POWER INSTRUMENTS
255 North Union Street
Telephone: 585-238-4994 Fax: 585-454-7805
E-mail: joe.ostrowsky@ametek.com

Date: October 25, 2015

Subject: Application for NYPSC Approval of the JEMStar II

Case #: TBD

To: Whom it may Concern-

I would like to introduce myself; I am Joe Ostrowsky the North East Regional for AMETEK Power Instruments. AMETEK released a new high end meter mid last year adding to our metering line which includes the original JEMStar meter which has NYS-PSC approval. Like the JEMStar, the JEMStar II Digital Power Meter is a multifunction electricity meter for use in revenue & billing, energy management and power quality applications. JEMStar II is available in a variety of installation styles including Socket-base (S-base), A-base using an adapter, Switchboard case and a several retrofits of older meters. The JEMStar II recently passed testing at MET Laboratories meeting the requirements of ANSI C12.1-2008 for Electric Meters, Code of Electricity Metering and ANSI C12.20-2010 for Electricity Meters – 0.2 and 0.5 Accuracy Classes, tested under the ANSI Certification Program.

Please feel free to contact me with any further concerns or questions.

Regards,

Joe Ostrowsky
AMETEK Power Instruments
North East Regional Sales Manager
3179 Valley Drive
Walworth, NY 14568
Ph: 585-943-4497
Email: joe.ostrowsky@ametek.com

CC: Nick Ritts – National Grid

PSC-93.6 (c)

1. Packaging

- Socket
- Switchboard
- A-Base
- Retrofit (JEM, GE, Quantum, Transdata, Landis Gyr, ITRON, Westinghouse, Kitron)
- IEC

1.1. Meter Forms

- ANSI Form 5,6,8,9 35,36,45
  - 2 Element [2PT's, 2CT's] (3 phase, 3 wire Delta)
  - 2 Element [2PT's, 2CT's] (3 phase, 3 wire Open Delta)
  - 2 Element [2PT's, 2CT's] (3 phase, 3 wire Network)
  - 2 Element [2PT's, 2CT's] (3 phase, 3 wire Wye)
  - 2 ½ Element [2PT's, 3CT's] (3 phase, 4 wire Wye)
  - 3 Element [3PT's, 3CT's] (3 phase 4 wire Delta)
  - 3 Element [3PT's, 3CT's] (3 Phase, 4 wire Wye)
  - 2 Element [3PT's, 2CT's] (3 Phase, 3 wire Delta)

2. Inputs

2.1. Current Inputs

- Current Class 2 (2Amps)
- Current Class 10 (10 Amps)
- Current Class 20 (20 Amps)
- Transformer correction (8 set points per CT)

2.2. Voltage Inputs

- 55-530VAC for nominal; inputs of 69, 120, 240, 277, 380, 480
- 50 or 60Hz
- Burden shall be a maximum of 0.5VA for voltage inputs only.

- Transformer correction (1 set point per PT)

2.3. Power

- 55-530VAC self-powered from any of the three phases
- 55-530VAC externally powered
- 90-300 VDC externally powered
- Maximum burden of 15VA.

3. Graphical Display

- Color LCD
- Backlighting
- 10 digit measurements
- Site monitor status, alarms and thresholds, input potential status, power flow
- Current/voltage vectors with phase angles and magnitudes (all 3 phases)
- User driven menu

4. Communications

- 8 Independent Ports
  - Optical
  - RS-232
  - RS232/485
  - RS232/485
  - Modem (Dialup or Cellular)
  - Ethernet with 12 simultaneous users
  - Ethernet with 12 simultaneous users
- Protocols
  - JEM Binary
  - MV90 (via JEM Binary)
  - DNP 3.0 Level 2 (Multi-User)
  - Modbus RTU, TCP/IP (master/slave)
  - ANSI Tables
  - IEC 61850
  - IEC 870-5-102

- PQ Dif (PQ Data)
- DLMS
- NTP, IEEE 1588
- Email, WEB Server, SNMP

5. Inputs and Outputs

- Internal I/O
  - 6 channel Digital - universal (Form C Input or KYZ Output)
  - 4 channel Analog Output– (0-1mA or 4-20mA)

