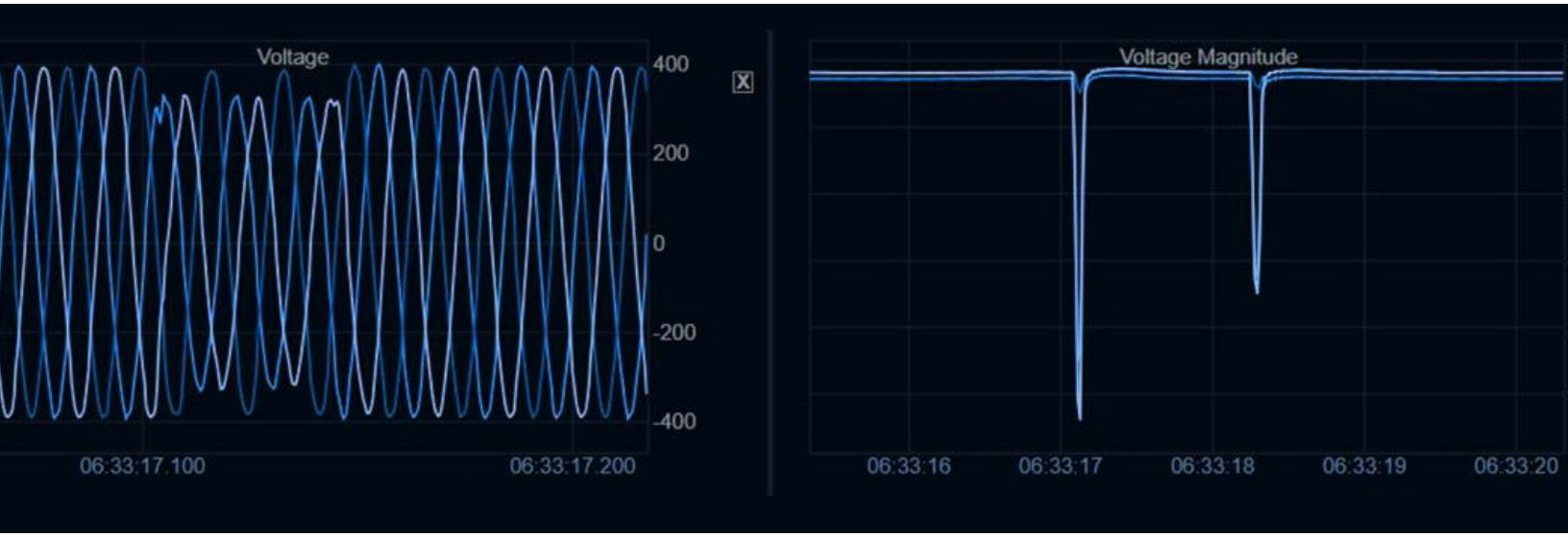
Capture Every Disturbance With Continuous Waveform Recording



Continuously measure, stream, and record time-synchronized waveform oscillography

