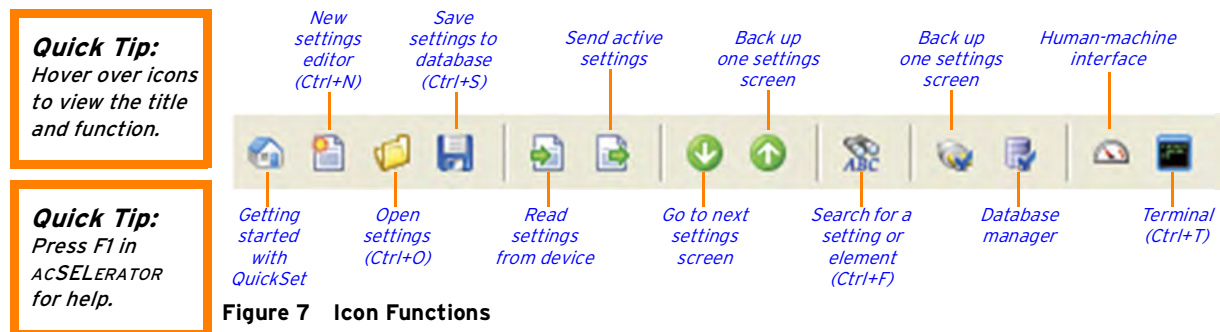Database manager
Terminal (Ctrl+T)

Figure 7   Icon Functions

2. Read Configuration Settings From the Meter Into ACSELERATOR

Before editing configuration settings, ACSELERATOR QuickSet must read them from the SEL-734.

Quick Tip:
ACSELERATOR sends all groups/classes by default. Deselect settings to speed read time.

Click **File > Read** as shown in *Figure 8* to read and load meter configuration settings. ACSELERATOR QuickSet will prompt which configuration settings that it will read. Click **OK** with all boxes checked to read all configuration settings.
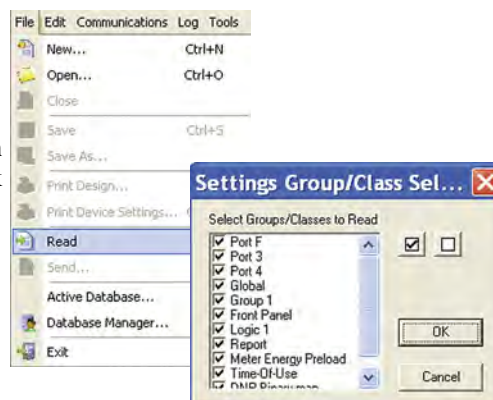
Figure 8   Read All Configuration Settings

3. Modify Configuration Settings

A tree view appears when ACSELERATOR QuickSet successfully reads meter configuration settings from the SEL-734.

Click the plus sign (+) to expand a setting group, or click a group name to see all associated configuration settings.

ACSELERATOR QuickSet automatically hides unavailable configuration settings and flags invalid configuration settings at the bottom of the screen.

Right-click on any setting for the previous or default value.

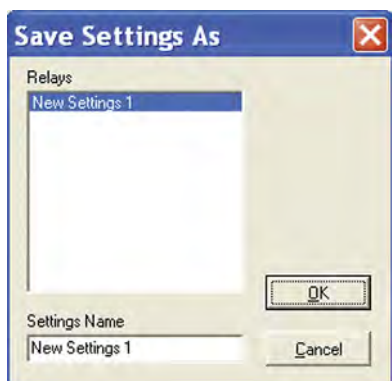**Figure 9   Meter Configuration Settings**

Figure 10   Save Settings

4. Save Configuration Settings to the PC Hard Drive

Select **File > Save** to save changes made within ACSELERATOR QuickSet to the PC hard drive. Replace **New Settings 1** in the **Settings Name** text box with a unique name. Click **OK** to save the configuration settings to the ACSELERATOR QuickSet settings database on the PC hard drive.

5. Send Configuration Settings to the Meter to Update All Modified Configuration Settings

The **File > Send** command sends any changes made within ACSELERATOR QuickSet to the meter. ACSELERATOR QuickSet automatically selects modified configuration settings groups and warns if these settings will overwrite existing data or change active communications parameters.