6. Meter Measurements

6.1. Accuracy

- Guaranteed accuracy of 0.05% reading for watthours
- Typical accuracy of 0.02%

6.2. Measurements

- Instantaneous Measurements
- Integrated Measurements
- Demand Measurements
- Power Quality (Harmonics, Flicker, Sag/Swell, waveform)
- Min/Max
- TLC, LLC, Time of Use
- Computed measurements (user configurable)

7. Recording

7.1. Display Registers

- 50 Normal
- 50 Alternate
- 50 Test registers

7.2. Load Profile

- Two Load Profile Groups (independent interval settings)

- 16 channels each
- Selectable pulse or engineering units
- Max 450 days storage at 15 min intervals @ 16 channels

7.3. Measurement Logging (future)

- Two Log Groups w/ up to 50 measurements per Log
- Max 180 days storage at 5 minute intervals @ 50 measurements

7.4. Harmonics (future)

- Individual Current/Voltage to 128th (magnitude and phase angle)
- 1 to 60 minute recording interval (continuous recording)
- Maximum storage of 240 days @ 60 minute recording intervals for 2nd to 128th harmonic (voltage & current magnitude per phase)

8. Timekeeping

8.1. Clock

- Internal crystal (0.5sec/day)
- 50/60HZ
- IRIG-B
- NTP, IEEE 1588
- DNP, Modbus, MV90, JEMREAD

9. Special Features

9.1. Triggers and Alarms

- 64 configurable triggers using any measurement(s)
- Combination triggers with up to 3 variables (future)
- Triggered events captured with time and date
- Triggers used to enable waveform recording, high speed RMS, digital outputs, email notification (future)

9.2. Power Quality (future)

- High Speed RMS

- 120Hz (1/2 cycle) recording of Voltage, Current magnitude and phase angle
- Maximum storage of 500 records with 5 second duration each

- Sags and Swells
  - 1 cycle resolution
  - Time Tag events
  - Min/Max/Avg of Amps, Volts, PF, frequency, THD per phae
  - Store 500 events
- Waveform Capture
  - 1 KHz sampling for max. 16seconds (up to 500 records storage)
  - 16 KHz sampling for max. 1 second (up to 64 records storage)
  - Maximum storage of 8 seconds @1kHz x 64 records + 0.5 seconds@16kHz x 64 records)
  - Adjustable Pre and Post recording
- Flicker (Pst and Plt)
- Compliance to EN50160, IEC 61000-4, IEEE 519, 1159, ITEC, CBEMA

9.3. PMU (future)

- Synchronized Phasor Measurements to IEEE Standard C37.118-2005
- 30 frames/sec at 60Hz and 25 frames/sec at 50Hz
- Outputs via Serial and Ethernet

10. Security Requirements

- NERC CIP, NISTIR 7628 v1.0, IEEE 1686TM – 2007
  - Electronic access control
  - Audit Trail
  - Supervisory monitoring and control
  - Configuration Software
  - Communication port access

11. Software Requirements

11.1. Configuration Software

- Compatible with JEMWARE II

11.2. Data Retrieval Software

- Compatible with JEMREAD

11.3. Power Quality Retrieval and Analysis (future)

- Software to retrieve power quality data and provide graphical analysis, reports and database storage

11.4. MV90

- The meter is compatible with MV90 software using a commonly available TIM.

PSC-93.6 (d)

I am working on projects for use of the JEMStar II with Nick Ritts and Larry Durantte at National Grid. National Grid received two meters for evaluation and qualification and have agreed to provide sponsorship of the JEMStar II.

