

CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT

EQUIPMENT SPECIFICATION

ANALYZER, TESTER, FIELD, FOR METERING

DATE	PREPARED BY	ISSUANCE/REVISION	APPROVAL
			PROCESS MANAGER/STANDARDS SUPV.
08/27/2010	Carlos Tello	Issuance	Herman Millican
05/02/2011	Carlos Tello	Revision	
09/02/2011	Joey Hernandez	Revision	Herman Millican

<i>Reason for Revision</i>	<i>Affected Paragraphs</i>
General rewrite	

This specification, until revised or rescinded, shall apply to each future purchase and contract for the commodity described herein.
Retain for future reference.

**CITY OF AUSTIN ELECTRIC UTILITY DEPARTMENT
EQUIPMENT SPECIFICATION
FOR
Field Tester/Analyzer**

1.0 SCOPE AND CLASSIFICATION

1.1 Scope

The City of Austin Electric Utility Department, hereinafter referred to as Austin Energy (AE), requires qualified manufacturers to supply AE with Field Tester/Analyzer.

Classification

1.2.1 This specification indicates desired features for Field Tester/Analyzer. Any item supplied under these specifications, which is not in complete compliance with these specifications, shall be noted by the bidder.

1.2.2 All Manufacturers furnishing Field Tester/Analyzer under these specifications shall have at least five (5) years experience in the manufacture and sale of Field Tester/Analyzers.

2.0 APPLICABLE SPECIFICATIONS (Latest editions)

2.1 ANSI C12.1, C12.10 and C12.18 and C12.20

3.0 GENERAL REQUIREMENTS

3.1 It is desired that the Field Tester/Analyzer system be a single unit, not weighing more than 55 lbs

3.2 Warranty

3.2.1 Minimum of a Five year warranty covering all parts and labor on the test unit.

3.2.2 Any available software updates shall be provided on a no-charge basis during the warranty period.

3.3 Software and Hardware

3.3.1 Vendor is required to provide the following:

3.3.1.1. Universal Test jack must conform with all meter forms listed in Section 4.1.2

3.3.1.2. Test Leads, Voltage - Similar to Fluke 1610103 AC220 SureGrip Alligator Clips or equivalent

3.3.1.3. Copy of Operational Software(CD or USB)

3.3.1.4. Single/Three Phase Load Box, Voltage Source to test 69 to 480 VAC meters, 0.1 to 50 Amp Current Output, Per phase.

3.3.1.5. Full color transfective display/monitor.

3.3.1.6. Test Leads, Current - Universal Test Plug Current Lead Sets for connection to test jack, test switch and flexible current probe.

4.0 TESTING REQUIREMENTS

4.1 Accuracy Test

- 4.1.1 The system shall be capable of closed link testing of single and polyphase electro-mechanical and solid state electricity meters. The system shall be able to test polyphase meters under both single phase or true three phase conditions.
- 4.1.2 Meter Forms
The system shall test the following ANSI C12 socket-based forms with the use of an adapter:
Meter test forms 1S – 5S, 9S, 12S, 16S, 35S, 45S
- 4.1.3 The system shall provide capability for creating new meter forms by means of user configuration of voltage, current, and phase relationships.