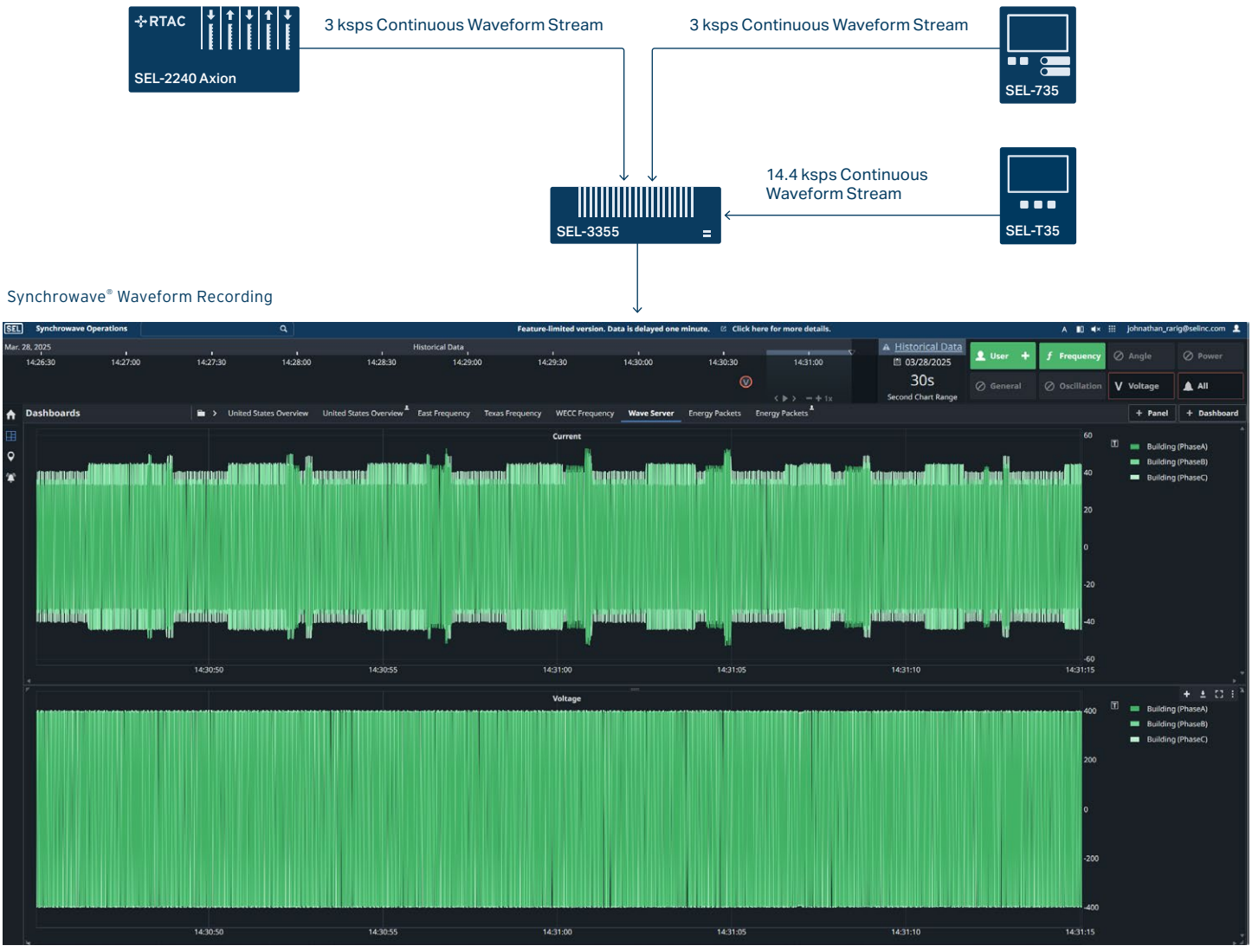
- Precisely measure energy exchange regardless of frequency, phase angle, or signal distortion.
- Analyze disturbances at 3—14.4 kilosamples per second (ksps) on ac current and voltage waveforms
- Instantly view detailed waveforms in intervals from microseconds to days.
- Visualize positive, negative, and net-energy packets in 1—10 ms intervals.
- Trend and view metering and power quality measurements alarms.
- Receive alarms when system conditions exceed set points.

Never Miss an Event

Conventional power monitors depend on phasor-based calculations to detect faults and disturbances, but energy flow changes faster than once per cycle—the typical measurement rate of these devices. Time-domain measurements in ksps expose power system disturbances that traditional power monitors do not typically capture, allowing you to take immediate action.

