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# SENTINEL®

# Multimeasurement

# Meter

The SENTINEL meter is a solid-state, electronic, multimeasurement, polyphase meter of exceptional accuracy. This self-contained or transformer-rated meter is designed for use in commercial and industrial locations, including large industrial sites and substations. An advanced analog-to-digital sampling technique samples each incoming current and voltage waveform 32 times per cycle (60Hz). Voltage and current values are calculated every two cycles using true Root Mean Square (RMS) calculation. Volt-amperes are calculated by multiplying the RMS voltage value with the RMS current value, thus providing an arithmetic calculation for VA. The SENTINEL meter also allows for a vectorial calculation of VA.



## FEATURES

### Flexible Platform

- » Electronic circuit boards fit together to perform various functions
- » Transformer input for current and resistive divider input for voltage
- » Analog-to-digital conversion and measurement processing
- » Register, load-profile, real-time clock, and communications processing
- » Input and output board for pulse accumulation or event notification

### Forms Available

- » **Socket:** 2S\*, 3S, 4S, 5S, 6S, 8S, 9S, 12S\*, 14S, 15S, 16S\*, 17S, 26S, 45S, 56S, 66S

\*Available in Class 320; also available with no potential links option

- » **A-Base:** 5A, 6A, 8A, 9A, 10A, 14A, 15A, 16A, 17A, 45A, 46A, 48A
- » **Switchboard Ready:** 5F, 6F, 8F, 9F, 45F, 46F

### Protocols

- » The SENTINEL meter uses PSEM (ANSI C12.18 - 1996) protocol
- » QDIP Protocol

### Standard Features

- » Class 0.2 accuracy
- » 5 measurement levels
- » Upgradable firmware
- » Error and event logging
- » SiteScan™ onsite monitoring system
- » SiteScan Diagnostic Snapshots
- » Flexible configuration for various metering applications
- » Autoranging power supply
  - Single Phase Power Supply
  - Available as a three phase power supply

## Registers

- » Register data and program information are retained in nonvolatile memory in the event of a power failure
- » Selection from hundreds of items on a liquid crystal display (LCD) that is programmable by the user

## Energy

- » Wh: delivered, received, net, unidirectional
- » VARh: delivered and received, net delivered, net received and 4 quadrant
- » VAh: vectorial and arithmetic, delivered, received and lagging
- » A<sup>2</sup>h: aggregate
- » V<sup>2</sup>h: aggregate
- » Ah: per phase and neutral
- » Vh: per phase and average

## Demand

- » Instantaneous values updated every second
- » Maximum, present, previous, projected, cumulative, continuous cumulative and coincident demand values are available

## Demand Register Types

- » Block and rolling demand intervals with programmable interval and subinterval lengths
- » Thermal demand calculations

## Power Factor

- » Average
- » Minimum
- » Instantaneous

## Self-Read and Snapshot Data

- » Two sets of snapshot data, automatically read at demand reset
- » Four sets of self-read data, user programmable schedule

- » One set of self-read data, automatically read at season change (last season data)

## Switchboard Ready™ Meter

- » Retrofits 13 Switchboard case styles
- » Retrofits 137 different devices

## Voltage Input Rating

- » Automatic voltage-sensing power supply, available in single-phase or three-phase
- » Single-phase power supply operates over a voltage input range of 120-480 V
- » Three-phase power supply operates over a voltage input range of 57.7-277 V

## Accuracy Data

The SENTINEL meter is a +/-0.2 accuracy device capable of displaying a wide range of register information as well as complying with the requirements of ANSI C12.20 - 2002 for Class 0.2 meters.

