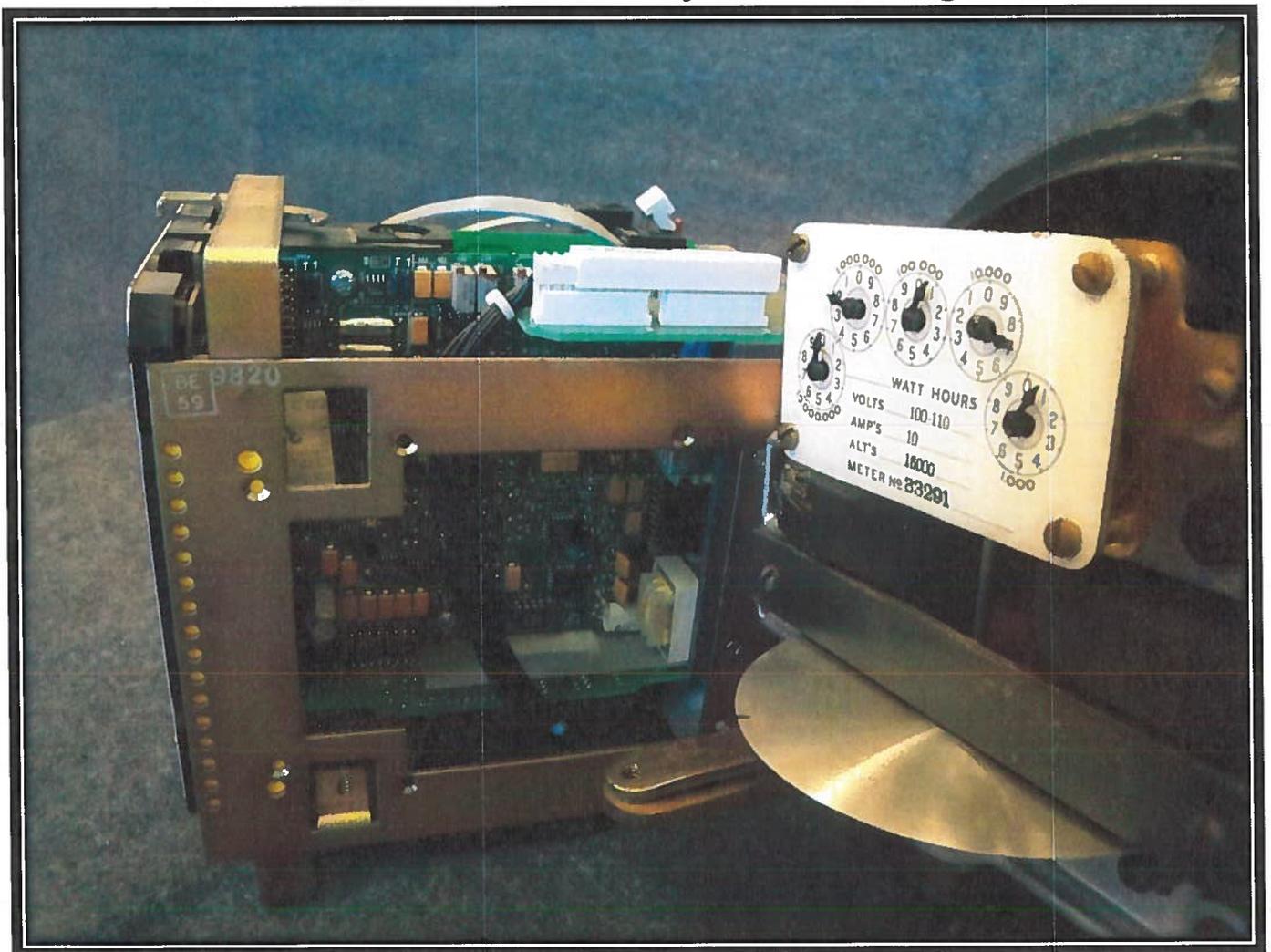




WESTERN AREA POWER ADMINISTRATION Metering Policy

Desert Southwest and Rocky Mountain Regions



August 08, 2012



**Western Meter Policy
DSW and RMR Regions**

Version 1.0

08/08/2012

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1. Purpose

- 1.1. The Western Meter Policy (Policy) establishes standards for the Western Area Power Administration, Desert Southwest (DSW) and Rocky Mountain (RMR) Regions (Western), for Revenue meter (intra-tie, generation, and load), and Boundary meter equipment, installation requirements and responsibilities. This policy applies to all metering Point of Delivery (POD), Point of Interconnection (POI) or Boundary Meter Point (BMP) to Western's power system for these regions.
- 1.2. Western's regions are Balancing Authorities, Transmission Owners and Power Marketers in the North American Electric Reliability Corporation (NERC), within the Western Electricity Coordinating Council (WECC) and the Midwest Reliability Organization (MRO) Western adheres to, and complies with, all the relevant NERC, WECC and MRO standards for maintaining accurate data for our Automatic Generation Control (AGC) and Area Control Error (ACE) systems.

2. Scope

- 2.1. This Policy supersedes any previous metering policies including the RMR Meter Policy dated 3/15/2012 and DSW Draft Meter Policy dated 06/14/2011. The Policy will be applied to all relevant Western contracts, agreements and arrangements made after the approval of this policy.
- 2.2. Western acquires, retrieves and integrates meter data into its billing, meter interrogation, scheduling and power accounting systems. These data are shared by Customers within the Balancing Authorities, and with adjoining Balancing Authorities. This Policy assures that accurate data is used by our billing, scheduling, and power accounting programs and operational systems.
- 2.3. Western will apply metering requirements and responsibilities defined in this policy to installations of meters owned and maintained by Western in its facilities and in customer facilities. Existing Western metering systems will be upgraded in accordance to the requirements of this policy, when these meters are replaced, upgraded or relocated.
- 2.4. Western requires this Policy to be used or adopted in any new contract or agreement by which Western is a participant in customer owned facilities and the meter system equipment is used for billing, scheduling, regulation, control or other service provided by Western. Existing customer metering systems will not be superseded by this Policy or its provisions. Western will work with its customers to adapt and conform to the Policy and appropriate provisions, when these meters are replaced, upgraded or relocated.