5.0 TEST FUNCTIONS

5.1 KWH

- 5.1.1 The system shall be capable of performing WattHour tests for both forward (delivered) and reverse (received) energy flow.
- 5.1.2 The system shall be capable of performing VARHour tests for both forward (delivered) and reverse (received) energy flow.
- 5.1.3 The system shall automatically select 10% of Full Load current for Light Load tests.
- 5.1.4 Testing functions will be capable of triggering using any of the test pulse detection methods detailed in Section 7.
- 5.1.5 Test Sequences
 - 5.1.5.1 The test system shall be configurable and capable of sequencing automatically through multiple test steps without operator intervention. Test steps shall consist of Creep, Full Load, Light Load, and Power Factor tests, for both Series and Elements, and may be arranged in any order or combination.
 - 5.1.5.2 The number of test sequences available, and the number of steps in each sequence will only be unlimited, except by available hard disk space.
 - 5.1.5.3 The operator shall have the option to skip any test step in the sequence.
 - 5.1.5.4 The operator shall have the option to repeat a test step or test sequence.
- 5.1.6 Test Limits (Tolerances)
 - 5.1.6.1 The system should provide the capability to enter separate high/low limits for “as found” and “as left” Full Load, Power Factor, and Light Load independently for series tests, element tests, and balance tests.
 - 5.1.6.2 Out-of-limits and out-of-balance results are to be identified different than normal results.
- 5.1.7 The test results shall be displayed in percent registration.
- 5.1.8 The system shall provide for calculation and display of a weighted-average accuracy, based on a user-programmed formula, utilizing series Full Load, Power Factor, and Light Load results.
- 5.1.9 The system shall provide for operator entry of miscellaneous meter information (i.e. meter number, manufacturer, etc.) by the operator before, during, or after a test.

5.2 Demand (KW)

- 5.2.2 The system shall provide the capability to calculate and display demand registration accuracy. Demand test duration shall be determined by revolutions or time. The operator shall be able to select the formula used to calculate Demand Register accuracy. It shall have the capability to support block/rolling demand testing
 - 5.2.3 The system shall have the ability to verify a KYZ (Pulse Initiator) device during demand testing. Device pulse ratios shall be entered as pulses/watthour or revolutions/pulse (MP). The accuracy of the device will be calculated and displayed.
- 5.3 ANALYZER
- 5.3.1 Shall be able to display single phase and true three phase vector diagrams, Waveforms, and Power Quantities in real-time showing the magnitude and phase angle relationship of the voltages and currents applied to the meter.
 - 5.3.2 For site analysis, the unit shall be able to display different single and three phase wiring diagrams for different service types.
 - 5.3.3 The unit should be able to measure harmonics up to the 50th Harmonic or greater on voltage and current with THD.
 - 5.3.4 Shall have the ability to perform, CT, burden and ratio testing.
 - 5.3.5 Shall have the ability for CT demagnetization.
 - 5.3.6 Shall have the capability to perform PT testing.
 - 5.3.7 Should have transducer testing capability.
 - 5.3.8 Shall have the ability to connect to all secondary currents, secondary voltages, and primary currents at the same time.
- 5.4 Graphical (Load Curve)
- 5.4.1 Test Parameters (Input)
 - 5.4.1.1 The system should allow the operator to create, store, and recall test profiles with multiple test steps to generate load curves.
 - 5.4.1.2 Test profiles will allow the variation of voltage, current, and phase in any combination and under balanced or unbalanced conditions.
 - 5.4.1.3 The number of test profiles available, and the number of steps in each profile will only be limited by available hard disk space.
 - 5.4.2 Test Operation

The system should allow the operator to select and run stored tests from a file. The system will automatically run all test steps without operator intervention.
 - 5.4.3 Test Results (Output)
 - 5.4.3.1 The system should display load curve test results graphically.
 - 5.4.3.2 The system should record the input parameters and test results for each test step in the sequence. The operator should have the option to save and recall load curve results.
- 5.5 Four Quadrant
- 5.5.1 Test Sequences

5.5.1.1 The test system shall be capable of automatically sequencing through multiple test steps without operator intervention. Test steps shall consist of exact test parameters (voltage, current, and phase), direction (forward/delivered or reverse/received), and energy measurement mode (WattHour/VARHour).

5.5.1.2 The number of test sequences available, and the number of steps in each sequence will only be limited by available hard disk space.

