



SEL-735 Power Quality and Revenue Meter

Now ANSI C12.20-2015,
0.1 Accuracy Class Compliant
and With 1 GB Storage



The SEL-735 meter combines leading power quality capabilities with exceptional revenue metering accuracy at an economical price. Power quality reports with IEC 61000-4-30 Class A compliance help identify and troubleshoot problems in power system equipment. Advanced communications deliver critical and historical information in real time to virtually any communications system. The SEL-735 is the essential meter for substation, power plant, and industrial metering.

Features and Benefits

- Achieve high-accuracy revenue metering under real-world conditions with compliance to ANSI C12.20-2015, 0.1 and IEC 62053-22:2003 0.2 accuracy class requirements.
- Capture every power quality disturbance with preconfigured logs and triggers.
- Compare power quality measurements across the system with IEC 61000-4-30 Class A power quality compliance.
- Perform onboard statistical calculations while reporting only critical information to save system bandwidth and server storage space.
- Capture and log years of data with 512 logging channels, 10,000 event reports, and more than 130,000 voltage events with 1 GB storage.
- Standardize on one revenue meter for generation, transmission, distribution, intertie, main entrance, and submeter applications.
- Perform real-time monitoring of the Power System with IEEE C37.118-2014 compliant synchrophasor data.
- Troubleshoot power system issues through the use of real-time oscillography functionality.
- Integrate into virtually any system with copper or fiber-optic Ethernet, serial, multidrop, infrared, or telephone modem communications.
- Deliver complete billing data to Itron[®] MV-90[®] software over any communications port.
- Simultaneously communicate with as many as ten other devices using industry standard protocols including DNP, synchrophasor measurements, Modbus[®], and IEC 61850.
- Synchronize metering time to IRIG-B, power line frequency, DNP3, Modbus, MV-90, SNTP, or manual input.
- Upgrade meters over serial and Ethernet ports using digitally signed firmware files.
- Start metering in less than five seconds after turning on the meter.

One Package, Three Flexible Solutions

Three SEL-735 variants provide a meter for any application and any budget.

Table 1 SEL-735 Power Quality and Recording Options

PQ and Recording	SEL-735 Basic	SEL-735 Intermediate	SEL-735 Advanced
Memory	128 MB	256 MB	1 GB
Max Harmonic Order	15th	63rd	63rd
Interharmonic Quantities	No	No	Yes
Harmonic Angles	No	No	Yes
Power Harmonics	No	No	Yes
Waveform Capture Event Reports			
Samples Per Cycle	16	16, 128	16, 128, 512
Duration (cycles)	15	15–600	15–600
Number of Events	256	33–6,200	101–10,000
COMTRADE Reports	Y	Y	Y
Wave View Oscillography	N	N	Y
Load Profile Recorder			
Recorders x channels	1 x 16	12 x 16	32 x 16
Acquisition rates	1–120 minutes	3–59 s, 1–120 minutes	3–59 s, 1–120 minutes
Storage duration for 10 minute interval data			
16 channels	10 years	20 years	20 years
192 channels	N/A	1.5 years	9.5 years
512 channels	N/A	N/A	3.5 years
Voltage Sag, Swell, Interruption (VSSI) Recorder			
Typical number of summary events	260	260	600
Number of detailed rows	60,000	60,000	130,000
Minimum disturbance duration	1/4 cycle	1/4 cycle	1/4 cycle
Sampling rate	4 samples/cycle–1 sample/day, adaptive	4 samples/cycle–1 sample/day, adaptive	4 samples/cycle–1 sample/day, adaptive
Sequential Events Recorder			
Number of events	> 80,000	> 80,000	> 80,000
Number of channels monitored	≤ 72	≤ 72	≤ 72

Table 2 SEL-735 Compliance With IEC 61000-4-30 Power Quality Standard (Sheet 1 of 2)

A refers to IEC 61000-4-30:2015 Class A compliance

IEC 61000-4-30 Requirement	SEL-735 Basic PQ	SEL-735 Intermediate PQ	SEL-735 Advanced PQ
General			
150/180-cycle, 10-min. aggregation	–	A ^a	A ^a
2-hour aggregation	–	A	A
Real-time clock uncertainty	A	A	A
Power Quality Parameters			
Power frequency	A	A	A
Magnitude of the supply voltage	A	A	A
Flicker	–	A (10 min, 2 hr updates)	A (1 min, 10 min, 2 hr updates)
Supply voltage interruptions, dips, and swells	A	A	A

Table 2 SEL-735 Compliance With IEC 61000-4-30 Power Quality Standard (Sheet 2 of 2)

A refers to IEC 61000-4-30:2015 Class A compliance

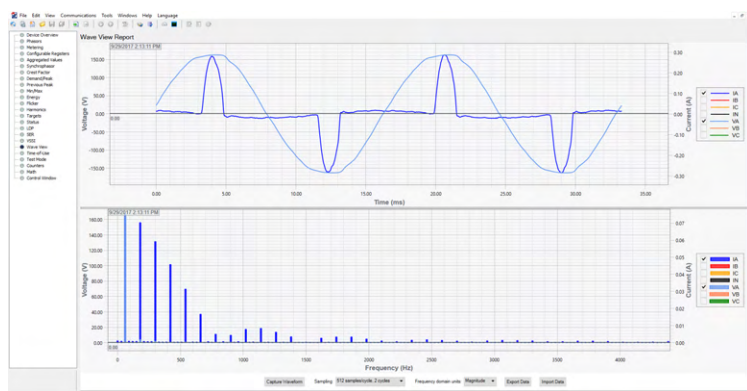
IEC 61000-4-30 Requirement	SEL-735 Basic PQ	SEL-735 Intermediate PQ	SEL-735 Advanced PQ
Supply voltage unbalance	A	A	A
Voltage harmonics	A	A	A
Voltage interharmonics	—	—	A ^b
Magnitude of current	A	A	A
Harmonic currents	A	A	A
Interharmonic currents	—	—	A ^b
Current unbalance	A	A	A

^a Complies with IEC 61000-4-30 Class A requirements, as tested according to IEC 62586-2. See Section 5: Metering in the SEL-735 Instruction Manual for details on the implementation.

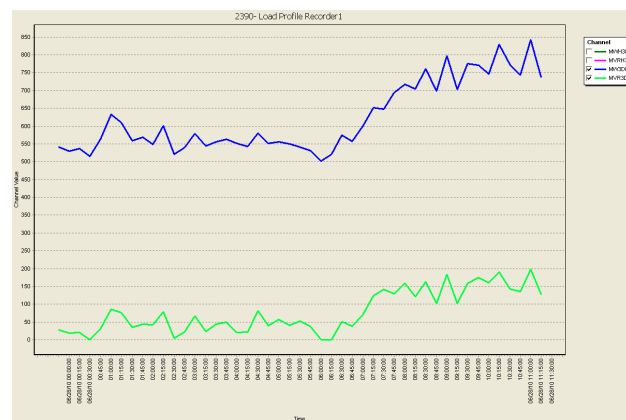
^b The SEL-735 does not aggregate interharmonic quantities.

Power Dashboard

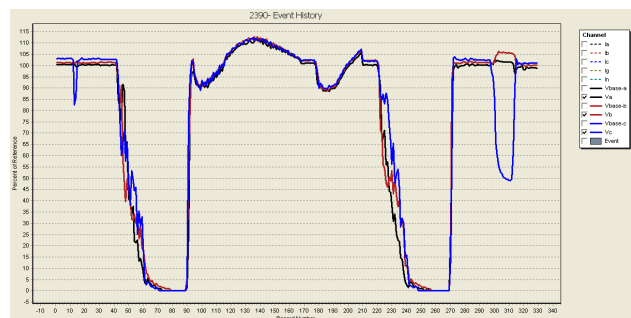
Monitor the state of the power system using no-cost ACSELERATOR QuickSet[®] SEL-5030 Software. View real-time voltage and current signals in both time and frequency domains with the Wave View oscillography functionality. Quickly assemble an overview of the most important system parameters. Load profile trending displays voltage, current, power, and harmonic information. Record years of voltage, current, power, frequency, and harmonic information on a per-phase basis.



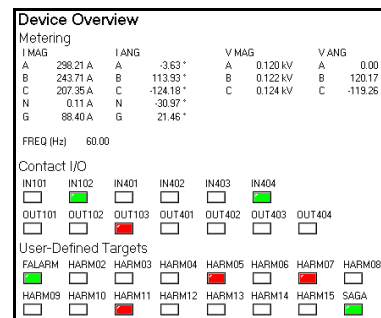
Real-Time Waveform Capture-Wave View Feature



Load Profile trends power draw and energy consumption



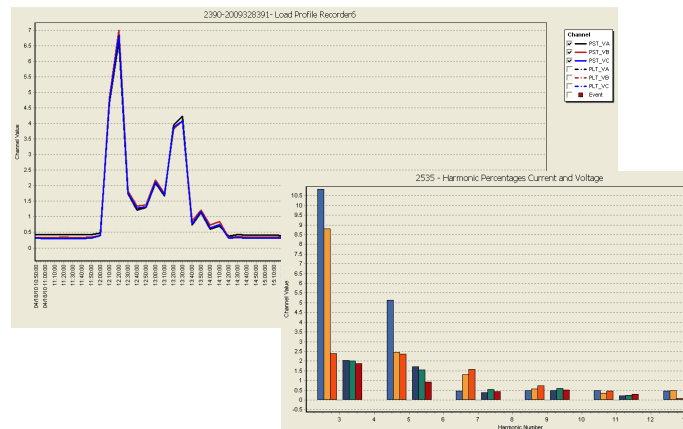
Voltage/Sag/Swell/Interruption reports system interruptions with 4 ms resolution