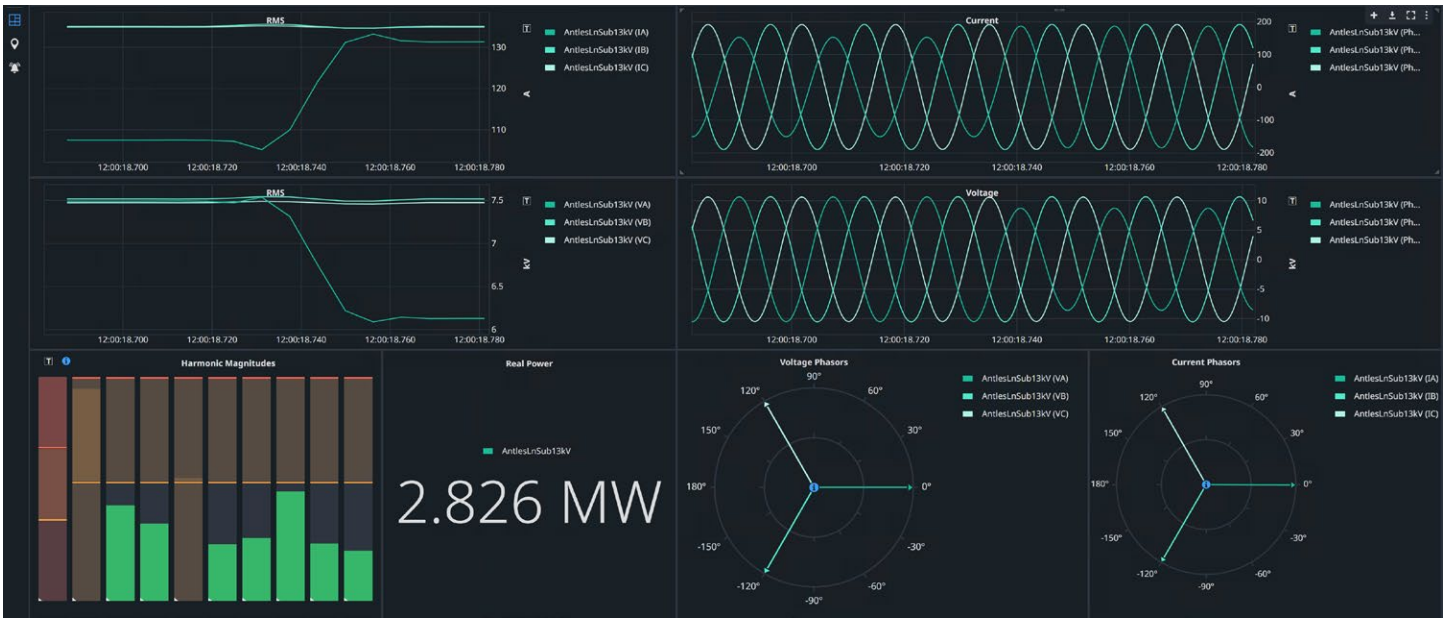
Monitoring devices—including protective relays and power quality meters—capture several cycles of waveform disturbance data based on predefined event conditions. Power system disturbances become less predictable as more distributed energy resources and nonlinear loads connect to the power system. Monitoring devices may fail to identify an event such as voltage oscillations. Additionally, disturbances like voltage sags on distribution circuits can last longer than the waveform recording window, and traditional recording devices may fail to capture the event.

The SEL continuous oscillography streaming and recording system provides gapless recording of voltage, current, and energy transfer, so you never miss an event.



Virtual Metering Expands Power Monitoring Applications

The Virtual Meters application in SEL Synchrowave software allows users to generate signals similar to SEL-735 Power Quality and Revenue Meter analogs using time-series data as a source. The software automatically converts instantaneous waveforms sampled at 3 or 14.4 ksps into phasor-based quantities. The application calculates current, voltage, power, frequency, harmonics, symmetrical components, and power quality measurements providing valuable reporting and monitoring data.