PSC-93.6 (e+f)

AMETEK Power Instruments independently certified the meter for meeting the requirements of ANSI C12.1-2008 for Electric Meters, Code of Electricity Metering and ANSI C12.20-2010 for Electricity Meters – 0.2 and 0.5 Accuracy Classes. The JEMStar II recently passed testing at MET Laboratories meeting the requirements of ANSI C12.1-2008 for Electric Meters, Code of Electricity Metering and ANSI C12.20-2010 for Electricity Meters – 0.2 and 0.5 Accuracy Classes, tested under the ANSI Certification Program. AMETEK can provide a copy of the full MET test report or further details is available at MET. Please reference MET Report: EMC & TEL83571-ANSI Dated August 25th, 2015. Test for both parties have been conducted and certified for the following:

(1) All tests have been conducted by personnel who have thorough practical and theoretical knowledge of the meters and adequate training in making precision measurements;

(2) The test equipment employed in these tests conforms to the applicable requirements specified in Standards and Standardizing Equipment, of the latest version of ANSI C12; and

(3) The accuracy of the test equipment has been established by comparison with standards whose accuracy is traceable to the National Institute of Standards and Technology.

MODEL NUMBER DESCRIPTION

This user manual is applicable to a broad range of JEMStar II meter options. To determine the options on your meter, read the model number located in the center front of the meter faceplate and compare it to the following guide.

JEMStar II Model Number

You build a model number by selecting options from each selection.

JEMStar II Base Meter				Communication and I/O Options				Additional Options	Power Quality
Meter Form	Enclosure	Frequency	Current Class	Communication Options		I/O Options		Comms, Power, Time Sync	Power Quality / PMU
05 = Form 5 *3 phase, 3 wire Delta*	S = S Base	50 = 50Hz	02 = Class 2	0	None	0	None	0 = No Additional Options	0 = No Additional Options
	A = A Base	60 = 60Hz	10 = Class 10	1A	Single Serial: RS-232	DIO	Internal Ch 6 D I/O		
	R = Switchboard		20 = Class 20	1B	Dual Serial: RS-232/485	DIOP	Internal 6 Ch D I/O w/PS	**Measurement Recording Options**	**Power Quality Options**
06 = Form 6 *3 phase, 4 wire Wye*	I = IEC			1C	Triple Serial: (2) RS-232/485, (1) RS-232	AO1	Internal 4 Ch AO (0-1mA)	DLP = Dual 16 ch Load Profile	PQ PQ Ready Meter can be upgraded in the field for a future PQ Option
	J1 = JEM1 Tall Retrofit					AO2	Internal 4 Ch AO (4-20mA)		
	J1F = JEM1 Front Retrofit			2A	Single Ethernet Port			**Meter Power Options**	
08 = Form 8 *3 phase, 4 wire Delta*	J2 = JEM2 Retrofit							EAP = External Power (socket)	
	J10 = JEM10 Retrofit								
	JS = JEMStar Retrofit			3A	Internal Analog Modem				
09 = Form 9 *3 phase, 4 wire Wye*	Q = Q121, 220 Retrofit					You can select 1 each of Items: DIO or DIOP AO1 or AO2			
	Q4 = Quad 4 Retrofit								
	TD = MarkV Retrofit								
45 = Form 45 *3 phase, 3wire Delta*	G1 = GE DS63 Retrofit								
	G2 = GE DSW63 Retrofit								
	G3 = GE DS64 Retrofit								
U = Universal Form 5/9 *3 phase, 4 wire Wye 3 wire Delta (use w/A Base & SWBD)*	G4 = GE DSW64 Retrofit			You can select 1 each of Items: 1,2,3 (Ex. 1B/2A/3A)					
	G5 = GE Phase 3 Retrofit								
	G6 = GE DS65 Retrofit								
	W = Westinhouse Retrofit								
	All retrofits are based on switchboard enclosure								

Typical Model Number

JSII-09S6020-1B/2A/3A-DIOP

JSII	JEMStar Meter
09	Form 9
S	Socket Base
60	60 Hz
20	Current Class 20
1B/2A/3A	Dual serial, single Ethernet, Analog Modem
DIOP	6 Channel I/O w/ power supply

JEMStar II
High Accuracy Revenue Meter

FOR GENERATION, TRANSMISSION, AND INDUSTRIAL POWER MEASUREMENT

SCIENTIFIC COLUMBUS

HIGH ACCURACY REVENUE METER

AMETEK's JEMStar II has the highest accuracy in the market, provides many communication options and monitors power quality making it the ideal choice for any metering application. An impressive color display makes it easy to view power measurements, phasor displays and meter diagnostics. The JEMStar II is easy to use and configure with our intuitive JEMWARE software and the meter's display provides a user menu to show and edit configuration details. The JEMStar II has 8 GB of non-volatile memory to store metering and power quality data for as long as needed. The meter has a single base model that can be used for simple revenue and billing applications as well as more complex power quality monitoring applications.