Meter monitoring software standard with the SEL-735

Power Quality Measurements

- IEC 61000-4-30 Class A power quality compliant
- Statistical trending of virtually any parameter, including:
 - Voltage and current
 - Frequency
 - Individual harmonics up to the 63rd
 - Total harmonic distortion (THD)
 - Unbalance—symmetrical components
- Sags, swells, and interruptions
- Flicker measurement
- Waveform capture of as many as 512 samples/cycle

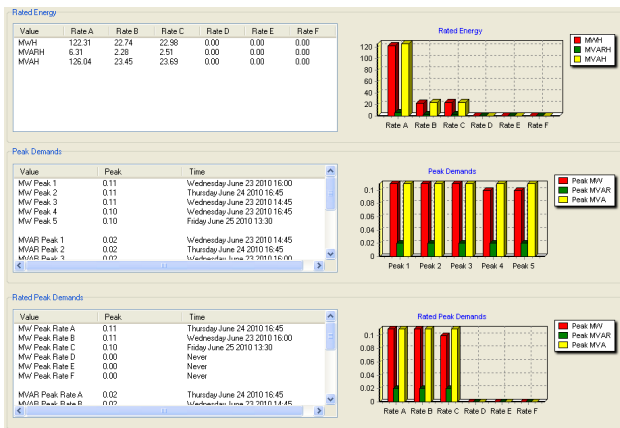


Flicker and harmonics reports help
locate system disturbances

High-Function Metering for Substations, Power Generation, and Industrial Loads

Revenue metering applications require a diverse set of features to cover both new and legacy metering requirements. The SEL-735 supports a large feature set to cover a wide range of metering needs.

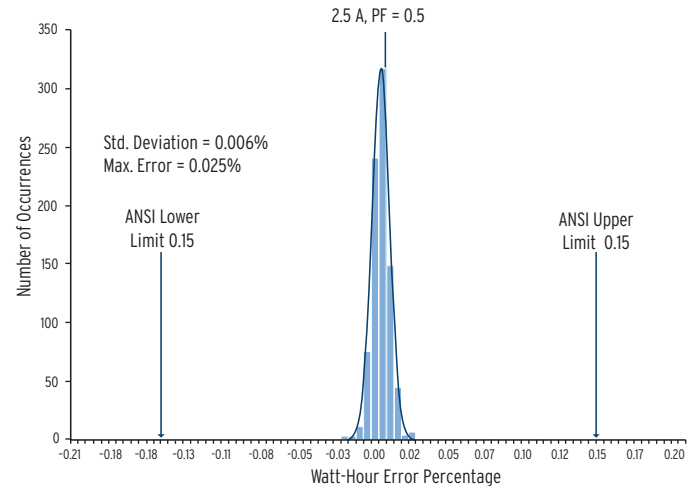
- 4-Quadrant Metering
- Multiple Load Profile Recorders
- Time-of-Use Metering
- Transformer/Line-Loss Compensation



TOU stores and resets peak demand data

High-Accuracy Metering for High-Value Applications

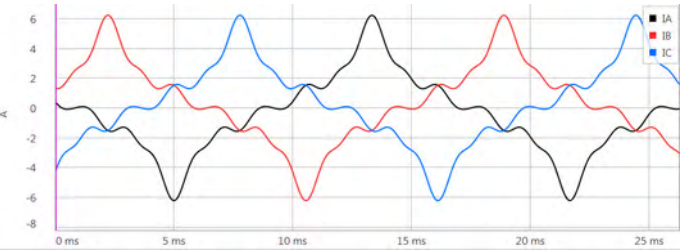
Exceeds the requirements of ANSI and IEC accuracy standards over a wide current range. The SEL-735 outperforms the new non-sinusoidal requirements of ANSI C12.20 and provides high accuracy over an extended operating range and other influencing quantities, as listed in ANSI and IEC revenue metering standards. All meters ship with individual calibration certificates.



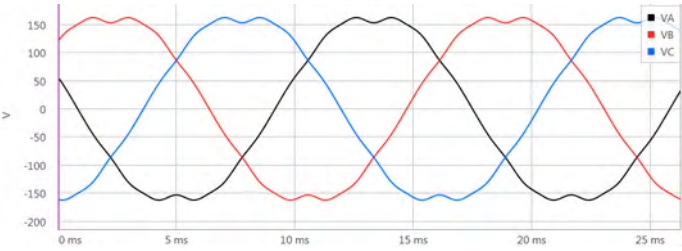
Accuracy-test results of approximately 1,000 SEL-735 Meters report a maximum error of 0.025 percent, outperforming ANSI 0.1 and IEC 0.2 accuracy class requirements.

Reliable and Precise Metering Under Non-Sinusoidal Waveforms

The SEL-735 accurately reports bi-directional energy even in the presence of harmonics and distorted waveforms. When tested with peaked waveform distortion, the SEL-735 reports with an error of just 0.006 percent.



ANSI Test #41 Peaked Current Waveform



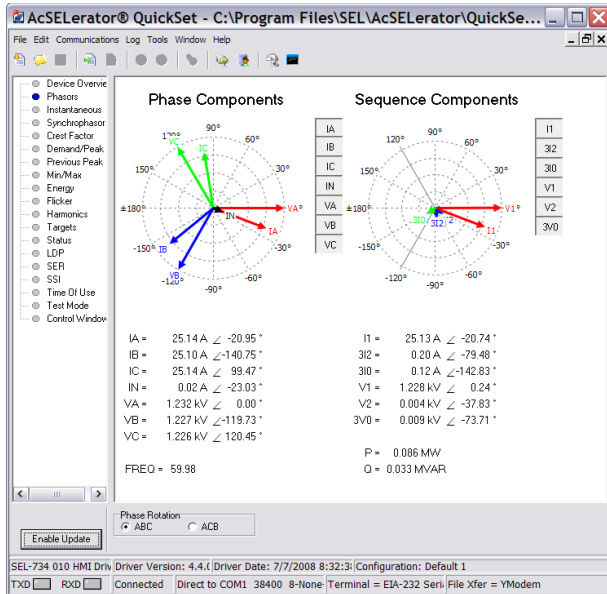
ANSI Test #41 Peaked Voltage Waveform

Table 3 SEL-735 Performance With Peaked Waveform Distortion

Voltage Waveform	Current Waveform	0.1 Accuracy Class Reference Performance (%)	SEL-735 Measured Error (%)
Sinusoidal	Sinusoidal	±0.05	0.003
Sinusoidal	Peaked Current Waveform	±0.2	0.006
Peaked Voltage Waveform	Peaked Current Waveform	±0.3	0.006

Simplified Setup and Troubleshooting

- Use ACSELEATOR QuickSet to customize your metering. Set and edit meter configuration, settings, and logic.
- View the HMI screens in ACSELEATOR QuickSet to view power system waveforms in real time, and to check wiring connections, phase rotation, and power flow direction.
- Voltage and current sequence elements allow fast troubleshooting of miswired installations.