5.5.2 Test Limits (Tolerances)

5.5.2.1 The system shall provide the capability to enter separate high/low limits for each test step.

5.5.2.2 Out-of-limits messages shall be displayed.

6.0 ACCURACY

6.1 Maximum system error of the calibrator for Watthours, measured at the test socket, for current ranges 0.1 Amps – 50 Amps shall be as follows:

6.1.1 Unity power factor: +/- 0.02% typical (+/- 0.04% worse case)

6.1.2 0.5 (50%) power factor: +/- 0.02% typical (+/- 0.04% worse case)

6.1.3 Power factors less than 0.5 : +/- 0.02% typical (+/- 0.04% worse case)

6.2 Maximum system error of the calibrator for VARhours (VARHour capable standard required), measured at the test socket, for current ranges 0.25 Amps – 50 Amps shall be as follows:

6.2.1 Unity power factor: +/- 0.02% typical (+/- 0.04% worse case)

6.2.2 0.5 (50%) power factor: +/- 0.02% typical (+/- 0.04% worse case)

6.3 The following factors shall be used to calculate the accuracies stated in sections 6.1 and 6.2. The maximum system error shall be the sum of the “worst case” error for each factor.

6.3.1 Uncertainty from NIST, System and Transfer Errors: +/- 0.02% or better

6.3.2 Stability (Allowed Drift over a 1 Year Period): +/- 0.004% or better

6.3.3 Repeatability (Difference between high and low for 5 measurements at the same test point): +/- 0.002% or better

6.3.4 Maximum Uncorrected Result (Maximum allowed difference between high and low for all available test points (voltage, current, phase)): +/- 0.009% or better

6.4 The system electronic standard(s) shall be directly traceable to the National Institute of Standards and Technology (NIST). Factory calibration documentation shall be provided with the test board.

6.5 No correction factors above shall be required or needed to meet the accuracy specifications stated in sections 6.1 through 6.3. Correction Factors shall also be systematically applied when needed.

6.6 Higher accuracy systems are available as an upgradeable option to worse case accuracy of 0.02% or 0.01%.

6.7 The vendor shall provide a user friendly methodology for performing periodic recertification of internal reference standard using AE Radian RD-33 Standard.

7.0 TEST PULSE DETECTION

7.1 The Meter Test System will be capable of testing meters by detection of test pulse(s) using any of the following optical or electrical methods:

- 7.1.1 Reflective - The system shall have laser optics that will detect the mechanical meter disk “black mark”.
 - 7.1.2 Through Hole - The system shall have laser optics that will detect the mechanical meter disk “creep” hole(s) without any special cables or adapters. This capability assumes a free vertical optical path through the disk creep hole, clear of any obstructions. The laser emitter and detector shall be permanently aligned, and shall remain in alignment through the full travel of the optics arm assembly.
 - 7.1.3 Infrared LED Emitter - The optics shall be capable of triggering from an electronic meter or register infrared LED output located either on the front, bottom, or top of the meter disk under test.
 - 7.1.4 KYZ Contact – Pulses from mechanical and electronic contact devices shall be detected either from the ANSI C12 socket base (potential pin row) or external meter “pigtail”. Devices supported will be two wire (Form A) and three wire (Form C).
 - 7.1.5 Optic Coupler - Provision for a detachable optic head, in accordance with ANSI C12.18, shall be provided to allow the infrared LED test pulse to be detected where the test pulses are supplied via the meter’s optic coupler of some solid state meters.
- 7.2 Audible and visual indications of triggering shall be provided.
 - 7.3 Sensitivity adjustment to the optics shall be needed.
 - 7.4 Optics Arm travel shall be sufficient to detect test pulses from all standard ANSI C12 socket meters listed in Section 4.1.2.

8.0 TESTING SOFTWARE GUI

- 8.1 The provided software shall be capable of the following functions:
 - 8.1.1 The software shall:
 - 8.1.1.1 Set, control, and monitor meter test parameters
 - 8.1.1.2 Configure the test unit for all ANSI C12 standard meter forms listed in Section 4.1.2
 - 8.1.2 Test result calculation and display
 - The system shall automatically calculate the meter accuracy and display the result in percent registration.
 - 8.1.3 Test data entry, storage, and retrieval
 - 8.1.3.1 The test system shall have the test record entry screen customized at the time of purchase/training.
 - 8.1.3.2 The user shall have the option of storing test record either automatically or selectively.
 - 8.1.3.3 Stored test records may be retrieved, edited, and saved.
 - 8.1.3.4 Stored test records may be printed or exported in a user programmable format.
 - 8.1.3.5 The test system shall have the ability to uniquely identify the test record such as using a Premise or service address entry
 - 8.1.4 Software for automated electronic standards verification shall be included with the system.