High Accuracy
The JEMStar II's precision design provides high accuracy with long term stability making it easy to guarantee our 0.05% accuracy for 10 years. Low current accuracy is better than 0.2% RDG at 50 mA.

Color Graphic Display

Meter Security
The JEMStar II includes security features that satisfy NERC CIPS requirements. Username & password combinations are required to access secure data and configuration details. The meter communications are password protected to prevent unauthorized access. Ethernet connections can be restricted to select IP addresses. Audit logs store all access attempts; including meter connection, configuration, firmware changes and data access with username and time/date for each occurrence. The audit log requires permission to view and cannot be modified or deleted from the meter.

FEATURES AND BENEFITS

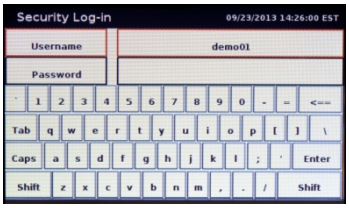
- High accuracy
- Easy to configure and operate
- Advanced communications
- NERC CIPS compliance
- Power Quality
- Graphic color display and user menu

AMETEK®
POWER INSTRUMENTS

EXPERIENCE THE POWER™

Ease of Use

The JEMStar II is easy to configure with AMETEK's intuitive JEMWARE Software that includes a Configuration Wizard to guide you through the necessary set-ups for your metering application. The meter display has a User Menu that displays configuration details without using a PC. Some configuration details can be edited once the necessary password is provided for access. The meter includes a built-in USB port that can be used to upload or download meter configurations, upload firmware or retrieve metering data using a simple USB memory stick.

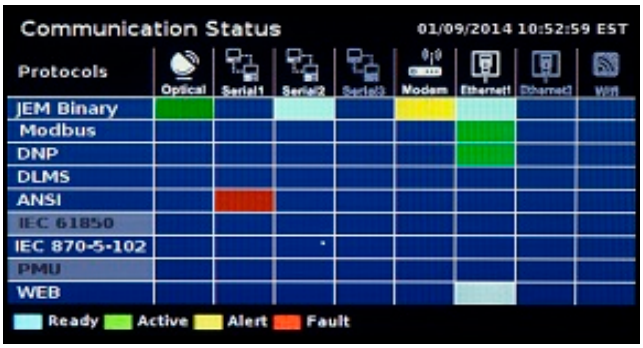


User Display Menus

Communications

The JEMStar II can be supplied with up to eight communication ports including:

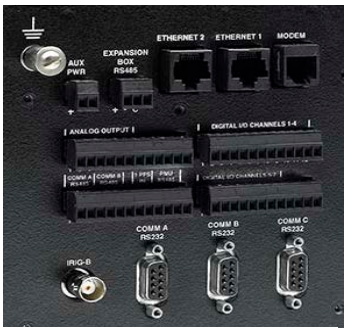
- Optical port
- (3) Serial ports – RS-232 & RS-485
- Analog or Cellular Modem port
- (2) Ethernet ports
- WIFI port



Communications Heads-up Display

Communication ports support a variety of metering protocols including DNP, Modbus, JEM Binary, ANSI Tables and IEC-61850. All ports can operate simultaneously and independently. Tracking the port status and protocol selections is simplified with our graphical 'heads-up display' showing which ports are installed and configured, which ones are in use and which ones require attention. The 'heads-up display' can also be viewed remotely on our JEMWARE Software.