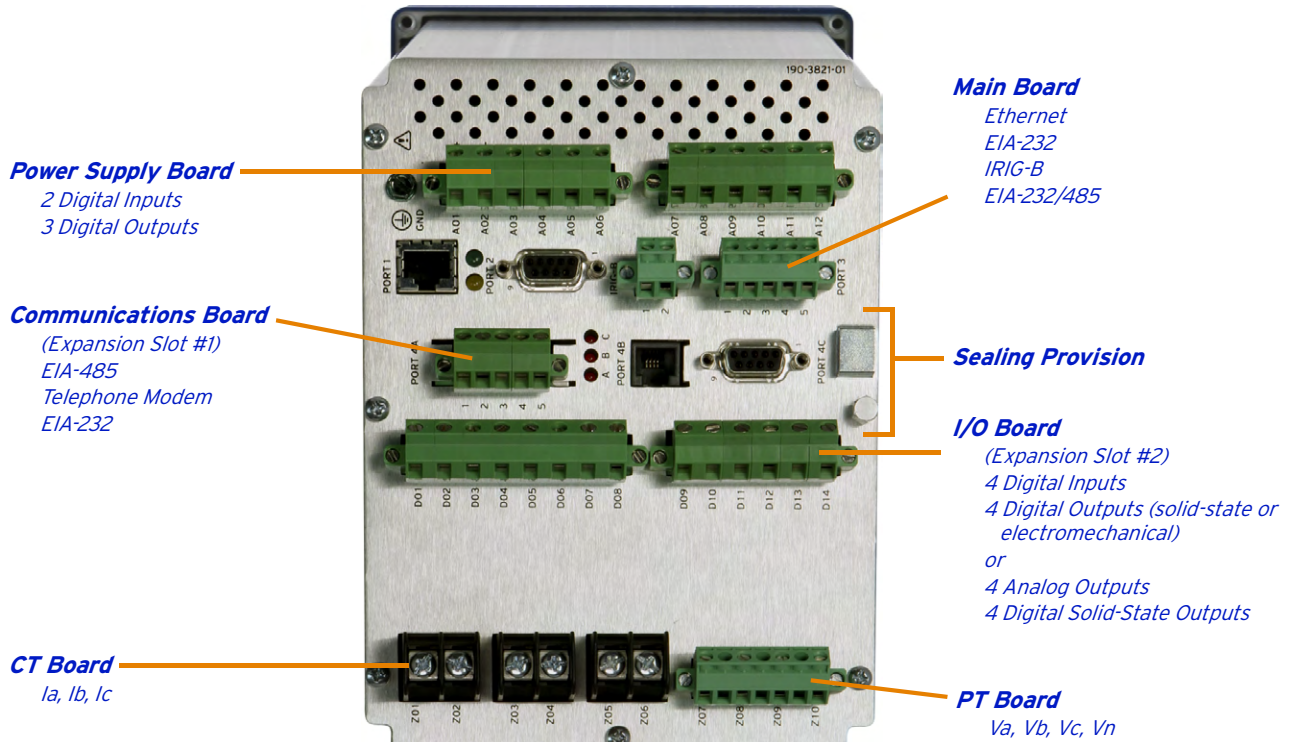


Feature Overview

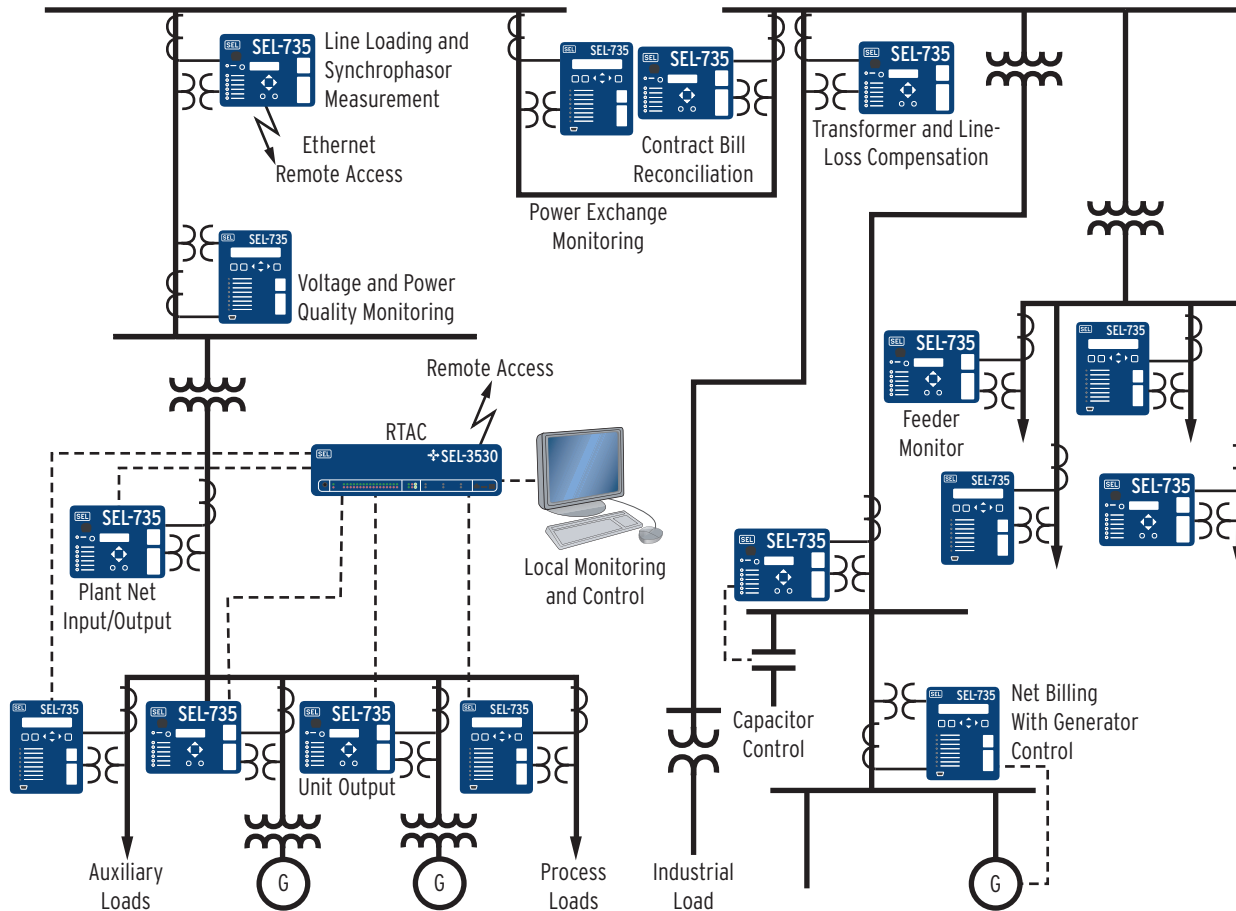
- Form 5, 3-Wire Delta, Form 9, 4-Wire Wye, and Form 36, 4-Wire Wye metering connections
- ANSI C12.20 0.1 (Form 5 and Form 9), ANSI C12.1 (Form 36), and IEC 62053-22 0.2 S accuracy class compliant and exceeding
- Rack-mount, panel-mount, easily extractable meter (EXM), wall-mount, and NEMA enclosure options
- Simultaneous Ethernet, EIA-485, EIA-232, telephone modem, and optical probe communications
- Real Time Synchrophasor data with IEEE C37.118-2014
- Enhanced SELOGIC[®] control equations
- Communication protocols
 - SEL ASCII
 - Modbus RTU/TCP
 - TCP/IP
 - Y-Modem
 - SEL Fast Operate/Fast Meter
 - MIRRORING BITS[®] communications
 - SEL Distributed Port Switch (LMD)
 - DNP3 Serial and LAN/WAN
 - IEC 61850
 - IEEE C37.118.2
 - MV-90
 - Telnet
 - SNTP
 - FTP
- Inputs/outputs
 - 2 digital inputs, 3 electromechanical outputs
 - 4 digital inputs, 4 KY outputs with programmable Ke
 - 4 digital inputs, 4 electromechanical outputs
 - 4 analog outputs, 4 KY outputs with programmable Ke

Product Overview

Advanced Display and Controls



Functional Overview



SEL-735 Capabilities

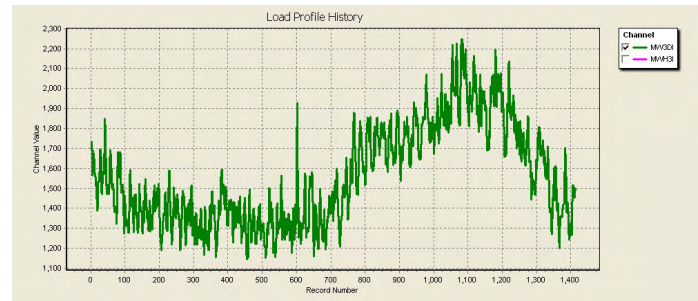
Accurate Revenue Metering

The SEL-735 exceeds ANSI C12.20 0.1 and IEC 62053-22 0.2 S accuracy class requirements with a 0.06 percent Wh guarantee. Transformer/line-loss compensation adds to meter accuracy when the meter location and billing points differ. Instrument transformer compensation removes the magnitude and phase error introduced by CTs and PTs. ACSELERATOR QuickSet provides a simple test mode interface to easily verify meter accuracy.

Load Profile Recorder

Independent load profile recorders in the SEL-735 allow simultaneous meter and power quality logging of as many as 512 data channels. Trend averages, minimums, maximums, changes, and snapshots at a rate of once every three seconds.

ACSELERATOR QuickSet offers a fast and simple method to retrieve, plot, and export load profile data to .HHF or .CSV formats. Itron MV-90 meter reading software communicates to any SEL-735 communications port and automates meter reads for large-scale metering installations.



Save LDP data in .HHF or .CSV formats.

Communications and I/O

Select from six communications protocols and five physical communications interfaces, including 10/100BASE-T, 100BASE-LX10, or 100BASE-FX Ethernet. Advanced communications and protocols, such as IEC 61850, synchrophasors, and DNP3, reduce the need for analog and digital outputs. When installations communicate with legacy equipment, SEL offers digital and analog output options for the SEL-735. The SEL-2800 Fiber-Optic Transceivers provide electrically isolated communications paths between EIA-232 ports.

Power Quality Capabilities

Measure and Record the Following:

- IEC 61000-4-30 Class A compliant current, voltage, power, frequency, supply voltage interruptions, dips and swells, harmonics, interharmonics, flicker, and unbalance
- Measurement aggregation in 10/12-cycle, 3-second*, 10-minute*, and 120-minute* intervals
- Harmonic phase angles for voltage and current*
- High-resolution, 512-samples/cycle waveform capture*
- Total harmonic distortion (THD), crest factor, and K-factor metering with up to 63rd harmonic content
- High-speed load profile recording with three-second resolution*
- VSSI
- Symmetrical components (unbalance)
- Real-time waveforms with the Waveview oscillography functionality*.

* Optional features listed. See the tables in *One Package, Three Flexible Solutions* for details.

VSSI Recorder

Correlate system disturbances with the voltage sag/swell/interruptions (VSSI) recorder. Enabled from the factory, the VSSI recorder time-stamps voltage excursions with as high as 4 ms resolution and records indefinitely using an adaptive sampling rate. The SEL-735 stores and reports residual voltage, duration, affected phases, CBEMA/ITIC reports, and time stamp of occurrence. The VSSI settings include trigger thresholds from $\pm 3\%$ to $\pm 100\%$ of the actual value and automatic recording duration dependent on the length of the voltage excursion. ACSELERATOR QuickSet and ACSELERATOR Meter Reports automatically graph and analyze VSSI data that include an export feature. Applications with SCADA systems can also retrieve these data using the DNP3 or IEC 61850 protocol.