## Software

- » PC-PRO+® Advanced
- » Field-Pro™
- » Shop-Pro™
- » PC-PRO+ Views

## OPTIONAL FEATURES

### Power Quality

- » Voltage Quality:
  - Phase to phase or phase to ground event detection
  - 3 levels of sags
  - 3 levels of swells
  - 3 levels of voltage imbalances
  - 3 levels of current imbalances
  - 3 classes of interruptions
- » Harmonics:
  - Per phase instantaneous % THD V and % TDD I
  - Prompt for peak demand current

- Per phase data is displayable
- ANSI and IEC calculation
- Harmonic Distortion Check

## Pulse outputs and inputs

- » One Form C KYZ output and one Form A low-current, solid-state contact output
- » Two Form C KYZ outputs and one Form A low-current, solid-state contact output
- » Two Form C KYZ outputs, one Form A low-current, solid-state contact output, and two Form A KY pulse inputs
- » Four Form C KYZ outputs and one Form A low-current, solid-state contact output
- » Four Form C KYZ outputs, one Form A low-current, solid-state contact output, and two Form A KY pulse inputs

## MeterKey™

- » Measurement level Upgrade/Downgrade
- » TOU
- » Load profile
- » Power quality
- » Bidirectional measurement
- » Totalization

## COMMUNICATION CAPABILITIES

### GPRS Communications

- » Secure cellular network
- » Communicates with Itron Transaction Management System (TMS)
- » Future-proofed, IP-based connectivity
- » Field upgradeable
- » Optional communication board

### Ethernet Communications

- » Fixed and dynamic IP addressing
- » Encryption support
- » Ethernet allows customers to remotely connect to the SENTINEL meter to program or read the meter

- » Email On Event
  - 26 User Configurable Event
- » Web page support

### Internal Modem

- » The modem allows customers to remotely connect to the SENTINEL meter to program or read the meter
- » It operates at a speed of 300/1200/2400 baud rates and is available for stand-alone or phone line sharing applications
- » Off hook detection
- » Phone Line Thru Cover

### I/O Network

The input and output options available are determined by the type of I/O board that is installed in the meter. The SENTINEL meter supports a maximum of 4 KYZ outputs, 1 (KY) low current/high current output, and 2 (KY) pulse or solid-state inputs.

### OEM Communication Options Available

- » Motorola™ Canopy (works with SENTINEL Meter with Ethernet Communications Board)
- » Trilliant NCGR801 GPRS/GSM
- » Trilliant CRDR-1010 CDMA/1xRTT
- » Trilliant NCZR801 Secure Mesh (ND04)
- » Trilliant CI-1000 Secure Mesh (ND10)
- » Aclara Power Line Carrier
- » Hunt TS2
- » Metrum UTILIWISE-SE

### RF ERT Modules

- » R300S (1 ERT)
- » R300SD (2 ERTs)
- » R300SD3 (3 ERTs)

### RS-232/RS-485

- » Supports PSEM (ANSI Tables) and QDIP protocols
- » One or two serial communication ports added to the SENTINEL meter
- » Each port is addressable

### Accuracy Tests

Measured Quantity	Phase Angle %	Error of Reading
Volts (0.75Vn-1.15Vn)	All Phase Angles	+/- 0.2%
Amps (0.1A-0.25A)	All Phase Angles	+/- 0.4%
Amps (0.25A-20A)	All Phase Angles	+/- 0.4%
Amps (2.5A-200A)	All Phase Angles	+/- 0.4%
Watts (0.05A-0.25A)	0°, 180°	+/- 0.4%
Watts (2.5A-20A)	0°, 180°	+/- 0.2%
Watts (2.5A-200A)	0°, 180°	+/- 0.2%
Watts (0.05A-0.5A)	-60°, +60°, -120°, +120°	+/- 0.5%
Watts (0.05A-20A)	-60°, +60°, -120°, +120°	+/- 0.3%
Watts (5.0A-200A)	-60°, +60°, -120°, +120°	+/- 0.3%
Vars (0.05A-0.25A)	-90°, +90°	+/- 0.4%
Vars (2.5A-20A)	-90°, +90°	+/- 0.2%
Vars (2.5A-200A)	-90°, +90°	+/- 0.2%
Vars (0.05A-0.5A)	-30°, +30°, -150°, +150°	+/- 0.5%
Vars (0.5A-20A)	-30°, +30°, -150°, +150°	+/- 0.3%
Vars (5.0A-200A)	-30°, +30°, -150°, +150°	+/- 0.3%
VA Arith. (0.05A-0.25A)	All Phase Angles	+/- 0.8%
VA Arith. (0.25A-20A)	All Phase Angles	+/- 0.6%
VA Arith. (2.5A-200A)	All Phase Angles	+/- 0.6%
VA Vec (0.1A-0.5A)	-60°, +60°, -120°, +120° -30°, +30°, -150°, +150°	+/- 0.6%
VA Vec (0.5A-20A)	-60°, +60°, -120°, +120° -30°, +30°, -150°, +150°	+/- 0.4%
VA Vec (5.0A -200A)	-60°, +60°, -120°, +120° -30°, +30°, -150°, +150°	+/- 0.4%

In Conformance with the ANSI C12.20 standard for Class 0.2 meters.