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3. General Meter Policy Requirements

- 3.1. Only one Revenue or Boundary meter shall be designated as the primary billing, power accounting and scheduling meter. This provision shall be in the agreements and contract between Western, Balancing Authorities and the Customers.
- 3.2. A primary Revenue or Boundary meter shall be a single metering device providing all meter functions and outputs, including, but not limited to; real-time power (Watts), real-time reactive power (Vars), digital kWh pulses, and kWh fifteen (15) minute interval demand power data (MV-90).
- 3.3. Western requires analog or digital real-time meter data, as detailed in agreement or contracts with our customers, for operational control, scheduling, power and ancillary service accounting. Real-time data will be transmitted over communication circuits that are owned, maintained or controlled by the customer supplying the primary meter data to Western.
- 3.4. MV-90 data access is required for every meter installation. The remote meter interrogation access can be provided by a public landline or cellular telephone, utility internal phone circuit or network TCP/IP. If direct, shared, remote access is prohibited by NERC CIP requirements or a utility's network system requirements, Western or the operating utility shall provide MV-90 formatted data files within (5) days of the 1st day of each month to each connected utility.
- 3.5. Metering system installations shall adhere to current applicable utility standards that include, but are not limited to: American National Standards Institute (ANSI), National Electric Safety Code (NESC), National Fire Protection Association (NFPA), Occupation Safety and Health Administration (OSHA), WECC and NERC
- 3.6. The costs of material and labor to install, modify, replace, change or remove Revenue or Boundary meters within Western's system shall be at the customer's expense, unless otherwise agreed in contractual agreements between Western and its Customers. Western cannot obligate its funds or expend labor resources without a signed contractual agreement and advance funding. Western shall terminate all work in-progress if funding becomes deficient.
- 3.7. Western (RMR) requires a Metering Application Agreement (MAA) for every new meter installation except where the installation and funding of the metering system equipment is covered under the scope of another agreement. The MAA process will be used internally to coordinate the metering equipment installation required by these agreements. Existing meters that require system upgrades, change of use, relocations of a POD, POI or BMP, necessitating contractual modifications, also require the MAA.