Time-of-Use (TOU) Metering

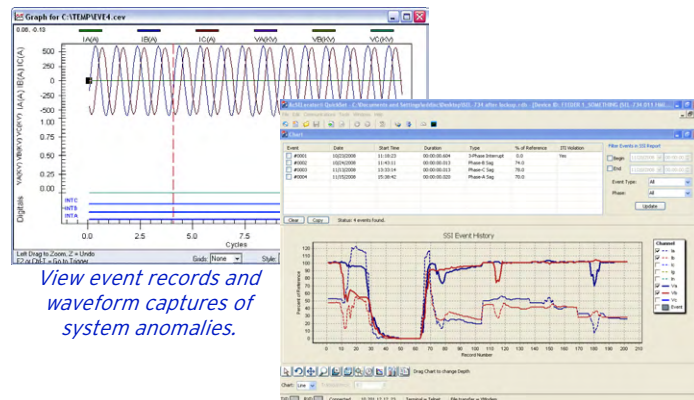
Record demand and energy consumption with a user-defined calendar; use TOU metering to bill consumption at different rates based on season, day type, and time of day. The program automatically self-reads and resets demand; there is no need to manually reset meters.

Harmonic Metering

Monitor, record, and control using individual harmonic values, THD, and K-factor with resolution up to the 63rd harmonic.

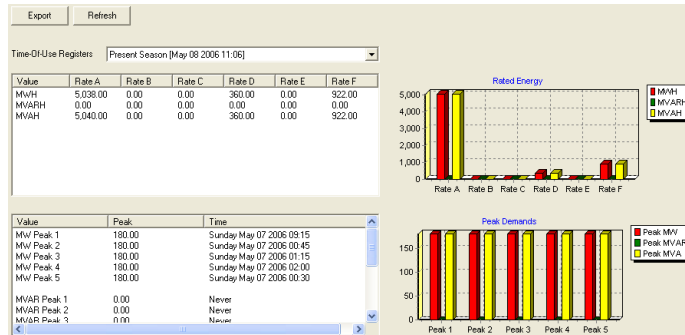
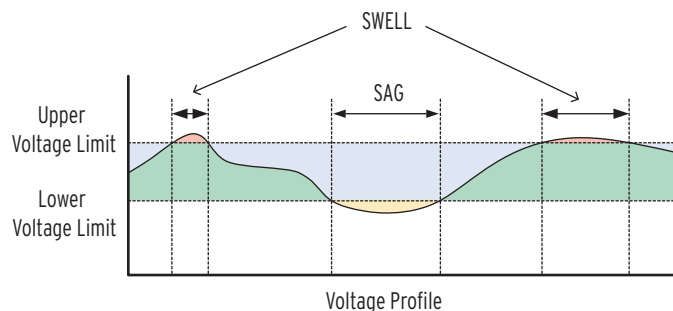
Interharmonic Metering

Measure, record, and control using Group THD. Measure interharmonics from 1 Hz to 3800 Hz in 1 Hz bins. Retrieve interharmonics with 1 Hz resolution through the Wave View functionality, available only on the Advance PQ option SEL-735 meters.

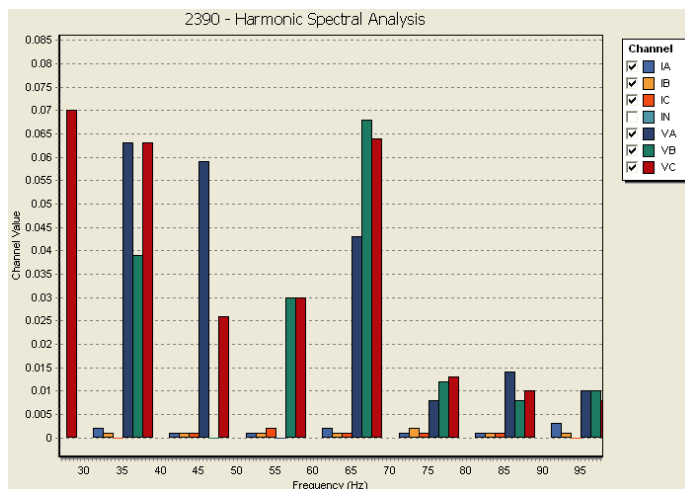


View event records and waveform captures of system anomalies.

VSSI reports detail system interruptions with 4 ms resolution.



TOU stores and resets peak demand data.



Advanced Capabilities

Transformer/Line-Loss Compensation

When the contractual billing point differs from the meter location, use transformer and line-loss compensation (TLLC) to optimize the metering location and reduce the instrument transformer costs. Both compensated and uncompensated values are stored in the meter to simplify site verification.

Instrument Transformer Compensation

Use ITC to correct for ratio and phase shift that occurs in the secondary signal to provide improved measurement accuracy.

Synchronized Phasor Measurement

Provide the SEL-735 with an SEL IRIG-B time source to measure the system angle in real time with a performance that meets the IEEE C37.118-2014 P class requirements. Measure instantaneous voltage and current magnitude and phase angles in real time to improve system operation with synchrophasor information. Use synchrophasor data for direct state measurement, study validation, or for tracking system stability.

The SEL-3373 Station Phasor Data Concentrator (PDC) or SEL-5073 SYNCHROWAVE® Phasor Data Concentrator Software* PDC combines and archives time-synchronized data from multiple measurement sources, such as the SEL-735.

*Additional cost software.

Predictive Demand

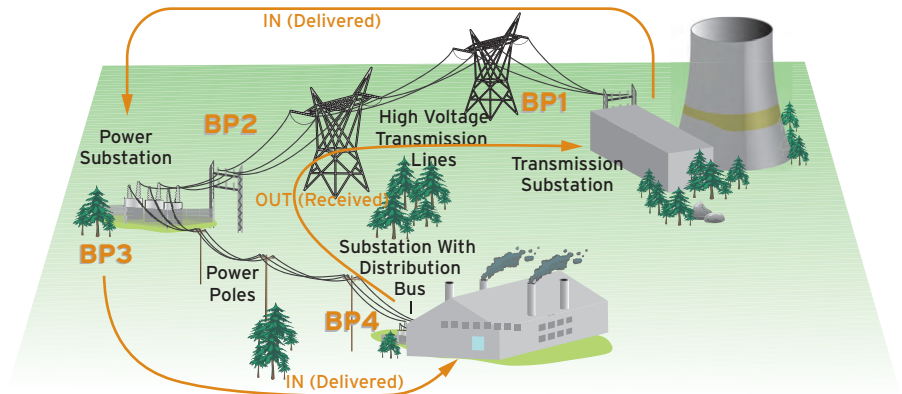
The predictive demand function monitors accumulated demand and alarms when the demand exceeds a user-defined limit or SELOGIC expression. The SEL-735 can then shut down loads or peak-shave with generation to avoid demand charges as shown to the right. The predictive demand alarm is available through IEC 61850, Modbus, DNP, MIRRORED BITS communications, or the front-panel LEDs.

Frequency Recording

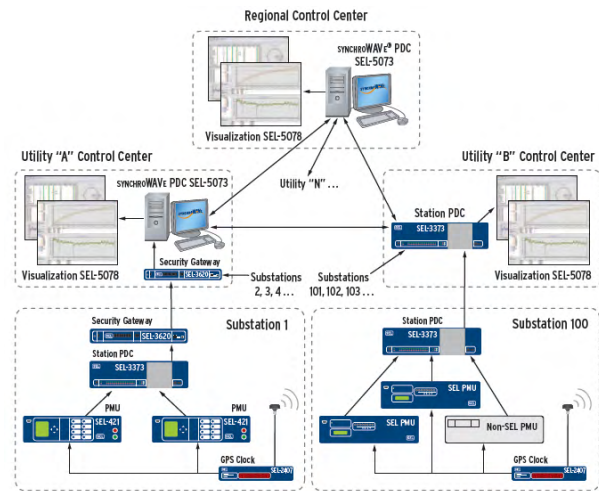
Measure frequency for local and remote indication or use in control and data acquisition. Use a load profile recorder for a "strip chart" record of the frequency as often as every three seconds.

Minimum/Maximum Metering

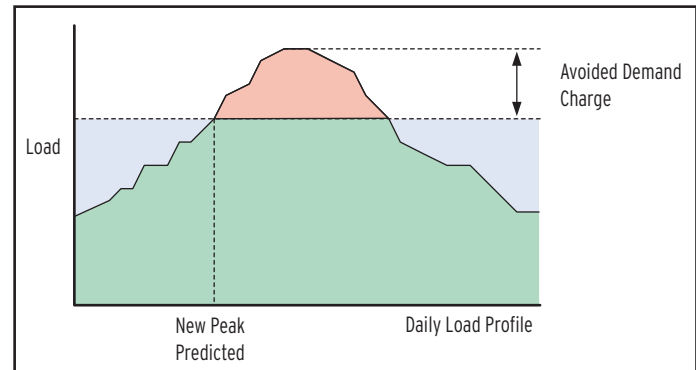
The SEL-735 automatically records the date and time of minimum and maximum voltage, current, and power measurements. Use this capability for equipment selection, troubleshooting, and diagnosis of any installation.



Choose from four billing and metering points with TLLC.



View system angle at multiple locations.



Reduce peak demand charges with the predictive demand alarm.

	Max	Date	Time	Min	Date	Time
IA (A)	2545.73	07/11/07	16:06:35.226	0.08	07/14/06	16:39:05.645
IB (A)	2317.88	07/11/07	16:06:35.226	0.05	08/31/06	15:05:45.316
IC (A)	2375.98	07/13/07	13:12:56.813	0.05	08/30/06	23:02:10.113
IN (A)	1.00	08/16/06	08:21:49.975	0.06	07/12/06	11:49:43.399
VA (RV)	123.63	09/12/07	09:45:39.150	0.12	07/12/06	13:56:43.811
VB (RV)	126.11	09/12/07	09:45:42.750	0.12	07/12/06	14:49:11.324
VC (RV)	123.00	09/12/07	09:45:39.150	0.12	08/31/07	17:25:07.585
P3p (MW)	396.39	09/12/07	09:45:40.350	-0.00	07/13/06	08:09:31.865
Q3p (MVAR)	77.36	09/12/07	09:45:42.750	-0.03	03/22/07	17:06:07.948
LAST RESET	06/16/06	14:37:25.075				

Capture minimum/maximum quantities with half-cycle resolution.