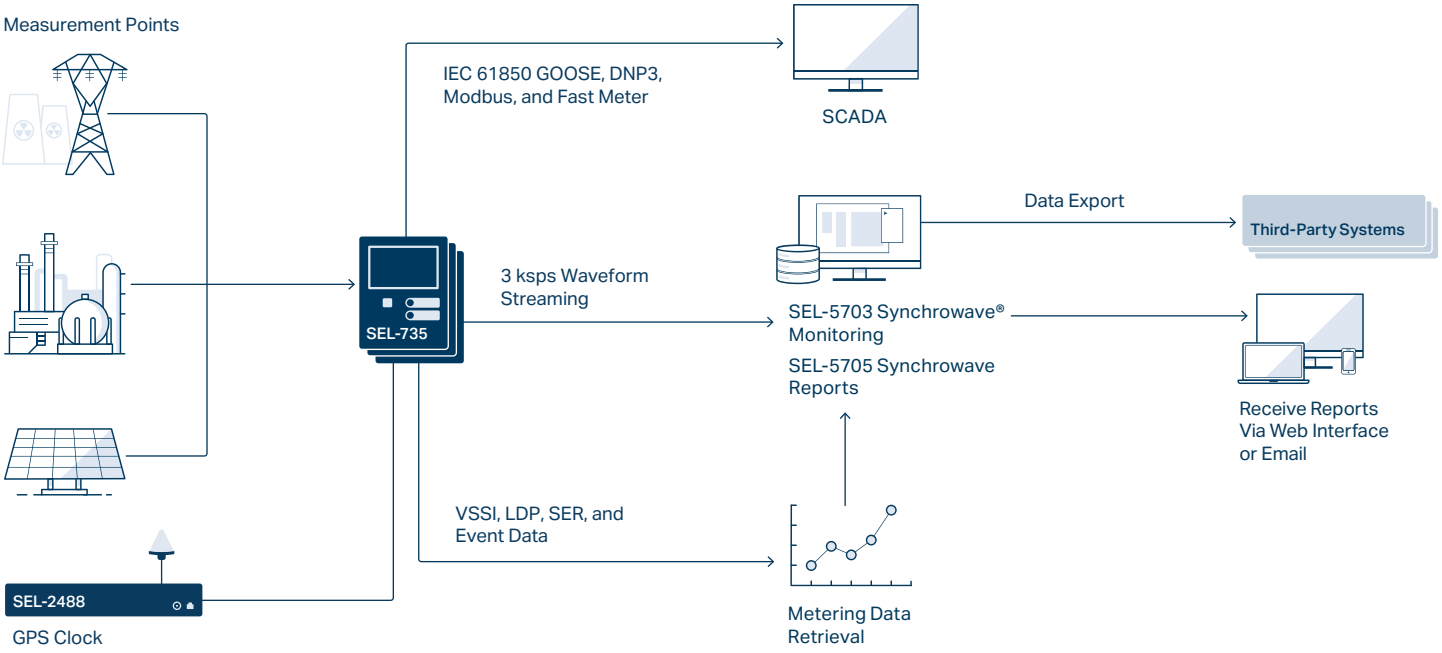


	SEL-735	Axion®/RTAC	SEL-T35
Revenue metering	On box	—	—
SCADA protocols	On box	On box	—
IEC 61000-4-30	Class A Virtual metering	Virtual metering	Virtual metering
Event capture	On box Virtual metering	On box Virtual metering	Virtual metering
Load profile	On box	On box	Virtual metering
Harmonics	On box	On box Virtual metering	Virtual metering
Transient capture	Virtual metering	On box Virtual metering	Virtual metering
Rapid voltage change	Virtual metering	On box Virtual metering	Virtual metering
1 ms energy packets	—	—	On box

SEL-735: World-Class Metering With Continuous Waveform Streaming

The SEL-735 captures every power system disturbance with optional continuous waveform streaming. SEL Synchrowave software displays and analyzes precise 3 ksps voltage and current waveform data that stream from the SEL-735.

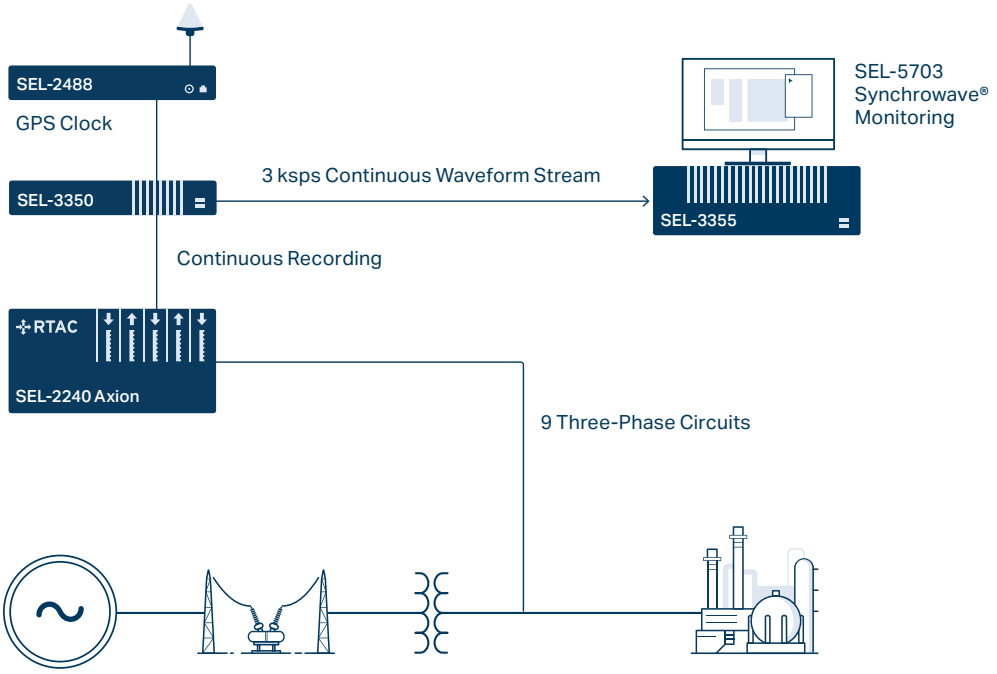
Integrate hardware and software with bundled solutions to streamline ordering and license management. Bundling allows for low-cost incremental software license purchases. Choose from a variety of bundles, tailored to your application.