<https://www.wapa.gov/rm/opsmaintRM/documents/Meter%20Application%20and%20Agreement%20Final%205-17-11%202.pdf>
- 3.8. Western (DSW) requires the customers to contact them by e-mail or letter for any metering request or access to their MV-WEB data

Link: <http://www.wapa.gov/dsw/contact/>



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3.9. When the contract changes or terminates and Western no longer needs the POD, POI or BMP, the responsibility for ownership, maintenance and interrogating the meter will be transferred to the customer in exchange for customer equipment of similar value to the Western owned meter system equipment or require removal of all Western owned meter system equipment.

4. Western Owned Facilities

- 4.1. Meter system installations, located within a Western facility, shall be owned and maintained by Western, unless otherwise noted in contractual agreement.
- 4.2. Western shall be responsible for the engineering design, installation and commissioning of all metering systems in Western Facilities.
- 4.3. Customers or their contractors that have been granted authority by agreement or contract to provide the design services, installation or commissioning of Western meter system equipment will adhere to the Policy provisions and obtain the appropriate approvals prior to installation or placing equipment in-service.
- 4.4. Western will make provisions to share the primary meter analog and/or digital data with all interested parties and customers. This may be provided by a direct meter connection, connection to a Local Data Concentrator (LDC), Remote Terminal Unit (RTU), Remote Data Concentrator (RDC), shared phone line, MV-WEB, data files or as a posted Inter-Control Center Communications Protocol (ICCP) value.
- 4.5. Customers may request installation of their meter system equipment within Western facilities for their own load monitoring or data retrieval. Western will approve the design and make any connections into the metering system circuits. The customer will have financial responsibility for the installation, maintenance, communication circuits, data retrieval and ownership. The customer will provide advance funding for any Western expense for the installation and maintenance of the equipment.

5. Customer Owned Facilities

- 5.1. Meter system installations located within a customer's facility shall be owned and maintained by the customer, unless otherwise noted in a contractual agreement. Western reserves the right to review and approve any modifications involving metering system equipment and to be present at the site when the modifications are accomplished.
- 5.2. Customers will make provisions to share the primary meter analog and/or digital data with Western and other interested parties. This may be provided by a direct meter connection,



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connection to a Local Data Concentrator (LDC), Remote Terminal Unit (RTU), Remote Data Concentrator (RDC), shared phone line, data files or as a posted Inter-Control Center Communications Protocol (ICCP) value.

- 5.3. Western reserves its right to witness routine testing, maintenance repairs or renovations of meter system equipment in a customer's facility where Western has a contractual interest in a Revenue or Boundary Meter. Advance notification is required prior to removing any in-service meter system equipment as defined in section 16.
- 5.4. In the event Western cannot witness Customer testing of meters, the Customer shall maintain a copy of the current test results plus an accumulation of 3 years of prior test results. These results will be available electronically upon Western's request.

6. New Meter Installations

- 6.1. New meter and meter system equipment shall be connected and installed at the POD, POI or BMP to Western's facilities, transmission lines, customer shared transmission lines, or other shared facilities as defined in an agreement. Meters shall be installed at the POD, POI or BMP high voltage delivery point. Low voltage, transformer loss compensated metering shall not be allowed unless high voltage connections are technically or physically not feasible. The economics of the installation is not a valid justification for installing low-side voltage metering unless the load is <250kW.
- 6.2. When the meter is a BMP installed in a non-BA owned substation. Western, as a Balancing Authority (BA), requires a BA to own and to maintain the boundary meter supplying the common AGC data. Operations and maintenance of the BMP equipment can be assigned and performed by other parties through agreements or contracts, but the BA that owns the meter retains the responsibility to provide accurate AGC data and is responsible for any NERC or WECC standard requirements, archived testing documentation and compliance reporting, if required. The ownership, operating utility and maintenance responsibilities shall be detailed in a contractual agreement signed by all of the participating parties.

7. Existing Meter Installations

- 7.1. This policy does not supersede existing metering conditions and configurations. However, as opportunities permit, Western and its Customers will collaborate to modify existing metering configurations in compliance with this Policy.