Advanced Capabilities (Continued)

Logging and Recording

Store more than 80,000 sequential events records capturing any power quality disturbance. Retrieve data by using ACSELERATOR QuickSet, Modbus, DNP3, IEC 61850, or ASCII. Store and analyze waveform capture data through use of ACSELERATOR QuickSet.

Automatic Event Reporting

After recording an event report, the SEL-735 can automatically report event data through SEL, IEC 61850, or DNP3 protocols to a communications master. ACSELERATOR TEAM® SEL-5045 Software can automatically collect SEL-735 waveform data without the need for manual retrieval.

Cybersecurity Features

Four password levels provide controlled access to metering data and ensure protection of critical meter configuration and data. Port Security settings allow three permission levels that provide controlled read and write access to the ports.

The meter verifies the authenticity and integrity of firmware files during upgrades by using a checksum and cryptographic signature. Any mismatch during a firmware upgrade will cause the meter to reject the file.

#	Date	Time	Element	State
10	11/19/08	15:24:28.327	SALARM	Assorted
9	11/19/08	15:24:29.327	SALARM	Deasserted
8	11/19/08	15:23:59.527	TRIP	Assorted
7	11/20/08	09:14:23.327	REMOVED	Assorted
6	11/20/08	09:15:09.302	SALARM	Deasserted
5	11/20/08	09:15:10.302	SALARM	Assorted
4	11/20/08	09:15:10.627	SALARM	Assorted
3	11/20/08	09:15:11.627	SALARM	Deasserted
2	11/20/08	10:08:40.927	SALARM	Assorted
1	11/20/08	10:08:41.927	SALARM	Deasserted

Monitor device and power system events with the Sequential Events Recorder (SER).

Programmable Logic (SELogic Control Equations)

The meter provides user-programmable logic to combine meter calculations, contact inputs, remote command inputs, and timers to control internal logic and contact outputs. The logic allows the following operations:

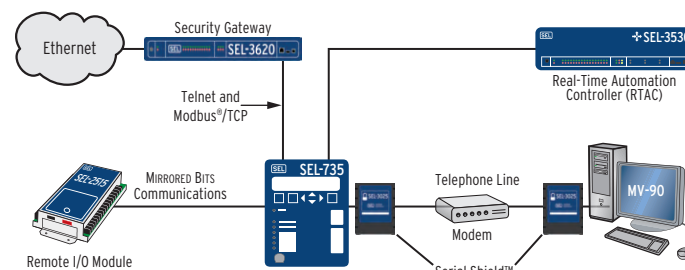
- Logic (OR, AND, NOT)
- Math (+, -, x, /)
- Analog compare (>, <, <=>, =, >=, <=)
- Triggers (RISING EDGE, FALLING EDGE)
- Sixteen latches
- Sixteen remote-control logic units
- Sixteen programmable logic variables with pickup and dropout timers
- Sixteen programmable analog variables

Metering Integration

Communication Integration and Security

Use the SEL-735 as part of a complete station integration package. Retrieve metering values with comprehensive security:

- Multitiered password protection
- Port security configuration
- Copper or fiber-optic Ethernet
- DNP3, IEC 61850, Modbus®, Fast Message, SEL, and MIRRORED BITS communications protocols
- Itron MV-90 compatible over serial, modem, and Ethernet



Integrate with many communications paths.

Test Block Integration

SEL supplies several types of test block as accessories for the SEL-735. Upon request, SEL will prewire the SEL-735 to a test switch installed in a rack-mount bracket, appearance bezel for panel mounting, indoor enclosures, and outdoor enclosures.

Metering Integration (Continued)

Outdoor Enclosure

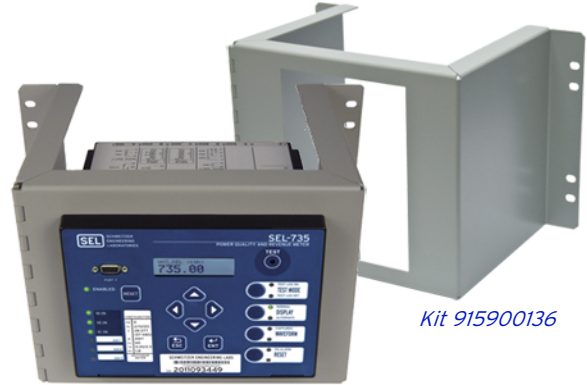
- Replace socket meters with a low-cost enclosure and prewired FT-1 test switch.
- Quickly install the meter with the support of thoughtful design details, such as DIN rails for accessories; a lockable, stainless steel latching system; wall-mount brackets; and wire clamps. The fully sealed enclosure complies with NEMA 4X, IEC 529, and IP66 protection requirements.



Outdoor Enclosure Mounting

Mounting Options and Accessories

Refer to the Metering Accessory Catalog, available at selinc.com/literature/product-catalogs, for more information on brackets, retrofit bezels, cover plates, and other accessories.



Kit 915900136

Kit 915900063



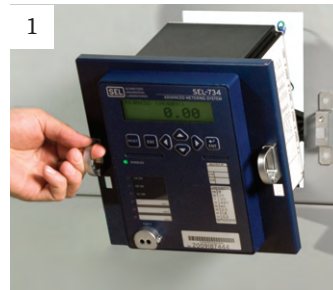
Horizontal Meter and Test Switch



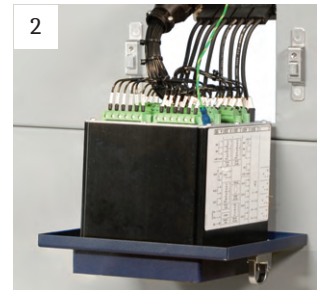
Vertical Bezels

Easily Extractable Meter (EXM)

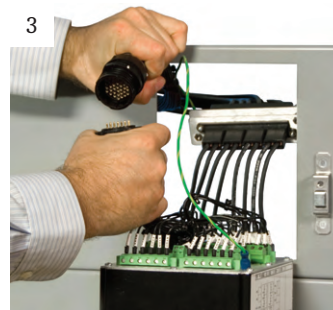
- Extractable in less than one minute.
- Safer than draw-out and socket meters.
- Self-shorting CT connector.
- Clearly marked wires.
- Easier to install and half the cost of a draw-out meter.
- Simplified field testing with integrated connectors.
- Simple retrofit brackets replace draw-out meters.



1. Pull quick-release latches.



2. Hinge meter down.



3. Remove quick disconnects.

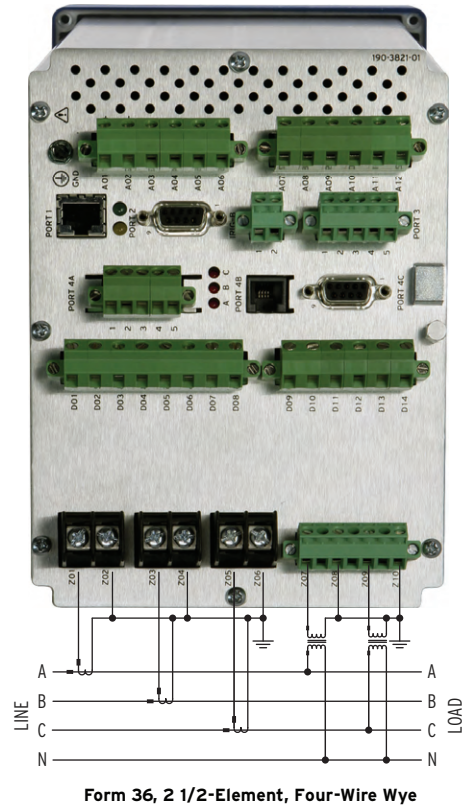
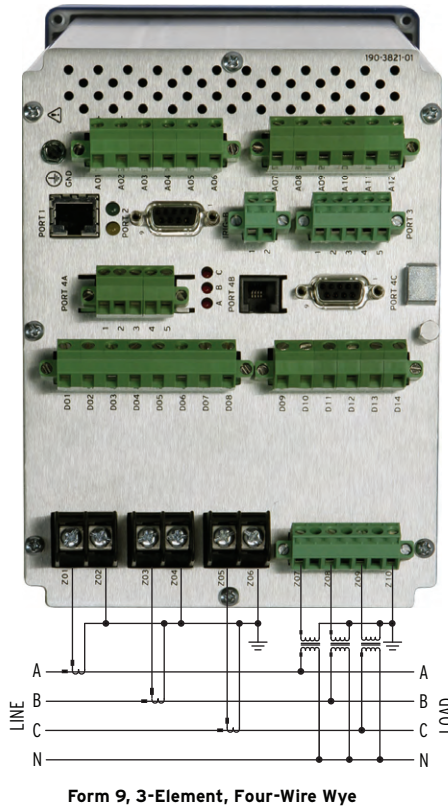
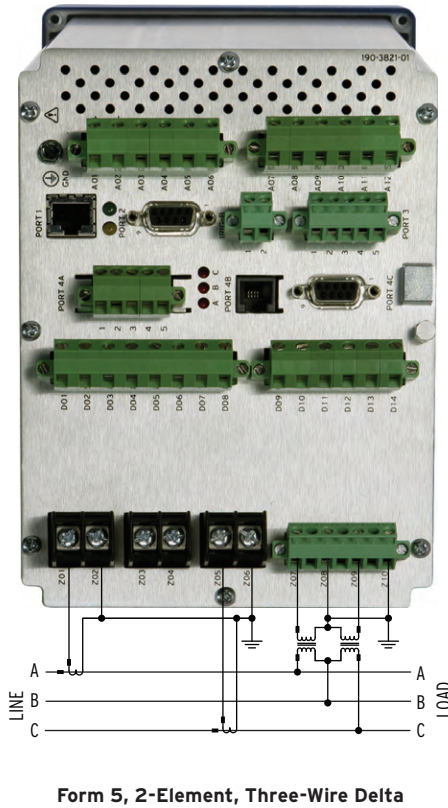