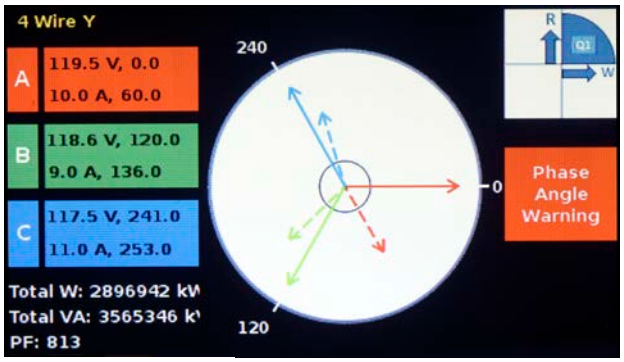
The dual independent Ethernet ports have separate IP Addresses so that end users can allow access to third parties without breaching their own secure network. Each Ethernet port can be addressed for multiple users and protocols operating simultaneously with permissions given to specified functions.



Switchboard Meter Rear View

Site Monitoring

Metering wiring connections can be checked at the meter via a color phasor diagram and alert you when wiring is mis-connected or phase angles exceed pre-set limits.



Phasor Diagram

The JEMStar II can be configured with alarm triggers on any power measurement, analog or digital I/O. Triggered events are always available for remote retrieval and triggers can activate power quality recording, generate an email notification or alarm an output contact.

Power Quality

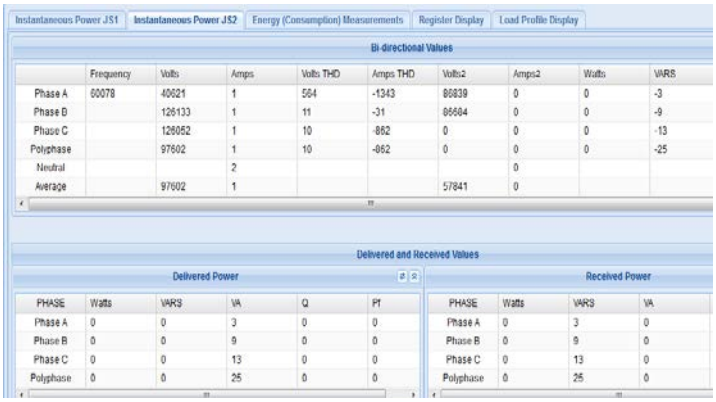
The JEMStar II comes equipped with Sag/Swell/Outage recordings that store the time, date, duration and site conditions. For advanced power quality analysis, there is an option to record high speed RMS measurements and waveform data from pre-selected triggers. Waveform data is selectable for 1kHz and 16kHz recording rates with durations lasting up to 16 seconds. Individual harmonics up to the 128th can be recorded for magnitude and phase angle as well as Flicker and long term voltage availability. Power quality data can be transmitted directly from the meter in a PQ Dif file format for easy analysis with our analysis software or third party applications. Power quality data can also be recorded and displayed in various standard formats including EN50160, CBEMA and ITIC.

Power Quality Recordings

Sag/Swell/Outage (standard)	• Record Event Time, Date, Duration • Record min/max/avg V, A, Pf, THD • Max 500 events
High Speed RMS (optional)	• Record voltage and current per phase • 120 Hz recording rate: max 500 records • Configurable trigger: pre and post event recording, max 60 second recording per event
Waveform Capture (optional)	• Record voltage and current per phase • 1kHz recording rate: max 500 records • 16 kHz recording rate: max 64 records • Configurable trigger: pre and post event recording, max 16 seconds recording per event
Harmonic Recording (optional)	• Record individual voltage and current harmonic per phase up to 128th • Record magnitude and phase angle • Recording interval: 1-60 min
Flicker Measurement (optional)	• Pst and Pit

WEB Connectivity

The JEMStar II can be equipped with a password protected WEB server that can be used to display real time measurements and metering events on any standard WEB browser. The WEB display can be customized to select specific measurements, show historical load profile data and real time measurements. The meter can be set up for email alarm notifications from pre-selected triggers.



