

MARK-V EMS60

Advanced High Accuracy Revenue Meter



- 4-Quadrant Bidirectional Metering
- 0.06% Revenue Accuracy
- Power Quality Monitoring
- DNP3/Modbus SCADA Communications

- Ethernet, 4G LTE, Serial Under-Glass
- Load Profile Recording
- Loss Compensation
- Industry Proven Revenue Meter



The Definitive Advanced Revenue Metering Solution

TransData's MARK-V Energy Meter is a top tier, advanced functionality electricity meter offering unmatched accuracy and reliability performance along with a complete range of wired and wireless communications capabilities for revenue metering Bulk-Power Generation, Distributed Energy Resources (DER's), ISO Transmission Grid, Distribution Substation and Commercial-Industrial AMI installations. The MARK-V is a field-proven, ANSI certified revenue meter purchased by hundreds of electric utilities, government agencies and independent power producers.

In compliance with the latest NERC-CIP and industry security audit requirements, TransData's MARK-V meters are fully designed and manufactured in the USA by a US-owned company in our ISO-9001 certified factory in Dallas, Texas.

Key Features

- 4-Quadrant, Bi-Directional Digital Revenue Energy Meter
- Multiport Ethernet, 4G LTE, Serial, POTS Modem Comms
- DNP3/Modbus Real-Time SCADA Meter Data Telemetry
- Power Quality Monitoring and Event Recording Systems
- $\pm 0.06\%$ Load Range Metering Accuracy
- -40°C to $+85^{\circ}\text{C}$ Rated Operating Range (Including LCD)
- Real-Time Multi Processor Operating System
- Compatible with Itron MV-90 and Primelink Reader Systems

Programmable Bi-Directional Metered Quantities

- Watthours, Varhours, VAhours, Qhours, Volthours, Volt²hours, Amphours, Amp²hours and Power Factor
- Polyphase and/or Per-Phase Metering
- 4-Rate Time of Use (TOU) Registers
- Transformer and Line Loss Compensation
- Auxiliary External Power Supply Available on Socket Meters

Advanced Meter Register Display

- Up to 100 User-Defined Displayable Quantities (00-99)
- Normal, Alternate, Test and Vector Analysis Display Modes
- Self-Read Registers with Hourly, Daily and Monthly Update
- Fixed or Rolling Block Demand, 1-60 Minutes Intervals
- Load Profiling Interval Data Recorder
- LCD Display Operating Range: -40°C to $+85^{\circ}\text{C}$
- Displays for Instantaneous Watts, Vars, Amps and Volts
- Memory Rating: 20-Years Normal Operating Conditions
- Indicators for Potential, Load Rate, TOU Rate, Quadrant

Load Profiling Interval Data Recorder

MARK-V Meters include a multi-channel Interval Data Recorder (IDR) that profiles energy usage data on an interval-by-interval basis with storage in non-volatile memory for future retrieval and analysis. The recorder is programmable for demand usage intervals of 1-60 minutes for fixed or rolling-block type demand and is fully compatible with Itron's MV-90 and Primelink meter data retrieval systems

Product Availability

- Service: 3-phase; 3-Wire Delta, 4-Wire WYE, 4-Wire Delta
- Socket Base: ANSI Forms 5S, 6S, 8S, 9S and 10S
- Short S1 Style Switchboard Case: ANSI Forms 5, 6, 8, 9
- Tall M2 Style Switchboard Case: ANSI Forms 5, 6, 8, 9
- Class 20 (0-20A); Class 10 (0-10A); Class 2 (0-2A)
- ANSI Voltages: 69, 120, 240, 277 or 480 volts

Pulse Input/Outputs

- 4 Form-C KYZ Pulse Initiator Outputs
- 5 Control/Alert Contact Outputs
- 2 Pulse/Status Contact Inputs

MARK-V Specifications

Revenue Meter Accuracy

± 0.06 Load Range Per ANSI C12.20 Test Report
 $\pm 0.1\%$ Rated - Test Amps to Full Load
 $\pm 0.1\%$ Rated - Light Load to Test Amps
 $\pm 0.15\%$ Rated - 0.1 Amps to 0.25 Amps
Meets ANSI Class 0.1% Accuracy Requirements

Operating Range

Voltage: $\pm 20\%$ of Rated Voltage
Current: 0 to Class Amps
Frequency: ± 3 Hertz
Temperature: -40°C to $+85^{\circ}\text{C}$
Humidity: 0-95% non-condensing
Frequency: 60 Hz, 50 Hz
Temperature Influence: Less than 100ppm/ $^{\circ}\text{C}$

Rated Maximums

Voltage: 125% of Rated Voltage Continuous
Current: 120% of Rated Current Continuous
Surge Withstand (SWC): 6000 Volts
Dielectric: 2500 Volts RMS, 60 Hz, 1 Min.