4. Easily extract the meter.

Metering Integration (Continued)

Wye or Open-Delta Integration

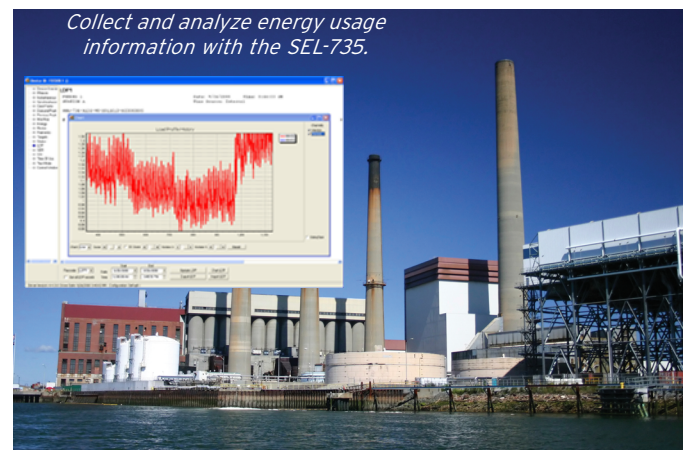
The SEL-735 supports four-wire wye-connected Form 9, three-wire open-delta connected Form 5, and four-wire wye-connected Form 36 configurations as shown below. The end user can select between Form 9, Form 5, and Form 36 metering options in the field by simply issuing a command to the meter.



Advanced Metering Applications

Industrial

- Support complex tariffs with a high-speed, 512-channel load profile data recorder in the SEL-735.
- Measure flicker induced by electric arc furnaces.
- Verify effectiveness of harmonic filters on large motor drives.
- Provide predictive demand for load control and energy usage information to the customer.
- Simplify troubleshooting by monitoring harmonics and interharmonics, triggering alarms, and capturing waveforms.
- Monitor and report water, air, gas, electricity, and steam (WAGES) meters with available digital inputs.



Advanced Metering Applications (Continued)

Substation

- Integrate the SEL-735 into any substation, automation, and protection system.
- Collect metering, power quality, and phasor measurements from remote substations.
- Monitor feeders in real time to collect event logs, waveforms, and power quality information.

Submetering

- Allocate energy costs by applying SEL-735 meters as submeters.
- Create advanced SELOGIC control equations to manage load and energy costs.

Mini-SCADA or Transducer Replacement

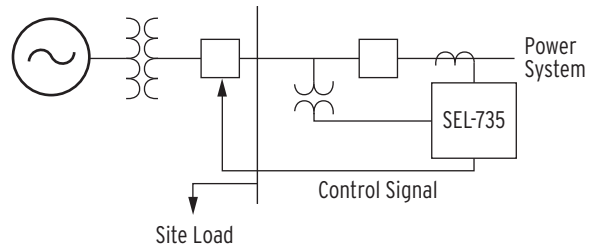
- Collect real-time voltage, current, and kVA information for direct SCADA interrogation via DNP3 or IEC 61850 protocol.
- Replace old, inaccurate, and maintenance-intensive transducers.
- Interface directly with auxiliary equipment and legacy devices, using status inputs and output relays.



Improve substation monitoring, automation, and control with the SEL-735.

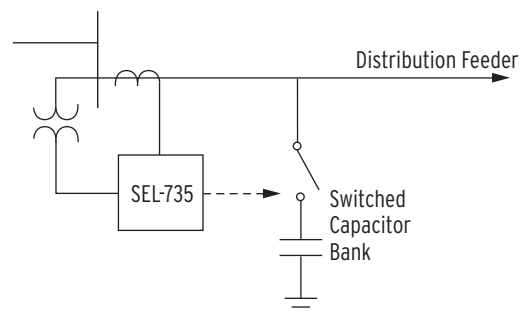
Distributed Generation Control

Provide automatic start and remote control to distributed generation facilities. SELOGIC control equations support any logical or mathematical combination of measured quantities and set points to control a generator or load switch.



Capacitor Bank Control

Program the SEL-735 to automatically control switched capacitor banks in distribution feeder applications (as shown at right). The SELOGIC meter capabilities combine fixed pickup settings with metered quantities, such as VAR flow, voltage, time-of-day, and current flow on the feeder.



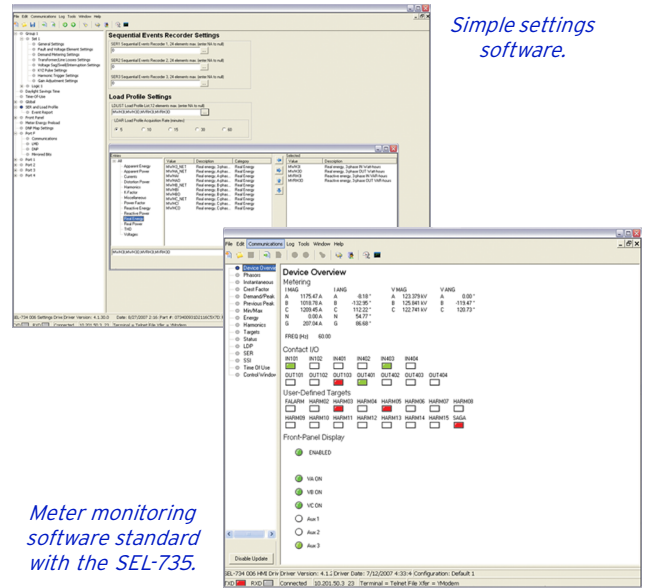
Simple Software Applications

Settings Editor

- Interact with menu-driven graphical interfaces with detailed help screens.
- Speed installation by standardizing settings files and modifying application-specific items.
- Develop settings offline.

ACSELERATOR QuickSet HMI

- Remotely monitor and reset real-time metering information, including:
 - Energy data
 - Demand and peak demand
 - Minimum/maximum records
 - Sequential Events Recorder (SER) data
- View load profile data.
- Monitor and control inputs and outputs.
- Read and save TOU data.
- Place meter into test mode and monitor test pulse output.



Event Reports and Analysis

- Quickly analyze event records, status bits, spectral analysis, and harmonic content using ACSELERATOR QuickSet.
- Convert event reports to oscillography with time-coordinated Device Word bit assertion and phasor/sequence element diagrams.
- Configure SEL-735 modem dial-out capability to automatically transfer event files to ACSELERATOR TEAM and ACSELERATOR Meter Reports software*.



ACSELERATOR Architect

- Manage logical nodes for networked IEC 61850 devices with ACSELERATOR Architect® SEL-5032 Software.
- Bind and identify IEC 61850 network data with this easy-to-use Microsoft Windows-based software.
- Get started faster with preconfigured configuration IED description (CID) files.

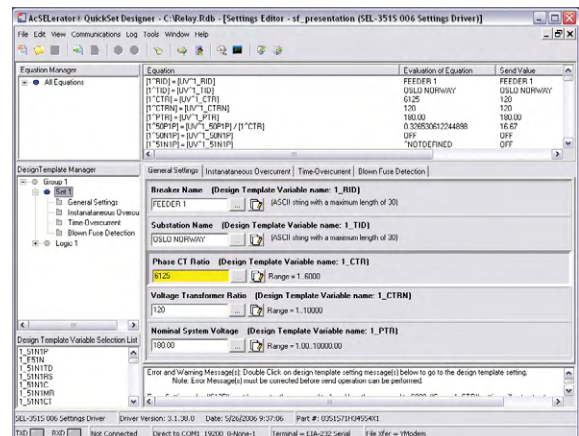
View event records and waveform captures of system anomalies.

VSSI reports detail system interruptions with 1 ms resolution.

ACSELERATOR QuickSet Designer*

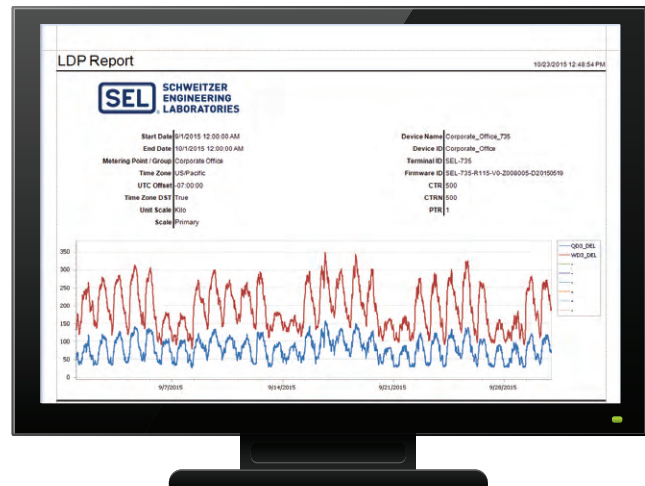
- Use the licensed version of ACSELERATOR QuickSet SEL-5030 Software to create custom settings templates. These templates simplify user programming and help ensure that new devices are applied according to your organization's standards.
- Import and use QuickSet Design Templates with ACSELERATOR QuickSet. Each meter needs fewer settings because the template hides standardized and unused settings.