Figure 11   Settings Group/Class Select

E. Commonly Used Configuration Settings

This section outlines commonly used meter configuration settings, including: Meter and Terminal Identifier, Current and Potential Transformer Ratios, Demand Metering, KYZ Pulse, Daylight Savings Time, Load Profile, Front-Panel Display, and Communications.

1. General Settings

The General Settings include the MID Meter Identifier, TID Terminal Identifier, and Current and Potential Transformer Ratios (CTR and PTR).

To access General Settings, expand **Group 1 > Set 1 > General Settings** from the ACSELERATOR QuickSet settings editor tree.

a. MID and TID Settings

Meter reports include the MID and TID for easy meter identification. These configuration settings help uniquely identify each meter within a system.

Quick Tip:
The MID setting must match the MV-90® Master File Device ID setting.

Figure 12 MID and TID Settings

b. Current and Potential Transformer Ratios

The CTR and PTR configuration settings scale the following meter reports from secondary to primary quantities:

–Meter Reports (MET)

–Meter and Control Interface (HMI)

–Load Profile (LDP)

–Display Points (DP)

–Distributed Network Protocol (DNP)

–CTR and PTR settings

–Front-Panel LCD

Figure 13 CTR and PTR Settings

Modbus® and SELOGIC® control equations are secondary quantities and are unaffected by CTR and PTR values.

To set the CT and PT ratios, choose **Group 1 > Set 1 > General Settings** from the ACSELERATOR QuickSet settings editor tree. Note that the CTR and PTR values are net ratios. For example, a 1200:5 CT ratio equates to a CTR setting of 240.

Figure 14 Demand Metering

2. Demand Metering

The SEL-734 supports Thermal, Rolling, and Block demand types with intervals of 1, 5, 10, 15, 30, and 60 minutes.

To configure demand metering, choose **Group 1 > Set 1 > Demand Metering Settings** from the ACSELERATOR QuickSet settings editor tree.

3. KYZ Pulse Settings

The KYZ Pulse Settings define the KYZ pulse weight. *Figure 15* depicts the KYZ settings that configure 1.8 kWh/pulse. Type **2**, **3**, or **4** in the **EKYZ Enable KYZ Pulse Settings** box to add additional KYZ pulses.

4. Map KYZ Pulse Settings

Before the KYZ outputs will operate, the user must map the KYZD1 setting to create a Form A KY output contact or a Form C KYZ output contact as shown in *Example 1* and *Example 2*. The SEL-734 supports four Form A outputs or two Form C outputs. Please verify that the meter contains solid-state output contacts prior to configuring KYZ outputs. Electro-mechanical contact outputs are only rated for 10,000 closures. With default KYZ configuration settings and 5 A and 120 V applied, 10,000 closures occur in just 30 hours.
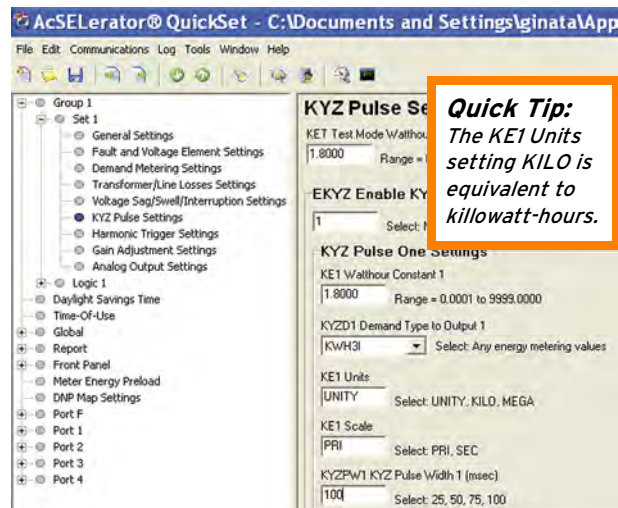

Figure 15   KYZ Pulse Settings

> **Quick Tip:**
> The KE1 Units setting KILO is equivalent to killowatt-hours.

EXAMPLE 1   Map a Form A KY Pulse Setting to OUT401

Step 1: Select **Group 1 > Logic 1 > Output Contacts** from the ACSELERATOR QuickSet settings editor tree.

Step 2: Type **KYZD1** in the **OUT 401 Output Contact 401** equation box.

