

Series 2100 Automated Meter Test Set

Portable Meter Test Set for On-Site Accuracy Certification of Revenue Metering Installations for Sarbanes-Oxley Act Compliance



Proudly Manufactured
in the USA

Designed for Testing High-Accuracy Multifunction Energy Meters for ISO Grid, Substation, Generation and Industrial Applications

- ▶ Fully Automated, Computer Controlled Meter Test Bench in a Portable, Self-Contained Package
- ▶ Windows-Based Operating System Compatible with MS Windows 98, NT and XP Versions
- ▶ Used On California ISO, ERCOT (Texas ISO), New York ISO, New England ISO and PJM Grids
- ▶ 0.025% Accuracy NIST Traceable Internal Standard for Certification of ISO Meter Installations
- ▶ Supports Accuracy Testing of KWh, KVARh, KQh, Volthours, V²h, Amphours and A²h Quantities
- ▶ Menu Driven Test Routines with Expanded Mode for Load Range Accuracy Certification
- ▶ Superior Stability Permits Accurate Testing of Transformer and Line Loss Compensated Meters
- ▶ Precision Built-in Current (0-30 Amps) and Voltage (0-600 Volts) Sources



The Worldwide Leader of Advanced Energy Metering Technologies...

Series 2100 Product Information

The Series 2100 is the Most Precise Means for On-site Certification of High-Accuracy, Transformer-Rated Revenue Metering Installations

- ▶ On-site Accuracy Certification of KWh, KVARh, KQh, Volthours, Volt²hours, Amphours and Amp²hours Metering
- ▶ Infra-red LED Sensor, Disk Sensor and KYZ Relay Pulse test pick-ups available
- ▶ Simple for Field Personnel to Use with Automated Menu-Driven Test Routines
- ▶ High-Accuracy $\pm 0.025\%$ Internal Multifunction Standard for Testing High Accuracy Meters
- ▶ Uses Industry Preferred "Active" Test Methodology with Built-in Current and Voltage Sources
- ▶ Expanded Rating Operating Test Range from 100 milliamps to 30 Amps and 0 to 600 Volts

Product Description

Introduced in 1991, the TransData Series 2100 was the industry's first portable, self-contained automated meter test set developed for on-site revenue certification of high-accuracy, transformer-rated, multi-function energy meters typically used by utilities for inter-tie, substation, generation and large industrial applications.

The Series 2100 features built-in current and voltage sources and a high-accuracy, multi-function reference standard capable of providing on-site certification of revenue metering installations to less than 0.1% accuracy with extreme certainty. The Series 2100 is so accurate and precise, it outperforms many types of meter shop test benches when testing high-accuracy meters.

Precision Regulated Current and Voltage Sources

Featuring built-in current and voltage sources, the Series 2100 generates 0-30 amps and 0-600 volts test signals just like the computer controlled test boards in utility meter shops.

The internal current and voltage sources are precision regulated to provide extremely stable signal levels during testing that are not prone to fluctuation with variations of the power supply voltage. The enhanced source stability of the Series 2100 provides extremely precise and repeatable test results, especially on transformer and line loss compensated meter installations.

Preferred "Active" Testing Methodology

The Series 2100 is an "active technology" meter test set meaning it generates its own pure current and voltage sinusoidal waveform test signals to provide to the meter under test. Active technology is the preferred testing methodology for all revenue meters and is an extension of industry established, NIST-traceable test procedures performed by most meter manufacturers and utility meter shops. Active testing eliminates errors caused by inducing distorted waveform signals.

Passive technology meter test sets do not have internal sources and must instead rely on using the current and voltage signals present at the meter site which introduces distorted waveforms and harmonic frequencies into the reference standard. Many reference standards specify NIST-traceable accuracy is attained at 60 hertz (± 1 Hz) with sinusoidal waveforms, passive testing methodology is not reliable for on-site accuracy certification of revenue meters.



Removable High-Accuracy Internal Multi-function Reference Standard

High Accuracy, Multi-Function Internal Standard

TransData first began manufacturing high-accuracy energy reference standards for the utility industry in 1985. The model 2110 internal standard used in the Series 2100 is an evolution of these earlier designs incorporating KWh, KVARh, KQh, Volthours, Volt²hours, Amphours and Amp²hours meter test functionality.

The 2110 precision reference standard has a NIST-traceable typical accuracy rating of $\pm 0.025\%$, with a $\pm 0.05\%$ maximum allowable rating. The 2110 internal standard can be tested against other standards while installed in the test set, or when removed.

Includes Rugged Wheeled Transport Case with Extendable Handle



Series 2100 Operation

Computer Controlled, Automated Meter Testing

The Series 2100 uses an IBM compatible computer with Microsoft Windows 98, 2000, NT or XP operating system to serve as its controller via an RS232 serial interface.