* Additional cost software



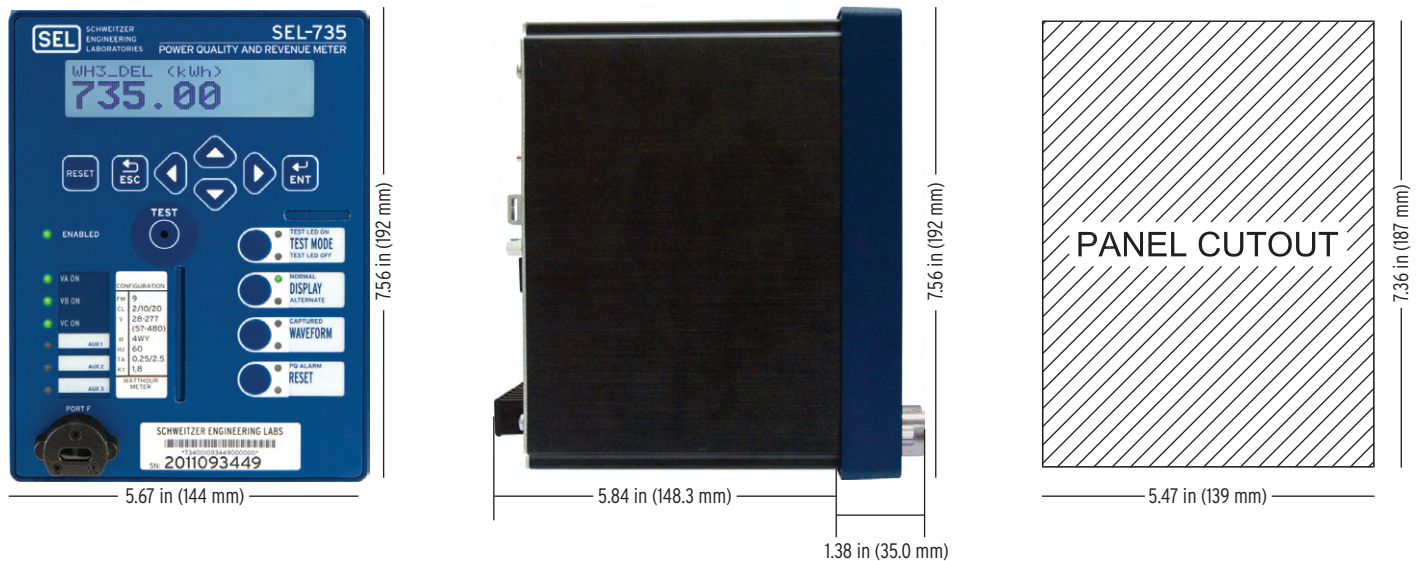
Simple Software Applications (Continued)

- Visualize metering data and identify opportunities for improvement with ACSELERATOR Meter Reports Software.
- Email a PDF or export a report to Microsoft® Excel® for further analysis.
- Combine SEL meters with pulse-type or DNP3-enabled devices to monitor consumption of other resources, such as water, air, gas, and steam (WAGES).
- Capture system-wide power quality disturbances and analyze data from multiple meters within one simple interface.
- Integrate into third-party enterprise systems with ACSELERATOR Database API SEL-5230.



Dimensions and Mounting

SEL-735 Vertical Dimensions



SEL-735 Horizontal Dimensions



Specifications

CAUTION

Observe ratings prior to commissioning.

Compliance

Designed and manufactured under an ISO 9001 certified quality management system

ANSI C12.20-2015, Accuracy Class 0.1; CL2/10/20, and CL10/CL20 (applies to Blondel-compliant Form 5 and Form 9 only)

ANSI C12.1 (Form 36)

IEC 62053-22:2003; class 0.2 S

IEC 62052-11; rack-mounted meters

IEC 62053-23:2003; class 2 S

IEC 61000-4-30:2015 class A

UL Certified for Hazardous Locations to U.S. and Canadian standards (file E475839)

C22.2 No. 61010-1-04

CAN/CSA C22.2 No. 142

ANSI/ISA 12.12.01-2015 and CSA C22.2 No. 213-15 Class I Division 2 Hazardous Locations (File E475839)

ERCOT Compliant
(applies to Blondel-compliant Form 5 and Form 9 only)

CAISO Compliant
(applies to Blondel-compliant Form 5 and Form 9 only)

CFG G0000-48-2010 Compliant per LAPEM

NMI M6-1 Electricity Meters: Part 1: Metrological and Technical Requirements

CE: Mark-EMC Directive, Low Voltage Directive

RCM Mark

General

AC Voltage Inputs

Maximum Rating: 300 V_{L-N} , 520 V_{L-L} continuous
600 V_{L-N} , 1039 V_{L-L} for 10 seconds

PT input has only been evaluated for a maximum of 300 L-N Vac input rating by UL.

Range:

Revenue: 28–300 V_{L-N} , 48–520 V_{L-L}

Measurement: 5–300 V_{L-N} , 9–520 V_{L-L}

Burden: 10 M Ω

AC Current Inputs

Maximum Rating: 20 A continuous, per UL 61010
500 A for 1 second

Range:

Current Class CL2/CL10/CL20, optimized for low-end accuracy:

Revenue: 0.010–22 A

Measurement: 0.001–22 A continuous

Current Class CL10/CL20, optimized for 100 A fault recording:

Revenue: 0.050–22 A

Measurement: 0.005–22 A continuous
22–100 A symmetrical for 25 seconds

Burden: ≤ 0.5 VA

Measurement Category: II

Frequency and Rotation

60 or 50 Hz system frequency specified at time of order. User selectable ABC/ACB phase rotation.

Frequency tracking range: 40 to 70 Hz based on V_A or V_C .

Power Supply

UL Ratings

120/240 Vac: 50/60 Hz, 40 VA

125/250 Vdc: 20 W

24/48 Vdc: 20 W

12/24 Vdc: 20 W

Continuous Operating Limits

120/240 Vac: 85–264 Vac (50/60 Hz)
85–275 Vdc

125/250 Vdc: 85–275 Vdc or 85–264 Vac

24/48 Vdc: 19–58 Vdc

12/24 Vdc: 9.6–30 Vdc

Rated Supply Voltage: 110–240 Vac, 50/60 Hz
110–250 Vdc

Input Voltage Range: 85–264 Vac
85–300 Vdc

Power Consumption: <50 VA (ac)
<25 W (dc)

Power Consumption Rating: <40 V (ac)
<20 W (dc)
<20 VA/7 W typical

Interruption (IEC 60255-11:1979)
50 ms at 125 Vac/Vdc
50 ms at 48 Vdc
10 ms at 24 Vdc
2 ms at 12 Vdc

Ripple (IEC 60255-11:1979) 12% for dc inputs

Terminal Voltage Dropout: <40 V within 1 minute of power removal

Rated Insulation Voltage (IEC 60664-1:2002): 300 Vac

Dielectric Test Voltage: 3.1 kVdc

100BASE-FX Fast Ethernet Fiber-Optic Port

Fiber Type: Multimode

Data Rate: 100 Mbps

Wavelength: 1300 nm

Optical Connector Type: LC

Link Budget: 11.8 dB

Min. TX Power: –20 dBm

Min. RX Sensitivity: –31.8 dBm

Fiber Size: 62.5/125 μ m or 50/125 μ m

Approximate Range: 2 km

100BASE-LX10 Fast Ethernet Fiber-Optic Port

Fiber Type: Single-mode

Data Rate: 100 Mbps

Wavelength: 1310 nm

Optical Connector Type: LC

Link Budget: 10 dB

Min. TX Power: –15 dBm

Min. RX Sensitivity: –25 dBm

Fiber Size: 9/125 μ m or 8/125 μ m

Approximate Range: 10 km

Compliant to IEC 60825-1:Ed. 2.0 and 3.0

Communications Protocols

SEL ASCII/Compressed ASCII, SEL Fast Operate/Fast Meter, MIRRORING BITS, SEL Distributed Port Switch (LMD), Modbus RTU/TCP, DNP3 serial and LAN/WAN, FTP, TCP/IP, Y-Modem, SNTP, IEC 61850, Telnet, MV-90, and IEEE C37.118-2014 (Synchrophasor measurements)

Output Contacts

Ratings determined by IEC 60255-23:1994.