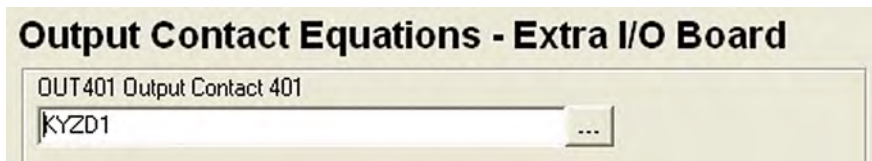Step 3: If necessary, repeat steps 1 and 2 to add an additional KY output.

Figure 16   Output Contact 401 Equation

> **Quick Tip:**
> KYZ pulses require solid-state output contacts.

EXAMPLE 2   Map a Form C KYZ Pulse Setting to OUT401/OUT402

Step 1: Select **Group 1 > Logic 1 > Output Contacts** from the ACSELERATOR QuickSet settings editor tree.

Step 2: Type **KYZD1** in the **OUT 401 Output Contact 401** equation box.

Step 3: Type **NOT KYZD1** in the **OUT 402 Output Contact 402** equation box.

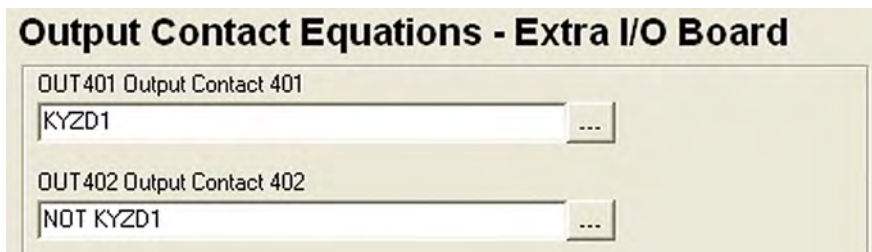Step 4. If necessary, repeat steps 1–3 to add an additional KYZ output.

Figure 17   Output Contact 401/402 Equations

> **Quick Tip:**
> If the number of KYZ outputs is half the expected value, divide the KE1 setting by two.

5. Date and Time Configuration Settings

a. Set the Date and Time

The SEL-734 internal time clock is accurate to 100 seconds per month. Use one of the methods listed below to improve time-clock drift.

–Configure MV-90 to set the clock during every read.

–Connect an SEL communications processor to Port 3.

–Set the time periodically using the DNP or Modbus protocol.

–Set the time with ACSELERATOR QuickSet Software.

–Connect an IRIG-B time-code input to the 2-pin terminal on the back of the SEL-734 (see *Figure 2*).

b. Daylight Savings Time (DST)

By default, the meter ships with the 2006 United States DST calendar. The meter begins DST on the first Sunday in April at 2:00 a.m. and ends DST on the last Sunday in October at 2:00 a.m.

> **Quick Tip:**
> *In 2007, the DST start and stop dates changed. Modify the SEL-734 DST settings accordingly.*

To enable DST, choose **Daylight Savings Time** from the ACSELERATOR QuickSet settings editor tree and select **Enable Daylight Savings Time Settings**. Enter or accept the default **Start Time** and **Stop Time**, then click **Start Dates** and **Stop Dates** to select the present DST schedule.

If the meter is connected to an external time source, disable the DST setting in the SEL-734 to avoid time-source conflicts.

c. Time Configuration Settings With MV-90

If using the **Auto Timeset** option as an MV-90 Master File setting:

–Disable the **Enable Daylight Savings** option in the SEL-734.