SEL-2240 Axion: Dense I/O With Continuous Streaming and Continuous Recording

The SEL-2240 Axion can be deployed alone as a continuous waveform streaming device or with a companion SEL-3350 RTAC or SEL-3555 RTAC to provide continuous streaming and continuous recording.

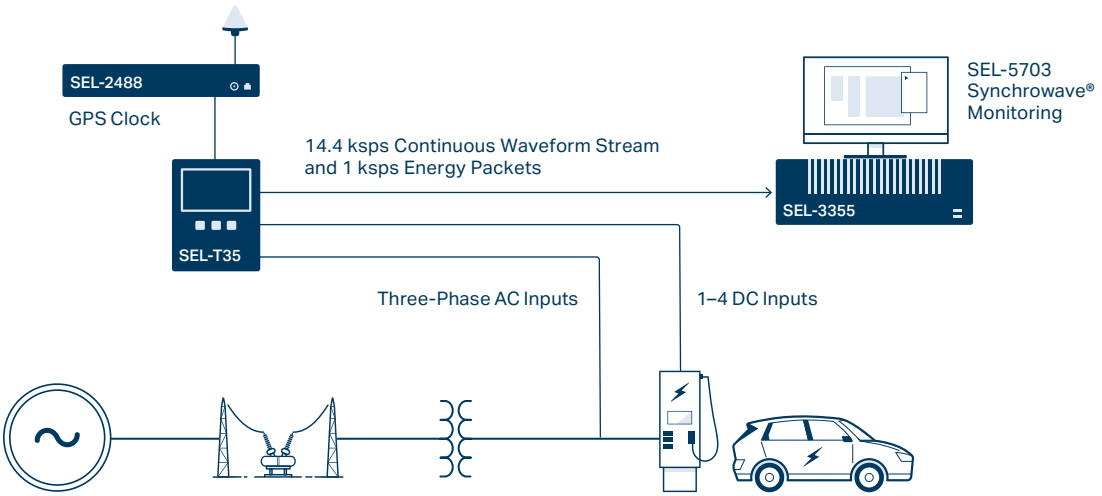
A ruggedized and modular hardware platform, the Axion can be configured with a SEL-2245-42 AC Protection Module and an onboard SEL-2241-2 RTAC logic engine to stream current and voltage measurements directly to SEL Synchrowave software. With its optional full-color touchscreen and the ability to stream up to 96 channels of current and voltage measurements at 3 ksps, the Axion is best suited for multicircuit monitoring and control applications.



Coming Soon: SEL-T35 Time-Domain Power Monitor

The SEL-T35 precisely samples ac and dc signals and streams voltage and current waveform data at 14.4 ksps and energy packets at 1 ksps to SEL Synchrowave software. This data stream includes energy packets calculated every millisecond, providing energy measurements independent of frequency and phase angles.

With the SEL-T35, you can view ac and dc voltage and current measurements in real time on the color touchscreen HMI, as though it were an oscilloscope. The low-level milliampere (mA) dc analog inputs measure outputs from third-party transducers, including temperature, solar irradiance, and high-energy dc voltage or current, allowing conversion efficiency calculations within SEL Synchrowave software. An integrated ride-through pack ensures that you never miss a disturbance during short-duration outages.