Burden

Power Supply: 8VA Max
Voltage: 0.03VA Max
Current: 0.15VA Max (Socket Meter)
0.30VA Max (Switchboard Meter)

Revenue Meter Test Certifications

- ANSI C12.1
- ANSI C12.20
- ANSI C12.16
- MTR 1-96 California ISO Meter
- Measurement Canada Approved
- IEC 687 Class 0.2% Precision

EMI/RFI Test Certifications

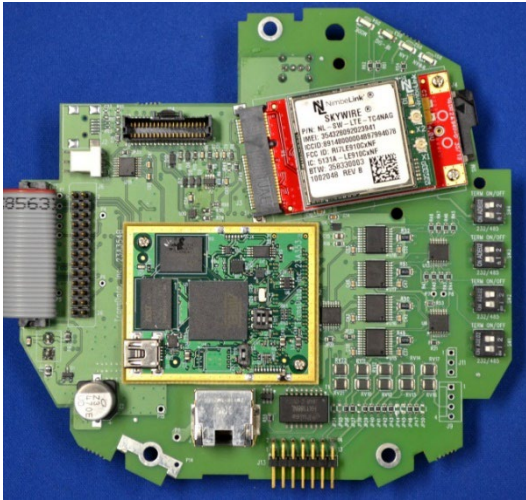
- ANSI/IEEE C37.90 SWC Wave/Transient
- ANSI C62.41 Ring Wave
- IEC 801-4 Fast Transient Burst
- FCC Parts 15, 68, 22 and 24

Industry Approvals

California ISO, ERCOT ISO, COMET (Texas), New York State, New England ISO, PJM Grid, Measurement Canada, USDA RUS.

Advanced Communications, Power Monitoring and I/O Systems

U-Com Linux Based Data Telemetry Module Provides Unrivaled Multiport Communications



Advanced U-Com Communications Module allows Multiple Users to Simultaneously Access Real-Time DNP3/Modbus SCADA and Accumulated Meter Register Data

- Linux Based Operating System Manages Communications Ports
- 10 Ethernet Ports, Addressable, Multi-Layer Password Secured
- 4 RS232/485 Switch Selectable Serial Ports for connecting to external Cellular, Satellite and Legacy RTU's
- 4G LTE Dual-SIM Verizon/AT&T Digital Cellular
- Optional Secure, Non-Routable DNP3 Ethernet Port
- Gateway Hub Functionality for Connecting to External Devices
- Network Time Protocol (NTP) Time Synchronization
- Itron MV-90 and Primestone Meter Reader System Compatible

MARK-V Pulse Input/Output Options

KYZ Relay Pulse Initiator Outputs

Up to 4 Form-C KYZ pulse initiator outputs are available for providing pulse data to energy management systems or demand recorders. The pulse outputs feature programmable scaling constants that permit configuration to virtually any unit of primary or secondary energy.

Control/Alert Contact Outputs

Up to five Control/Alert contact outputs are available for providing customized monitoring and alert features

- End-of-Interval Alert
- Demand Threshold Alert
- Power Factor Threshold Alert
- TOU Rate Change Alert
- Loss of Potential Alert
- Capacitor Bank Controller Output (VARs or VA)

Pulse/Status Inputs

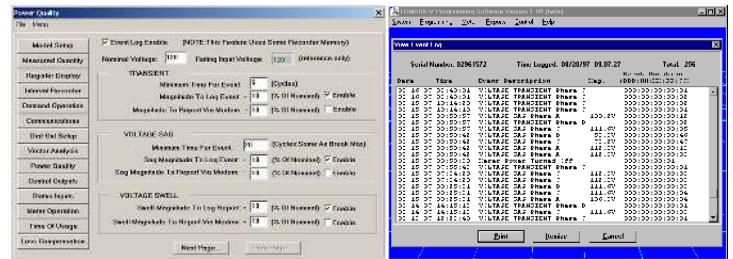
The MARK-V can be equipped with Form-A digital pulse inputs for advanced metering applications. The pulse outputs can be programmed to perform a variety of advanced metering functions including

- Demand Time Synchronization Input
- Load Profile Recorder Input from External Device
- Meter Measuring On/Off Switch
- TOU Rate Change Switch Input
- Meter Data Channel Switch

Power Quality Monitoring and Event Recording

The MARK-V Power Quality Monitoring system is used to detect, record and report voltage sags, swells, interruptions and outages occurring at the meter site. The system features user defined threshold levels and timing trigger settings to detect events with the capability to initiate dial-out reporting to Itron's MV-90 System