Web Browser Display

Metering Features and Functions

The JEMStar II has 50 normal and 50 alternate registers that can be shown on the graphical display, listing 1-4 measurements per display screen. The meter can be provided with two independent load profile groups, each with 16 channels at intervals of 1 to 60 minutes. Measurements can be stored in scalable counts or 32 bit engineering units. For additional measurement logging, the meter can record up to 50 different power measurements in two independent logs each with their own recording interval. Logs can be used for short or long term trending of energy values, min/max/avg power measurements and harmonics up to the 128th.
The meter comes with 8GB of non-volatile memory for storing Load Profile, Measurement Logs and Power Quality Data, providing ample space for all.

Flexible Design

The JEMStar II is equipped with a wide range current and voltage input that can be supplied in a universal form to handle any three phase Delta or WYE application. The meter can be provided in a switchboard, A-Base and several retrofit packages for easy plug and play replacement of many legacy meters. The meter can be easily field upgraded for any option, including power quality recording making it a universal fit for any application.

Input/Output Capability

The JEMStar II can be equipped with an internal six channel digital I/O and a four channel analog output module. Each digital I/O channel can be selected as either an input or output and has a built-in isolated supply to provide power for inputs. Additional digital I/O and analog inputs can be provided external to the meter.

Time Synchronization

The meter clock can be synchronized from it's own high accuracy temperature compensated source or externally synchronized to the AC frequency, IRIG-B, NTP, IEEE-1588 and PPS inputs depending on your application requirements.

SPECIFICATIONS

METER FORMS
Meter Forms: 5, 6, 8, 9, 45, Universal

INPUTS
Voltage
- 55-530 VAC auto-ranging
- Burden*: 0.5 VA @ 530V

*Does not include auxiliary power requirements.

Current
- 1 Amp: ANSI Class 2
- 5 Amps: ANSI Class 10
- 10 Amps: ANSI Class 20
- Burden: 0.5 VA maximum
- Overload: 1.5x rated class current continuous
- Starting Current: 0.002 A
- Frequency range: 45-55 Hz, 55-65 Hz

AUXILIARY POWER
S-base and A-base
- Self powered via all three phases: 55-530 VAC
- External Aux Power Option: 55 – 530 VAC or 90 – 300 VDC; 19-58 VDC

Switchboard
- Aux Power: 55 – 530 VAC or 90 – 300 VDC; 19-58 VDC option

Auxiliary Power Burden
- 25 VA maximum

ACCURACY
Watt Hour
- 0.05% Reading (0.02% Typ.)

Volts, Amps
- 0.04% Reading

MEASUREMENTS
- Bi-directional, 4 quadrant
- Energy, Instantaneous: per phase values
- Min/Max/Avg values
- Demand: Peak, Present, Past, Thermal & Coincident
- TOU: 8 rates/day, 4 season
- TLC, LLC: Per Phase, Delivered & Received, transformer factors or % loss

Measurement Logging (optional)
- 2 groups x 50 channels
- Recording Interval: 1-60 min

REGISTERS
- 50 Normal, 50 Alternate, 50 Test

LOAD PROFILE
- 16 channels storage
- 1-60 minute intervals
- Values stored in scalable counts or 32 bit engineering units
- Optional second independent LP Group
- Max 225 days storage of: 32ch @ 15 min intervals per Load Profile group

TIME SYNC
- Internal Clock: 0.5 sec/day accuracy
- 50/60HZ Line Frequency
- External Time Sync Options: IRIG-B, NTP, IEEE-1588, PPS

OPTIONAL I/O
Internal I/O
- Digital I/O: 6 channel selectable as input or output. Isolated Power Supply for Digital Inputs
- Analog Output: 4 channel; 0-1mA or 4-20mA

External I/O
- Digital I/O: 8 channel selectable as input or output.
- Analog Input: 4 channel; 0-1mA or 4-20mA
- RS-485 connection to meter (max 4,000 feet)

Digital Input Rating
- Form A or KYZ
- Maximum voltage 40 VDC

Digital Output Rating
- Form A or KYZ
- Maximum open-circuit voltage: 200V DC or peak AC
- Maximum switching current: 50 mA