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- 7.2. An existing meter located at a POD, POI or BMP, that is being relocated or split to multiple delivery points, shall be connected to the same voltage as the original connection point and not be loss compensated at a lower voltage.
- 7.3. Existing meters that are low voltage, transformer loss compensated shall:
 - 7.3.1. Be allowed within existing meters only until the meter system equipment is upgraded, replaced, relocated or requires a contractual modification, and then 7.3.2 will apply.
 - 7.3.2. Be programmatically calculated within MV-90, other metering and power accounting systems, or as defined in a contractual agreement, and shall not be within the meter.
- 7.4. Line loss compensation shall be programmatically calculated within MV-90, other metering and power accounting systems, or as defined in a contractual agreement, and shall not be permitted to be within the meter.

8. Meter System Requirements

- 8.1. Metering system equipment shall be installed to meet certain accuracy standards in order to achieve a \pm one percent (1%) overall accuracy.
- 8.2. Meters and instrument transformers shall be installed to correctly measure real power (Watt), reactive power (Var) and energy usage (kWh) and shall not be bypassed without approval by Western. Instrument transformers shall meet the requirements of sections 11 and 12.
- 8.3. Meter percent registration (measured by out-of-service testing) for microprocessor meters shall be no greater than \pm two-tenths of one percent ($\pm 0.2\%$) for full load kWh, light load kWh and kVARh in each power direction.
- 8.4. Meter in-service testing percent error shall be no greater than \pm three-tenths of one percent ($\pm 0.3\%$) for the measured power flow.
- 8.5. Meter percent error for real-time Watts and Vars (if required) shall be no greater than \pm two-tenths of one percent ($\pm 0.2\%$) in each power direction. Zero (null) shall be tested for accuracy with no-load applied.
- 8.6. Meters located at grounded wye-connected facilities shall be 3-element, 4-wire meters. 3-element metering is required at POD or POI locations where real-time data is collected for AGC or ACE needs.
- 8.7. Meters located at delta-connected or ungrounded wye-connected facilities may be 2-element, 3-wire meters for revenue (load) type meters only.



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- 8.8. 480 volt meters are unacceptable for revenue metering. When a customer requests that Western assume maintenance or ownership responsibility for a 480 volt meter, the customer shall be responsible for all costs to change to a 120 volt meter.
- 8.9. The utility owner that is responsible for the metering and telecommunications will comply with the applicable contractual or regulatory requirements for equipment security access, cyber security, telecommunication transmission and data storage.
- 8.10. Typical block diagram configurations are provided for the various meter installations and configurations in Exhibits A through C. These drawings detail the standard requirements for data and communications that are required by Western for each Boundary and Revenue meter. Any deviation from these requirements must receive prior approval from Western and must be documented in the appropriate contractual agreement.

9. Meter Requirements

- 9.1. Western uses a microprocessor meter for its standard meter as detailed in Exhibits D through G. Western shall approve use of other meter manufacturers, if they meet the following minimum requirements to measure, record, store, and transmit data, as determined by Western, based on the meter data requirements.
- 9.2. Meters shall be electronic microprocessor based: wye connected, grounded configuration: 3-phase, 3-element, 4-wire for any Boundary or Revenue meter requiring real-time data. Delta connected configuration: 3-phase, 2-element, 3-wire may be approved for Revenue (load) metering only.
- 9.3. Form 5 (delta connection) and form 9 (wye connection) Exhibit H user configuration option.
- 9.4. Class: Transformer rated class 2, 10 or 20 (user configuration option) bi-directional; four (4) quadrant instantaneous quantities.
- 9.5. \pm Two-tenths percent (0.2%) accuracy class per the most recent ANSI C12.20.
- 9.6. Power supply: 125 VDC or 120 VAC
- 9.7. Control input voltage: 125 VDC.
- 9.8. Power quality measurement and data storage capability, user selectable configuration.
- 9.9. 120 VAC line to neutral metering voltage for wye metering; 120V phase to phase for delta metering; 60 HZ system frequency; auto-ranging voltage.