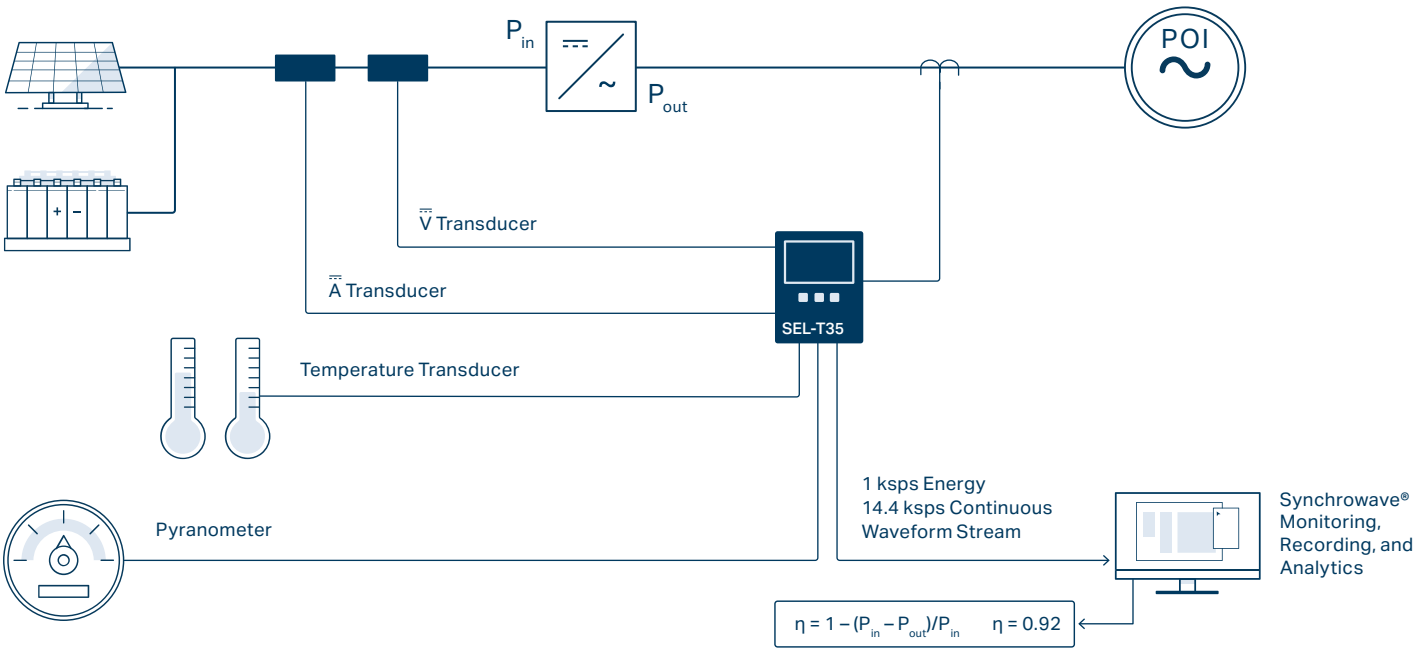
Energy Measurement Redefined

Industry-exclusive energy packet technology from SEL precisely reports energy flow under all system conditions, regardless of frequency, angle, or distortion. Positive energy packets represent energy delivered to the load. Negative energy packets represent energy received (returned) from the load. Negative energy packets can indicate suboptimal system utilization.

The SEL-T35 streams 1 ms energy packet calculations while Synchrowave Monitoring software calculates 10 ms energy packets from the Axion data streams. This information increases insight into bidirectional energy transfer, reverse power flow, subcycle oscillations, and contributors to lost capacity. Operators can clearly identify load changes such as motor starts, inverters cycling, and inrush events.

See application guide AG2023-19, "View Streamed Axion Wave Server Time-Series Data in Synchrowave Monitoring and Calculate Energy Packets in RTAC Logic Engine," to apply energy packet technology with the SEL Axion data streams. The guide provides instructions on how to calculate and visualize energy packets.

Configure an Axion to share energy packet information with control and monitoring systems via traditional protocols, including GOOSE, DNP3, and Modbus.



Measure production and calculate power conversion efficiency and distortion.

Flexible Hardware Supports Any Application

SEL provides multiple time-synchronized continuous waveform streaming devices that integrate with SEL-5702 Synchrowave Operations and SEL-5703.

Single-Circuit Monitoring

The SEL-735 meter streams three current and three voltage measurements. The SEL-T35 power monitor streams four current, four voltage, and four 0—50 mA analog measurements at 14.4 ksps. These devices are well suited for distributed three-phase circuit monitoring.

Multicircuit Monitoring

The SEL Axion and RTAC monitoring system can stream up to 96 channels of current and voltage measurements at 3 ksps. Each SEL-2245-42 AC Protection Module streams measurements from a three-phase circuit from a total of 16 modules. This system is designed for bus-monitoring, digital fault recording, and centralized power monitoring.

	SEL-735	Axion/RTAC	SEL-T35
Streaming sample rate	3 ksps	3 ksps	14.4 ksps
Three-phase circuits	1	16	1
0—50 mA analogs	—	—	4
Digital inputs	6	Up to 1,700	2
Auxiliary 0—300 V ac/dc inputs	—	—	1
Energy packets	—	10 ms	1 ms
Synchrowave software license	Optional	Optional	Included
Onboard storage	Load profile and event reports	8 TB*	—
DC metering	—	—	Included
Cost per circuit	$$	1 circuit: $$$ 9 circuits: $	$$

*Continuous recording requires pairing the Axion with the SEL-3350 RTAC or the SEL-3555 RTAC.

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