The PC controller serves a multi-purpose role by storing the predefined meter test routines and archiving the test results in Microsoft Access 2000 database. During testing, the PC controller automatically sequences the Series 2100 through test routines, compares the output of the meter to the reference standard, calculates the differential error, displays and archives the test results.

Fast, Simple and Easy to Use

Using the Series 2100, a revenue metering installation can be fully tested and certified to revenue accuracy within a matter of minutes. The current and voltage leads are connected to the meter test switch or terminated to an A-Base adapter. Switchboard meters can be tested with a relay test paddle.

Available pick-up sensor options permit complete testing of the meter and its pulse initiator outputs. The optional LS1 infrared LED sensor pick-up is used with the infrared LED's on solid-state meters, the optional DS1 disk sensor pick-up for electro-mechanical meters and a KYZ pickup cable is included for relay pulse output testing.

Safety features include an emergency shutdown mode and internal fusing to protect the user during short or open circuit conditions.

Operation

To test a meter, the user simply connects the current and voltage leads to the meter test switch, attaches the pick-up sensor, selects the appropriate test set-up from the user created library and the Series 2100 is ready to go. The PC controller takes over from there, automatically sequencing the Series 2100 through the user defined test routines. High capacity relays automatically switch the current and voltage signals between tests to perform series and per phase testing without the technician having to move any wires.

Meter test results are illustrated in familiar "As Found" and "As Left" formats, and are saved on the computer's hard disk in Microsoft Access 2000 for future retrieval or downloading into your meter management system. A portable printer can be interfaced to provide an on-site printout of the test results during witness testing.

Meter Test

Test Setup Information:

File Name: Sample File Date: 4/ 1/03 Test Voltage: 120.0000
 Company Name: TransData, Inc. Batch Number: 12345 Full Load Current: 2.500000
 MFR. Serial No.: 33215546 Test Setup Name: Setup1 Test Constant: 1.200000
 Operator: Lena Joy Form: 9S, 3EL Measured Quantity: Wh
 Instrument Transformer Correction Factor: DISABLED - see System Setup to enable

Test Results:

Series	AS FOUND				AS LEFT			
	Full Load	Light Load	Power Factor	Special Test (%)	Full Load	Light Load	Power Factor	Special Test (%)
A Phase	100.0366	100.1565	100.0391	0.0000	100.0440	100.1255	100.0342	0.0000
B Phase	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C Phase	99.9667	100.0937	99.9886	0.0000	99.8878	100.0831	99.9293	0.0000

Test Status: *** DATE OF RECORD: ***

Buttons: As Found Test, As Left Test, Start Source, Stop Source, Save Results, Single Test, Print, Export Text, Get Setup, Options, Cancel

User-Defined Test Routines

The Series 2100 supports accuracy testing of KWh, KVARh, KQh, Volthours, V²h, Amphours and A²h measured quantities found in most multi-function energy meters being produced today. A complete range of full load, light load, power factor, series phase and individual per-phase testing can be conducted on the supported measured quantities for both forward and reverse power flow at varied power factor levels to determine accuracy compliance.

The "Meter Test Setup" screen features drop-down menus to define the metered quantity, test resolution, meter form designation, meter test constants, power direction and more. Once created, the test routines are saved under a file name and stored on the PC controller for access when required.

Meter Test Setup

Test Variables:

Setup Name: Setup1
 Description: Solid State, Ta = 2.5, 120 Volts, KYZ, 3EL
 Test Constant: 0.090000 Test Frequency: 50 Hz / 60 Hz
 Resolution: 0.0010000 % OR Test Time: 0 s
 Pickup Type: Form C Measured Quantity: Wh
 Form: 9S, 3EL Percentage: %REG / %ERR

Test Limits:

Full Load: +0.0200 -0.0200
 Power Factor: +0.0200 -0.0200
 Light Load: +0.0400 -0.0400
 Special Test (%): + -

Test Setup Status: EM3EL120

For SF, SP, SL, AF, AP, AL, BF, BP, BL, CF, CP, CL

Test Voltage: 120.000 Power Factor: 0.5
 Full Load Current: 2.50000 Direction: Forward / Reverse
 Light Load Current: 0.25000 Phase: Lag / Lead

For SX, AX, BX, CX (Custom Test Points)

Test Voltage: 0.00000 Direction: Forward / Reverse
 Test Current: 0.00000
 Power Factor: 1.0 Phase: Lag / Lead

Tests Performed: SF SP AF AP BF BP CF CP
 SL SX AL AX BL BX CL CX

Buttons: New Setup, Get Setup, Enter Counts, Enter Notes, Transformer Loss Compensation, Save, Cancel

Expanded Test Mode Operation

The expanded test mode is an added feature that permits configuring specific tests to determine meter accuracy performance over a variety of load range, voltage variation and power factor conditions. This feature is especially useful for performing meter acceptance testing to confirm ANSI C12.20 accuracy requirements are met.