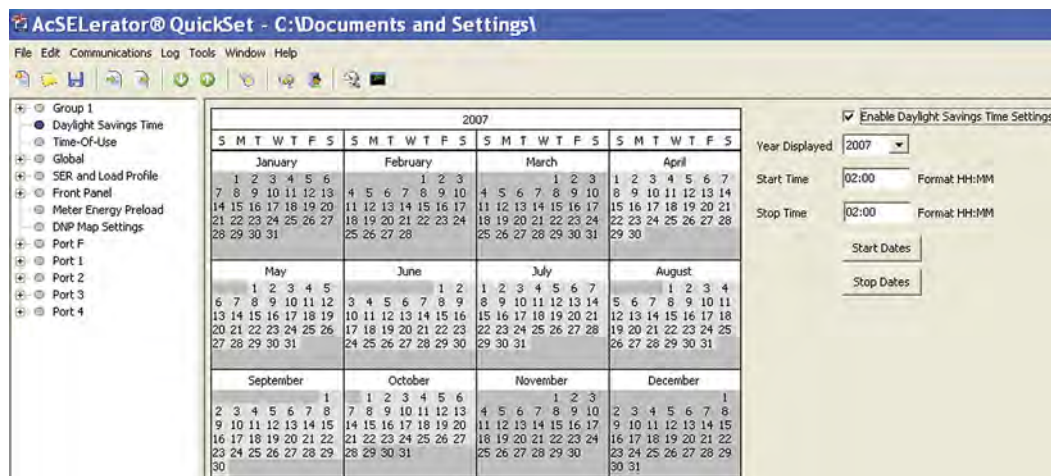–Do not connect an external time source. This keeps the meter clock synchronized with the PC clock and MV-90.

Figure 18   Daylight Savings Time Settings

6. Load Profile (LDP) and MV-90

The SEL-734P supports as many as 12 recorders each having 16 channels, with an acquisition rate of 3–59 second or 1–60 minute intervals. The Load Profile Settings LDLIST tool presents a list of all available LDP values.

Meter reading software built into ACSELERATOR QuickSet quickly retrieves, graphs, and exports LDP data in either .HHF or .CSV format. In addition, third-party meter reading software, such as MV-90 from Itron, can automatically read LDP data from the SEL-734. The data are also available through the SEL Ymodem, Modbus, and DNP protocols.
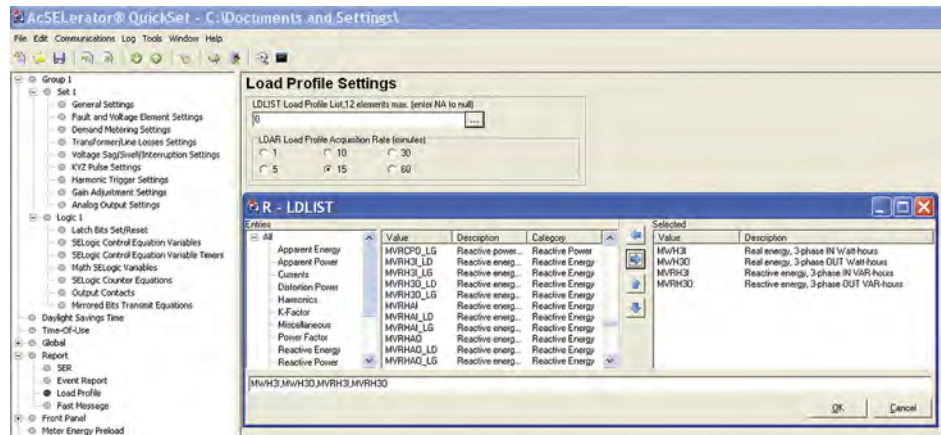

CAUTION: Sending new LDP settings clears the LDP records stored in the SEL-734.

Figure 19   Load Profile Settings

The SEL-734 follows the IEEE power flow notation as depicted in *Figure 20*. Verify this notation when selecting LDP quantities.
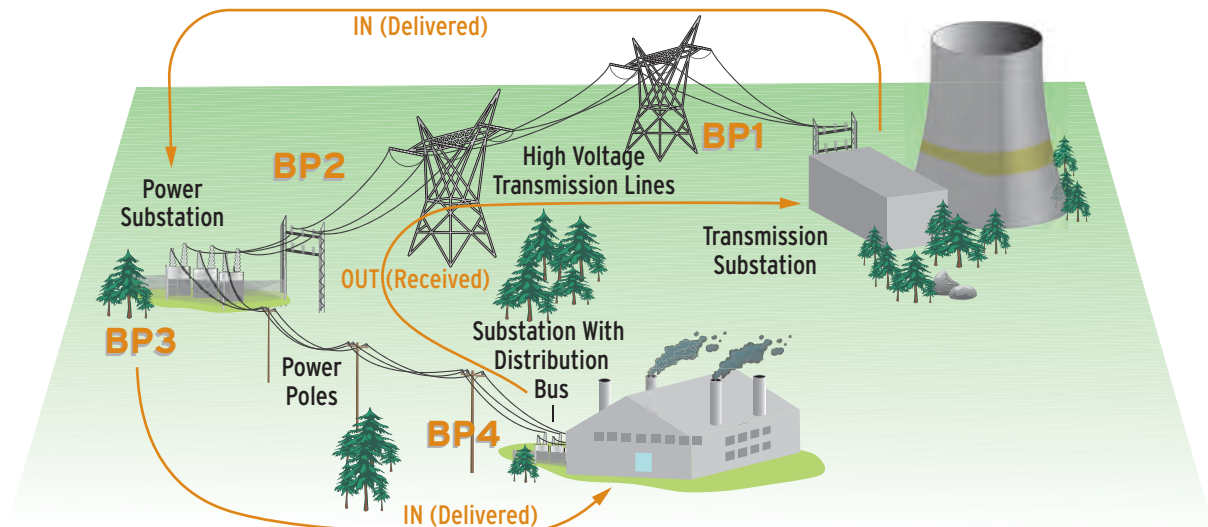