Standard (Electromechanical)
250 Vac, 30 Vdc, 3 A resistive

Make: 30 A per IEEE C37.90-1989
3.6 kVA, $\cos \phi = 0.3$

Break Rating: 360 VA, $\cos \phi = 0.3$

Breaking Capacity (10000 operations):

12/24 Vdc 0.75 A L/R = 40 ms

48 Vdc 0.50 A L/R = 40 ms

125 Vdc 0.30 A L/R = 40 ms

250 Vdc 0.20 A L/R = 40 ms

Carry: 3 A at 120 Vac, 50/60 Hz
1.5 A at 240 Vac, 50/60 Hz
50 A for 1 second

Durability: >10,000 cycles at rated conditions

Pickup/Dropout Time: <16 ms

Maximum Operating
Voltage (Ue): 250 V

Current (Ie): 3 A

Rated Insulation Voltage (Ui)
(excluding EN 61010): 300 V

Optional (Solid State)

Voltage: 250 Vdc or Peak ac maximum

Current: 100 mA maximum

Capacity: 0.6 VA at 25°C, 0.2 VA at 85°C

Pulse Rate: 20 pulses per second

Maximum On Resistance: Typical: 50 Ω
Guaranteed: <100 Ω

Minimum Off Resistance:
10 M Ω

Pickup/Dropout Time: <25 ms

Analog Outputs

Maximum Firmware Update
Rate: 100 ms

Maximum Settling Time for
Full Range Change to 0.1%
Full Scale: 500 ms

Bandwidth: 0 to 4 Hz

± 1 mA Output

Range: ± 1.2 mA

Minimum Output Impedance:
100 M Ω

Maximum Load: 10 k Ω , 100 μ H

Accuracy: $\pm 0.15\%$ ± 2.0 μ A at 25°C

4-20 mA Output

Range: ± 24 mA

Minimum Output Impedance:
100 M Ω

Maximum Load: 500 Ω , 100 μ H

Accuracy: $\pm 0.20\%$ ± 10 μ A at 25°C

Optoisolated Input Ratings (Digital Input Ratings)

DC Control Signal 250 Vac/Vdc (signal level)

250 Vdc: Pickup 200–275 Vdc
Dropout 150 Vdc

220 Vdc: Pickup 176–242 Vdc
Dropout 132 Vdc

125 Vdc: Pickup 100–137.5 Vdc
Dropout 75 Vdc

110 Vdc: Pickup 88–121 Vdc
Dropout 66 Vdc

48 Vdc: Pickup 38.4–52.8 Vdc
Dropout 28.8 Vdc

24 Vdc: Pickup 15–30 Vdc
Dropout <5 Vdc

12 Vdc: Pickup 9.6–16.7 Vdc
Dropout <6 Vdc

AC Control Signal

250 Vac: Pickup 170.6–300 Vac
Dropout 106 Vac

220 Vac: Pickup 150.3–264 Vac
Dropout 93.2 Vac

125 Vac: Pickup 85–150 Vac
Dropout 53 Vac

110 Vac: Pickup 75.1–132 Vac
Dropout 46.6 Vac

48 Vac: Pickup 32.8–57.6 Vac
Dropout 20.3 Vac

24 Vac: Pickup 14–27 Vac
Dropout <5 Vac

Current Draw at Nominal DC

Voltage: 2–6 mA

Time-Code Input

Meter accepts demodulated IIRIG-B time-code input at EIA-232 Port 3, Port 2, or dedicated IIRIG-B port (2-pin Phoenix connector).

IIRIG Port Electrical Characteristics

Nominal Voltage: 5 Vdc

Maximum Voltage: 8 Vdc

Input resistance: >2 k Ω

Dedicated IIRIG Port

On (1) State: $V_{ih} \geq 3.5$ V

Off (0) State: $V_{il} \leq 1.5$ V

IIRIG Pins on Port 2 and Port 3

On (1) State: $V_{ih} \geq 2.0$ V

Off (0) State: $V_{il} \leq 0.8$ V

Time Accuracy

Clock Drift with no time input: 4 minutes per year, typical

IIRIG Accuracy: ± 2 μ s

Line Frequency
Synchronization: ± 0.1 PPM

Simple Network Time Protocol (SNTP) Accuracy

Multicast or Unicast ± 5 ms (when directly connected to SNTP Server)

Broadcast: No specified accuracy

Operating Temperature

IEC 60068-2-2:1993: -40° to $+85^\circ$ C (-40° to $+185^\circ$ F)

Note: Not applicable to UL applications.

LCD

Operating Temperature:	−20° to +70°C (−4° to +158°F)
Dimensions:	3.86" x 0.902"

Operating Environment

Pollution Degree:	2
Overvoltage Category:	II
Indoor Use	
Maximum Altitude:	2000 M
Maximum Humidity:	95% RH non-condensing

Weight

2.3 kg (5.0 lb)

Dimensions

Refer to *Dimensions and Mounting on page 16* for meter dimensions.

Routine Dielectric Test

Current Inputs:	2.75 kVac for 1 s
Voltage Inputs:	2.2 kVac for 1 s
Inputs and Outputs:	2.2 kVac for 1 s
Power Supply:	3.11 kVdc for 1 s
EIA-485 Port:	1.5 kVdc for 1 s
IEC 60255-5:2000	2200 Vdc for 1 s on EIA-485 communications port
Dielectric tests performed on all units with the CE mark:	2000 Vac for 1 s on contact inputs, contact outputs, and analog inputs

Terminal Connections

Rear Screw-Terminal Tightening Torque	
Current Input Terminal Block (ring terminals are recommended)	
Minimum:	0.9 Nm (8 in-lb)
Maximum:	1.4 Nm (12 in-lb)
Connectorized [®]	
Minimum:	0.5 Nm (4.4 in-lb)
Maximum:	1.0 Nm (8.8 in-lb)
Compression Plug Mounting Ear	
Minimum:	0.18 Nm (1.6 in-lb)
Maximum:	0.25 Nm (2.2 in-lb)

Connectorized terminals accept wire size 12–24 AWG.

User terminals or stranded copper wire should be at a minimum temperature rating of 105°C (221°F).

Synchrophasor Measurements

Compliance	P Class Synchrophasor data compliant with IEEE C37.118.1-2011 as amended by IEEE C37.118.1a-2014.
Data Transfer:	IEEE C37.118.2-2011 (Backward compatible with IEEE C37.118-2005)
Message Rates:	60 Hz: 1,2,4,5,10,12,15,20,30,60 messages per second 50 Hz: 1,2,5,10,25,50 messages per second
Nominal Voltage:	
120V when VBASE < 180	
240V when 180 < VBASE < 250	
250V when VBASE ≥ 250	
Voltage Range:	
80%–120% of Nominal Voltage	

Nominal Current:

5A with CL2/10/20 current card

10A with CL10/20 current card

Current Range:

10% to 200% of Nominal current with CL2/10/20 current card

25% to 200% of Nominal current with CL10/20 current card

Processing Specifications

AC Voltage and Current Inputs

512 samples per power system cycle.

Control Processing

1/2-cycle processing interval

SELOGIC Pickup and Accuracies

SELOGIC Timers:	±1/2 cycle
Analog Values:	±3%

Metering/Monitoring

Voltage, Current, and Power Accuracy

Unity Power Factor:	±0.06%
0.5 Power Factor:	±0.16%

Energy Accuracy (Form 5 and Form 9 only)

Unity Power Factor:	±0.06% guaranteed ±0.02% typical
0.5 Power Factor:	±0.16% guaranteed ±0.06% typical

ANSI C12.20-2015, Accuracy Class 0.1

IEC 62053-22:2003 Accuracy Class 0.2, three times as accurate

IEC 62053-23:2003 Accuracy Class 2, nine times as accurate

Frequency Accuracy

FREQ_PQ:	±0.001 Hz
FREQ:	±0.01 Hz

Power Quality

IEC 61000-4-30:2015 Class A

Flicker

PST:	±5% over the range 0.5–25 P _{ST} (10-min interval)
PLT:	±5% over the range 0.5–25 P _{LT} (2-hour interval)

Type Tests

Electromagnetic Compatibility Immunity

Surge Withstand Capability:	IEC 60255-22-1:2007, Severity Level: 2.5 kV common mode, 1.0 kV differential mode 1.0 kV peak common mode on communications ports IEEC C37.90.1-2002 Severity Level: 2.5 kV oscillatory, 4 kV fast transient
Electrostatic Discharge Immunity:	IEC 60255-22-2:2008 Severity Level: 4 (both polarities at Levels 1, 2, 3, and 4) IEC 61000-4-2:2008 Severity Level: 4

Radiated Electromagnetic Field Immunity:	IEC 60255-22-3:2007 IEC 61000-4-3:2010, Severity Level: 10 V/m ANSI C12.20-1998, Severity Level: 15 V/m
Electrical Fast Transient Burst Immunity:	IEC 61000-4-4:2011, Severity Level: 4 kV
Surge Immunity:	IEC 62052-11:2003, 4 kV for Current, Voltage, and Power Supply Mains 1 kV for Auxiliary Circuits
Conducted Radio Frequency Immunity:	IEC 61000-4-6:2008, Severity Level: 10 Vrms

Environmental

Cold:	IEC 60068-2-1:2007 Test Ad: 16 hours at -40°C IEEE 1613-2009 + A1-2011
Dry Heat:	IEC 60068-2-2:2007, Test Bd: 16 hours at +85°C IEEE 1613-2009 + A1-2011
Damp Heat, Cyclic:	IEC 60068-2-30:2005 Test Db: 9% RH, 25° to 55°C, 6 cycles (12 + 12 hour cycle)
Enclosure Protection:	IEC 60529:2001, IP65, enclosed in panel with available gasket (P/N: 915900097); IP41 without gasket; IP20 for rear panel

Vibration

Vibration Resistance:	IEC 60255-21-1:1988 Class 1 Vibration Endurance Class 2 Vibration Response
Shock Resistance:	IEC 60255-21-2:1988 Class 1 Shock Withstand Class 2 Shock Response Class 1 Bump Withstand
Seismic:	IEC 60255-21-3:1993 Class 2 Quake Response

Safety

Dielectric Strength/Impulse:	IEC 60255-5:2000 IEEE C37.90:2005 IEEE 1613-2009 + A1-2011 Severity Level: 2500 Vac for 1 minute, 3100 Vdc for 1 minute on power supply Severity Level: 0.5 Joules, 5 kV
High-Voltage Line Surges:	IEEE C62.41-1991 100 kHz Ring Wave for Location Category B3, Peak Voltage of 6 kV and Short-Circuit Peak Current of 3 kA 1.2/50 µs Combination Wave for Location Category B3, Peak Voltage of 6 kV and Short-Circuit Peak Current of 3 kA

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This product is covered by the standard SEL 10-year warranty. For warranty details, visit selinc.com or contact your customer service representative.

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