COMMUNICATIONS
8 Com Ports Available

Port 1: Optical (Standard)
- Type 2 – 19,200 Baud

Port 2: RS-232 Serial (opt)
- User configurable: 300 to 38400 baud

Port 3: RS-232/485 Serial (opt)
- User selectable: RS-232/485
- User configurable: 300 to 38400 baud

Port 4: RS-232/485 Serial (opt)
- User selectable: RS-232/485
- User configurable: 300 to 38400 baud

Port 5: Internal Analog Modem (opt)
- 56K baud
- With optional phone home on power fail
- With optional RS-485 Communication Repeater

Port 5: Internal Cellular Modem (opt)
- CDMA: Verizon, Sprint
- GSM/GPRS: Cingular, AT&T, Rogers, T-Mobile
- Internal or External Antenna

Port 6: Ethernet (opt)
- 100 BaseT, unshielded twisted pair
- DHCP or Fixed IP Address
- Up to 12 simultaneous connections
- WEB Server, Email Notification

Port 7: Ethernet (opt)
- 100 BaseT, unshielded twisted pair
- DHCP or Fixed IP Address
- Up to 12 simultaneous connections
- WEB Server, Email Notification

Port 8: WIFI (opt)
- Fixed IP Address
- Up to 12 simultaneous connections

USB Port:
- Compatible w/ USB Flash Drives
- Upload/Download Configuration
- Upgrade Firmware
- Retrieve Meter Data

Communication Protocols
- Modbus RTU, Modbus TCP/IP (Master & Slave)
- DNP 3.0
- ANSI Tables
- IEC 61850 (opt)
- JEM Binary

METER DISPLAY
- 4.3” Color Graphic LCD
- Registers, Phasor Diagram, Diagnostics
- User Menu Configuration

MECHANICAL
Case Styles
- Socket connected (S-base), small switchboard case, bottom connected (A-Base), meter retrofits (JEM-2 and others)

Size and Weight
- S base: 5.5 pounds
- A-base: 7.5 pounds
- Switchboard: 11.5 pounds

ENVIRONMENT
Operating Temperature
- -22◦ to 185◦F (-30◦ to 85◦C)

Storage Temperature
- -40◦ to 185◦F (-40◦ to 85◦C)

Humidity
- 5 to 95% relative humidity, non-condensing

ELECTRICAL STANDARDS
Fast Transient
- IEC 61000-4-4

Radiated/Conducted Emissions
- IEC 61000-4-3, IEC-61000 4-6

Surge Immunity
- IEC 61000-4-5

Electrostatic Discharge
- IEC 61000-4-2

Surge Withstand (SWC)
- IEEE Standard C37.90.1

AGENCY STANDARDS
- ANSI Standard C12.20-2010
- FCC Part 68, FCC Part 15
- IEC61000-4-30-2008
- EN50160

AMETEK POWER INSTRUMENTS

For Customer Support
AMETEK Power Instruments
255 North Union Street
Rochester, NY 14605
Tel: +1 585.263.7700
Fax: +1 585.454.7805
power.sales@ametek.com

U.S.A. Headquarters
AMETEK Power Instruments
50 Fordham Road
Wilmington, MA 01887
Tel: +1 978.988.4903
Fax: +1 978.988.4990
www.ametekpower.com
power.sales@ametek.com

European Headquarters
Unit 21 Ridgeway
Donibristle Industrial Estate
Dalgety Bay
FIFE, Scotland KY11 9JN, UK
Tel: +44 (0) 1383-825630
Fax: +44 (0) 1383-825715
power.sales@ametek.com

Asia Pacific Headquarters
No. 43 Changi South Avenue 2
#04-01
Singapore 486164
Tel: +65 6484.2388
Fax: +65 6481.6588
sales@ametekasia.com

AMETEK Instruments India Pvt. Ltd.
1st Floor, Prestige Featherlite Tech Park
Plot 148, EPIP Phase II
Whitefield, Bengaluru 560 066
Tel: +91 80.67823252
Fax: +91 80.67823232
powersales.india@ametek.com

SCIENTIFIC COLUMBUS · Gulton Statham · RIS ROCHESTER · PANALARM · Pulsar

ISO 9001 Certified