### SPECIFICATIONS

#### Technical Data

- » ANSI C12.1 - 2008
- » ANSI C12.10 - 2004
- » ANSI C12.18 - 1996
- » ANSI C12.19 - 1997
- » ANSI C12.20 - 2002
- » ANSI C12.21 - 1999

#### Surge, Impulse and RF Interference

- » ANSI C37.90.1 - 2002
- » ANSI C62.41.1 - 2002
- » FCC Part 15 (Class B)

- » ANSI C62.45 -2002

- » FCC Part 68

#### Reference Information

- » SENTINEL Meter Technical Reference Guide
- » SENTINEL Meter Overview Brochure
- » SENTINEL Meter Communication Option Specification Sheets
- » Hardware Specification Form
- » Site Analysis Guide
- » Metering Pocket Guide

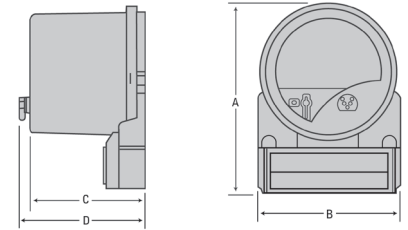
## Dimensions

A-Base				
A	B	C	D	
9.46"	7.28"	5.90"	6.44"	
24.0 cm	18.48 cm	14.97 cm	6.35 cm	

Socket Meter				
A	B	C	D	E
6.95"	6.31"	5.46"	6.00"	7.30"
17.65 cm	16.03 cm	13.87 cm	15.24 cm	18.54 cm

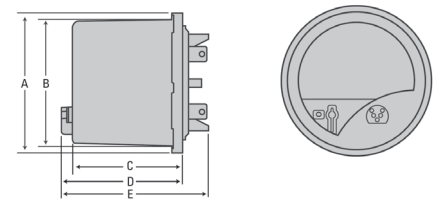
## SENTINEL A-Base Meter



## Specifications

Power Requirements	Voltage Ranges:	-20% to +10% of nominal voltage (1 or 3 phase)	
	Frequency:	50-60Hz	
	Operating Voltage:	± 20%	
	Operating Range:	45 Hz to 65 Hz	
Load Profile/TOU Battery	Load Profile/TOU Battery Carryover:	12 year minimum	
	Operating Range:	3.4 V- 3.8 V	
	Shelf Life:	25 years minimum	
Time	Line Sync:	Power line frequency	
	Crystal Sync:	±0.003% @25°C; ±0.02% over full temperature range	
Operating Environment	Temperature:	Meter: -40° to +85°C Modem: 0° to +70°C	
	Humidity:	0% to 95% non-condensing	
Transient / Surge Suppression	ANSI C37.90.1-2002		
	ANSI C62.41-2002		
Accuracy	ANSI C12.20:2002 for class 0.2 meters		
Characteristic Data	Starting Current:		
	0.005 amps (Class 20)	0.050 amps (Class 200)	0.080 amps (class 320)
Burden Data	Voltage circuit:		
	Voltage 120	Watts: 1.3	VA 2.2
	Voltage 240	Watts: 1.6	VA 3.1
	Voltage 277	Watts: 1.7	VA 3.4
Voltage 480	Watts: 2.4	VA 5.2	

## SENTINEL Socket Meter



## Shipping Weights

A-Base		
Net Weight	Gross Weight (Meter & Carton)	
5.7 lbs (2.6 kg)	9.3 lbs (4.2 kg)	

Socket Meter		
Net Weight	Gross Weight (Meter & Carton)	Gross Weight (4 Pack)
4 lbs (1.8 kg)	7.5 lbs (3.4 kg)	20.2 lbs (9.2 kg)

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