- 8.1.4.1 The system shall interface and support verification of the accuracy of the internal electronic standard by automated comparison with a Radian RD-33, external electronic transfer standard.
 - 8.1.4.2 After initial setup, the system shall automatically sequence through a set of user programmable test points with no operator intervention required. The duration of each test point shall also be programmable.
 - 8.1.4.3 The user shall be able to generate, save and recall a report detailing the test parameters and accuracies for each standard verification session. The serial numbers of the internal and external standards shall be recorded as part of the report.
- 8.2 The system shall be configured for meter form, base, current, voltage, and Kh by all the following means:
- 8.2.1 Keyboard entry of individual parameters on the screen.
 - 8.2.2 Entry of a single user-selected meter type code to set all parameters.
 - 8.2.3 Recalling previous test parameters for a particular meter stored on disc by entering the meter ID number.
 - 8.2.4 Bar code entry using bar code reader.
 - 8.2.4.1 Bar code reader shall be a hand-held laser scanner type connected to the system PC USB COM port.
 - 8.2.4.2 Scanner shall be capable of accepting industry standard AEP or non-standard label formats. Label format shall be user configurable.
- 8.3 Reports - As a minimum, the system will have the capability to create the following reports:
- 8.3.1 Count Report
 - 8.3.2 Statistics
 - 8.3.3 List of Meters
 - 8.3.4 Custom Meter Data

9.0 ELECTRICAL

- 9.1 General
- 9.1.1 All voltages and currents generated shall be transformer isolated so that all ANSI C12 meter forms may be tested under "closed link" conditions.
 - 9.1.2 The test system shall be capable of selecting single-phase or true three-phase power to be applied to the meter under test.
 - 9.1.3 The provided Load Source shall be able to supply 3 phase power as WYE or Delta in any phase rotation.
- 9.2 Test Voltage
- 9.2.1 Voltage shall be controlled by keyboard entry and shall be programmable from 69 to 480 volts with a resolution of 0.1 volt.
 - 9.2.2 Voltage set-point accuracy at the socket shall be +/- 0.5% or better.
 - 9.2.3 Voltage regulation at the meter socket shall be +/- 0.2% or better for a 10% change in power line voltage.

- 9.2.4 Harmonic distortion shall be less than +/- 1.0% at any meter voltage.
- 9.2.5 The system shall be able to provide the necessary VA capacity (135VA minimum) in the potential circuit to conduct the required meter test with the AMI device connected.
- 9.3 Test Current
 - 9.3.1 Current shall be controlled by keyboard entry, and shall be selectable from 0.1 to 50 amperes with a resolution of 0.01 ampere.
 - 9.3.2 Current set-point accuracy at the socket shall be +/- 0.5% or better.
 - 9.3.3 Current regulation shall be +/- 0.2% or better for a 10% change in power line voltage.
 - 9.3.4 Harmonic distortion shall be less than or equal to +/- 1.0% at any test current for standard tests.

10.0 SAMPLES, INSPECTION AND TEST REQUIREMENTS

- 10.1 The vendor shall supply the following:

- 10.1.1. Online manual
- 10.1.2. List of spare parts
- 10.1.3. Complete set of installation software
- 10.1.4. Training

The vendor shall provide a minimum of eight (8) hours of in-person, face-to-face training for setting up the hardware, installing the software, database configuration on the computers that will be driving the test units, operational facets of the test unit, and utilizing the software that controls the test unit.

- 10.1.5. Maintenance

The vendor shall provide firmware updates, software or hardware support/updates throughout the warranty period.