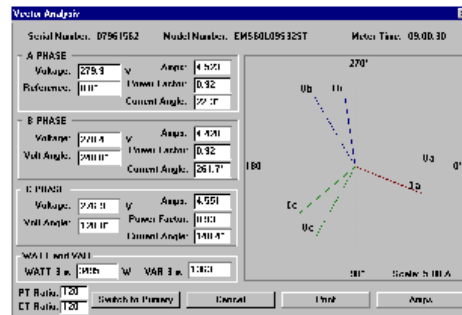
- Detects Sags, Swells, Interruptions and Outages
- Programmable Threshold Levels Down to 1 Cycle
- Records, Time, Description, Magnitude and Duration of Events



Vector Analysis Site Diagnostics System

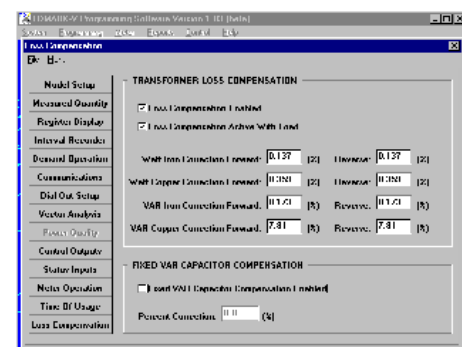
The Vector Analysis system enables meter technicians to remotely verify site electric service with the capability to detect equipment failures, blown fuses, mis-wired CT's/PT's and site tampering. The system includes on-line diagnostic screens with a real-time phasor diagram illustrating the direction and angles of power flow.

- Online Site Analysis System with Real-Time Phasor Diagram
- Verifies Correct Site Wiring, Input Levels and Phase Rotation
- Detects and Reports Equipment Failures and Tampering



Transformer and Line Loss Compensation

The Transformer and Line Loss Compensation is used to compensate power transformer losses in high-side billing applications and line losses in transmission or legal billing point applications with 5-digit resolution. Loss compensation is performed real-time on a per cycle basis with programmable fields for Iron and Copper loss values. An on/off switch allows accuracy testing in both compensated and uncompensated modes without reprogramming.



MARK-V Advanced Revenue Meter Product Matrix

Measured Quantities	EMS60E	EMS60L	EMS60X
Revenue Metering Measurement Channels	4	8	8
KWh, KVARh, KQh, KVAh - Delivered and Received	■	■	■
4-Quadrant KVARh (Lead & Lag - Delivered & Received)	NA	NA	■
Volthours, Volt-Squared hours	■	■	■
Amphours, Amp-Squared hours	NA	■	■
Power Factor	■	■	■
Per-Phase Metered Quantities	NA	■	■
Demands: Peak (Max), Current, Cumulative, Coincidental	■	■	■
Power Quality Monitoring	■	■	■
Transformer/Line Loss Compensation	■	■	■
Demand Interval Data Recorder			
Demand Interval Recording Channels	4	8	8
Recorder Capacity - 4 Channels at 15-Minute Intervals	149 Days	NA	NA
Recorder Capacity - 8 Channels at 15-Minute Intervals	NA	74.5 Days	225 Days
Memory Type	LiRAM	LiRAM	LiRAM
Data Retention Lifetime Rating	20-Years	20-Years	20-Years
Meter Register			
Display Channels (00-99)	100	100	100
Programmable Demand Interval Periods	1-60 Minutes	1-60 Minutes	1-60 Minutes
Fixed or Rolling Block Demand 1-60 Minute Intervals	■	■	■
4-Rate Time-of-Use (TOU) Meter Registers	■	■	■
Self Read Registers - Hourly, Daily, Monthly	■	■	■
Demand Deferral (Demand Forgiveness)	■	■	■
Meter Billing Register Communications			
10 Port Ethernet - Multi-user Addressible	■	■	■
4G LTE Dual SIM Verizon/ATT Cellular	■	■	■
4 RS232/485 Serial Ports	■	■	■
Secure Non-Routable Ethernet Port	Available	Available	Available
Other Communications	-	-	-
POTS Telephone Modem	Available	Available	Available
ANSI Type II Optical Port	■	■	■
DNP3/Modbus SCADA Communications			
10 Port Ethernet - Multi-user Addressible	■	■	■
4 RS232/RS485 Serial Ports - Multi-user Addressible	■	■	■
4G LTE Dual SIM Verizon/ATT Cellular	■	■	■
Secure Non-Routable Ethernet Port	Available	Available	Available



For over 55-years, TransData has specialized in the design and manufacture of advanced power and energy metering products used by electric utilities, power producers and government agencies to accurately measure, monitor and control the flow of electricity being generated and distributed on the power grid.

Based in Dallas, Texas; TransData's mission is to provide a valuable strategic partner to fulfill our clients diverse power and energy metering requirements. TransData believes that forging long-term relationships based on win-win scenarios and dedication-to-quality are key aspects to market leadership.



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