Figure 20   IEEE Power Flow Notation With Billing Points (BP) Shown

7. Scaling and Display Settings

The DECPL, SCALE, and DND configuration settings affect the number of decimal places, the scaling, and the number of digits shown in AcSELerator QuickSet meter reports. The FP_DECPL, FP_SCALE, and FP_DND configuration settings affect the SEL-734 front-panel LCD reports. Refer to *Table 2* for details on how these configuration settings scale each communications interface.

Table 2   Energy Interface Table

Interface	Scaling	Number of Digits	Number of Decimal Places	MEGA	KILO	UNITY	Pri	Sec	Rollover	Max Digits (including decimal places)
Front-Panel LCD	FP_SCALE	FP_DND	FP_DECPL	X	X	X	X		X	11
AcSELerator QuickSet Energy	SCALE	DND	DECPL	X	X	X	X		X	8
AcSELerator QuickSet LDP			2			X		X	X	9
Modbus Energy	x100		2			X		X	X	9
Modbus LDP	x100		2			X		X	X	9
Modbus Front Panel	FP_SCALE	FP_DND	FP_DECPL	X	X	X	X		X	9
DNP Counters			DECPLE OR PER POINT	X				X	X	2^{32} or 2^{16} depending on variation
DNP LDP Counters	x100		2			X		X	X	9
Fast Meter			FLOAT 32	X			X			6
Fast Message			0		X		X		X	9

8. Communications and Protocol Settings

The SEL-734 supports the communications protocols listed in *Table 3*. The Ethernet port supports three simultaneous Modbus TCP or Telnet (SEL ASCII) communications sessions, including one DNP3 LAN/WAN session. Port 4 supports three communications options, but only one is available at a time.

To change the communications parameters, click on the desired communications port followed by Communications in the AcSELerator QuickSet settings editor tree. Note that some options are unavailable for different protocols.

Table 3   Available Communications Protocols

Protocols	Ethernet (Port 1[a])	Serial: EIA-485, Modem, and EIA-232 (Port 2, Port 3, Port 4[a])	Front Port (Port F)
SEL ASCII	•	•	•
MODM	•	•	•
Modbus RTU		•	•
Modbus TCP	•		
DNP3[a]	•	•	•

[a] Additional cost option.

9. Send and Save Configuration Settings

After completing all configuration settings in AcSELerator QuickSet, save and send them as detailed in *Section IV. AcSELerator QuickSet SEL-5030 Software*.

V. Human-Machine Interface (HMI)

The ACSELERATOR QuickSet HMI displays instantaneous meter information, captures reports, and allows test and control of the SEL-734. To access the Meter and Control interface, choose **Tools > HMI > HMI** in the main ACSELERATOR QuickSet window.

To maneuver through the windows, click on the HMI tree-view list until the required display appears on the right-hand side. Press **F1** in the HMI window to view help on each interface.

Figure 21   Device Overview Window

A. Device Overview

The Device Overview window emulates the front-panel interface of the SEL-734 and updates approximately every second. This window displays instantaneous metering information, and contact I/O and front-panel LED status.