Precision accuracy testing can be performed across a meters complete operational load range to determine its overall accuracy compliance rating. Additionally, the expanded test mode permits testing at specific voltage and power factor levels to simulate actual conditions at the meter installation during energy audits.

Expanded Test Mode

Test Info:

File Name: File 1 Date: 4/ 1/03 Test Frequency: 50 Hz / 60 Hz
 Company No.: TransData, Inc. Batch Number: 12345 Percentage: %REG / %ERR
 MFR. Serial No.: 33215546 Test Setup Name: Expanded Setup Pickup Type: Form A / Disk
 Operator: Lena Joy Measured Quantity: Wh Form: 9S, 3EL
 Resolution: 0.01 % OR Test Time: 0 s Test Constant: 1.0
 Instrument Transformer Correction Factor: DISABLED Test Status:

Tests 1 - 8 Tests 9 - 16 Stop Test

Test	Test Voltage	Voltage A/B/C	Test Current	Current A/B/C	Forward / Reverse	Power Factor	Lead / Lag	Test Result
1	120.000	A	5.000	ABC	Forward	1.0	Lag	0.000
2			2.500					0.000
3			10.000					0.000
4			5.000					0.000
5				A	Reverse			0.000
6				B	Forward			0.000
7								0.000
8				C				0.000

Buttons: Run Test, Get Setup, Start Source, Stop Source, Options, Print Results, Export Text, Save Setup, Save Results, Cancel

Series 2100 Specifications and Ordering Information

Specifications

Operating Range	0.01 Amps (10mA) to 30 Amps	Phase Angle Accuracy	±0.002PF @ Unity, ±0.5deg @ 0.5PF
NIST Certification Range	0.1 Amps to 30 Amps	Phase Angle Range	0–360 degrees in 1 degree steps
<i>Note- Testing below 0.1 amps falls outside NIST accuracy certification capabilities</i>			
Internal Multi-Function Reference Standard, Nominal at 23°C			
Wh, VARh, Qh Accuracy	±0.025% typical @ 1.0PF, (0.25-30 Amps) ±0.035% typical @ 0.5PF, (0.25-30 Amps) ±0.05% maximum allowable ±0.003% of FL allowable below 0.25 amps	Source Distortion	<0.5% THD for steady state loads
Vh, V ² h, Ah, A ² h Accuracy	±0.05% of Full Load	Source Frequency	60Hz, ±0.01%
Voltage Source Range	0–600 Volts, 40VA maximum	Operating Temperature	0 to 40°C, or limits of computer
Voltage Source Resolution	0.1 Volt steps, 0–150 Volts 1.0 volt steps, 150–600 Volts	Vibration/shock	30 G, half-sine, 11mS duration
Current Source Range	0–30 Amps, 65 VA maximum	Dimensions	17" L x 21" W x 6" D
Current Source Resolution	0.01 Amp steps from 0–5 Amps 0.1 Amp steps from 5–30 Amps	Weight	35 lbs.
		Power Supply	120 VAC, 60Hz sine or square wave
		Computer Hardware Requirements-Minimum	IBM Compatible PC, Pentium 100mhz or better with 64MB RAM, RS232 Serial Port
		Computer Software Requirements	Windows 98, 2000, NT or XP Versions with Microsoft Access 2000 Database

Ordering Information

Part Number	Description
Model 2130	Includes: 2100 Test Set with built-in current and voltage sources(0 to 30 Amps, 0-600 Volts), 2110 multifunction internal standard, 1 set of Current and Voltage test cables, serial port interface cable, KYZ relay pick-up cable, power cord, wheeled transport case, operating software and instruction manual.
Accessories	Description
LS1	Infrared LED Test Sensor Pickup, suction cup mount for Solid-State Meters with Dedicated IR test signal.
DS1	Disk Sensor Pickup for Socket & A-Base Electro-mechanical Meters
TP1	Switchboard Case Relay Test Paddle (GE Type)
TX1	Test Input Expander with TransData KYZ Input Cable <i>(Other cables can be custom made, consult factory)</i>
PD1	Test Input Pulse Divider <i>(For comparison with RM-10, SC10 standards)</i>
AP1	Analog to Pulse Converter, 0 - 1mA input, 0-10,000 counts per hour output, 120 VAC power <i>(For testing analog outputs)</i>



Company Profile

Serving the electric utility industry for over 35 years, TransData is a technology-based corporation specializing in the design and manufacture of advanced Energy Metering Systems, Wireless Automatic Meter Reading (AMR) Technologies, Metering Isolation Relays, Power & Energy Transducers, Solid-State Demand Recorders and Portable Metering Test Equipment.

TransData's products are used for measuring and managing energy consumption by utilities and industry. TransData serves over 2000 customers in more than 25 countries worldwide, including 49 of the 50 largest U.S. electric utilities.

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