B. Phasors

Phasor diagrams are a powerful troubleshooting tool. Technicians and engineers can quickly determine and resolve wiring issues at a glance. This section contains phasor diagrams from three example installations. *Example 3* depicts a phasor diagram from a properly wired installation. *Example 4* and *Example 5* depict the most common wiring issues.

Figure 22   Correct Phase Rotation

EXAMPLE 3   Correct Phase Rotation

Figure 22 illustrates a balanced, three-phase, ABC rotation installation with lagging power factor. Study the phasors in the counterclockwise direction and note that they read as A-B-C. The SEL-734 registers Watt-hours delivered for this condition.

Use the Phase Rotation button at the bottom of the screen to switch phasor calculation reference between clockwise ABC and counterclockwise ACB phase rotation. Click the buttons to the right of the phasor quantities to hide individual phase vectors.
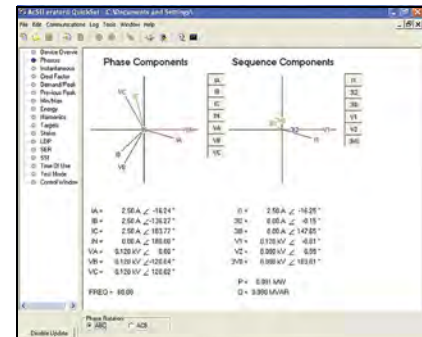
EXAMPLE 4   Incorrect Phase Rotation

Figure 23 illustrates the phasor diagram of a balanced, three-phase installation with lagging power factor and two swapped phases. Note that the phasor diagram reads counterclockwise A-C-B. This phasor response indicates that the VB/VC and IB/IC connections are swapped. The system responds with unexpected ACB phase rotation instead of the IEEE standard ABC rotation. The SEL-734 still registers energy correctly, but the power quality functions will not operate correctly.
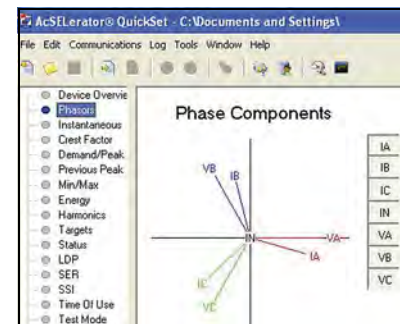

Figure 23   Incorrect Phase Rotation

EXAMPLE 5   Reversed CT Connections

Many times CT polarity convention varies from site to site, which can lead to reversed CT connections. The top label of the SEL-734 indicates CT polarity convention with a dot that denotes current flow out of the instrumentation transformer and into the SEL-734 CT terminal.

Figure 24 illustrates the phasor diagram of a balanced, three-phase installation with lagging power factor and reversed IA, IB, and IC connections. Note the abnormal position of the phase current with respect to their phase voltages. The SEL-734 incorrectly registers Watt-hours received for this condition.
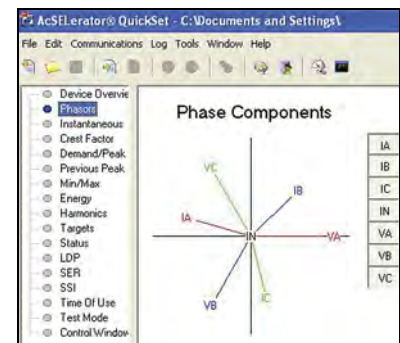

Figure 24   Reversed CT Connections

C. LDP and SSI

The ACSELERATOR QuickSet HMI displays Load Profile and Voltage Sag/Swell/Interruption (VSSI) reports. To capture any of these reports, select the required date range and click **Export**.

1. Load Profile (LDP)

The meter adds an entry to the load profile recorder at the interval set by the LDAR setting. This entry contains the time stamp, the present value of the selected LDLIST analog quantities, and a checksum.

2. Voltage Sag/Swell/Interruption (VSSI)

The SEL-734 meter records voltage sags, swells, and interruptions with 1 ms accuracy. Enable and configure VSSI in the Voltage Sag/Swell/Interruption Settings window of ACSELERATOR QuickSet Software.

Figure 25   LDP Graph in HMI

D. Test Mode

The ACSELERATOR QuickSet HMI allows simple test mode interaction and eliminates the need to navigate through the front panel to enable test mode. While in test mode, the SEL-734 stops collecting LDP and Demand data and places an asterisk next to records in the LDP report.

To place the meter into test mode, select a Test Mode Quantity from the drop down box and click **Enter Test Mode**. The test mode window depicts an optical port that pulses a red test pulse in conjunction with the actual front optical port. Click **Exit Test Mode** at the end of an accuracy test to restore normal meter operation.

> **Quick Tip:**
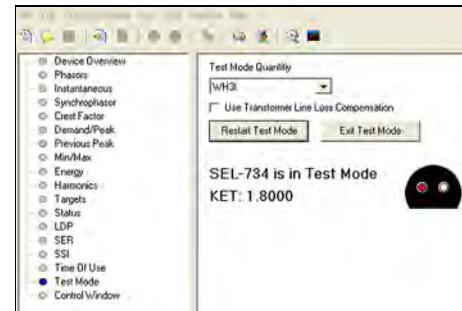> The QuickSet HMI supports all rear-panel communications ports when in test mode.

Figure 26   Test Mode

E. Control Window

The control window provides an interface to set the date and time, reset data, and test output contacts. For example, to set the time, click **Set** next to the Time edit box to update the timer in the meter.

ACSELERATOR QuickSet Software prompts for a 2AC password before it will control the meter or reset data. See *Section VI. Security and Passwords* for additional information.

> **Quick Tip:**
> To reset the Peak Demand, click the Reset button under Peak.
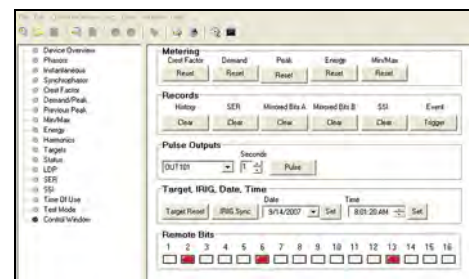

Figure 27   Control Window

VI. Security and Passwords

A. Security

The SEL-734 supports four access levels to prevent unauthorized entry. The *Table 4* describes the default passwords and the capabilities of each access level. The user must enter the ACC access level before entering the EAC or 2AC access levels.

Table 4   Default Passwords and Access Levels

Access Level	Terminal Prompt	Default Password	Password Change Command	Capability
0AC	=	NA	NA	Entry access level
ACC	=>	OTTER	PAS 1 "PASSWORD"	View configuration settings and meter data
EAC	E=>	BLONDEL	PAS E "PASSWORD"	Reset demands and perform all ACC commands
2AC	=>>	TAIL	PAS 2 "PASSWORD"	Change configuration settings, reset all data, and perform all EAC and 2AC commands

B. Changing Passwords

To prevent unauthorized access, set strong passwords as described in the steps below. For example, the password **OTTER** is weak because it is a six-character word found in the dictionary. The password **O#h"pVw&** is strong because it is random, undefined, and contains eight characters.

Step 1.   Click **Tools > Terminal** in ACSELERATOR QuickSet to open the Terminal window.

Step 2.   Type **ACC <Enter>** at the terminal prompt.

Step 3.   Enter the ACC level password (**OTTER**).

Step 4.   Type **2AC <Enter>** at the terminal prompt.

Step 5.   Enter the 2AC level password (**TAIL**).

Step 6.   Type **PAS 1 0||3R** to change the ACC level password from **OTTER** to **0||3R**.

```
FEEDER 1                              Date: 09/06/07  Time: 15:40:56:350
STATION A                                             Time Source: int

Level 2
->>PAS 1 weak
Set
->>PAS E StrONg
Set
->>PAS 2 0#h"pVw&
Set
->>PAS
1:weak
E:StrONg
2:0#h"pVw&
->>
```

Step 7.   Type **PAS E B10nd3l** to change the EAC level password from **BLONDEL** to **B10nd3l**.

Step 8.   Type **PAS 2 |^il** to change the 2AC level password from **TAIL** to **|^il**.

Step 9.   Type **PAS** to review and verify the passwords.

Step 10. Record the new passwords on a piece of paper and store in a secure place.

Step 11. Type **QUI** to set the meter back to 0AC level.

VII. Factory Support

We appreciate your interest in SEL metering products and services. If you have questions or comments, please contact us at:

Direct meter support line: +1.509.334.8793

Meter support email: metersupport@selinc.com

Metering website: *www.selmeters.com*

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