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- 9.10. RS-232 serial or optical communication port, front mounted, ANSI type 2, for magnetic sensor attachment, per latest ANSI C12.18 standard, with adjustable communication rate from 300 to 9,600 bps (minimum), with 2 password levels (minimum).
- 9.11. Serial communication ports, rear mounted, EIA RS-232, with adjustable communication rate from 300 to 38,400 bps (minimum), with selectable communication protocols including DNP 3, and 2 password levels (minimum).
- 9.12. 10-base-T Ethernet port, rear mounted, with adjustable communication rate from 300 to 38,400 bps (minimum), with 2 password levels (minimum).
- 9.13. Cyber security access, ports and services user configuration capabilities. Compliant with all current applicable NERC (CIP) standards.
- 9.14. Internal telephone modem, with adjustable communication rate from 300 to 19,200 baud (minimum), with 2 password levels (minimum).
- 9.15. TCP/IP accessible; Ethernet compatible.
- 9.16. A minimum of four analog output channels configurable for real-time data. Analog output will be: -1 to 0 to 1 mA, user programmable, with a compliance voltage of at least +/- 10 volts.
- 9.17. A minimum of four (4) A, B, or C form output contacts, user selectable for function type, suitable for 125 VDC control "wetting" voltage.
- 9.18. Twelve load profile channels (minimum); a minimum of (8) time of use (TOU) rates; transformer and line loss compensation.
- 9.19. A minimum of one (1) meter "health" alarm output contact, i.e., a meter health monitor. This meter health monitor contact shall be separate from and in addition to the four output contacts specified in 9.16.
- 9.20. Meter configuration software, if required. The manufacturer shall certify any meter configuration software is, and future releases shall remain, backward compatible with all earlier versions of the software.
- 9.21. Remote interrogation access for meter configuration programming and/or MV-90 data retrieval shall be user selectable via telephone connection, RS-232, Ethernet, fiber optic through any communication processor, port switch, sharing device, or data collection device.
- 9.22. Local interrogation access by direct RS-232 or optical interface connection for meter configuration programming and MV-90 data retrieval using a portable computer. Local interrogation as a data collection method shall be allowed only when remote access is temporarily unavailable.



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10. Meter Connection and Enclosure

- 10.1. Meters shall be installed with a disconnect device on the line side of the meter for isolation to facilitate the safe maintenance and repair of the meter. Disconnecting devices shall open the potential signals and shunt the current signals around the meter. Suggested devices are ABB, model FT test switches, or States brand switches of similar style.
- 10.2. Meter auxiliary power of 125 VDC or 120 VAC will be supplied to a fuse disconnect that is accessible at the meter location. The fusible disconnect shall be capable of using LOTO. Operating the meter auxiliary power from the meter PT source will only be allowed when no other power source is available.
- 10.3. A properly designed space shall be provided to protect meters and other communication equipment from the environment and that meets appropriate State and Federal Safety regulations. A National Electrical Manufacturers Association (NEMA) Type 4 enclosure is required for all outdoor location.

11. Potential Transformers (PTs)

- 11.1. Either wound-type potential transformers (PT) or metering accuracy capacitance coupled voltage transformers (CCVT) may be used for metering, provided they meet the requirements under ANSI C57.13 for the following accuracy classifications at system voltages of five (5) kilovolts and higher, three-tenths percent (0.3%) at all burdens W, X, Y, Z. To preserve the accuracy of the waveforms and signals, the manufacturer recommended burdens for potential transformers shall not be exceeded.
- 11.2. Meter potential transformers (PT) shall have a cartridge type fuse disconnect for each phase that is accessible at the meter location. The fusible disconnect shall be capable of using Lock-Out, Tag-Out (LOTO). This fusible disconnect shall be electrically inserted before the meter disconnect. (reference section 10)
- 11.3. Western does not routinely test or request the customer to test metering PTs once they are placed into service, unless there is a suspected accuracy problem determined under section 17. All expenses for testing request by any party, not validated as an accuracy issue under section 17, will be paid for by the requesting entity.



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12. Current Transformer (CT's)

- 12.1. All current transformers used for metering shall be located as close to the delivery or Interchange points as practical. They shall be installed and designed such that the power to the meter and transducers will not be interrupted when a line breaker is bypassed (main-transfer bus configuration) or when one of the breakers is opened (ring bus or breaker-and-a-half bus configuration).
- 12.2. Current Transformers (CTs) for metering shall be of the wound-type and meet the requirements under ANSI C57.13 for an accuracy classification of three tenths percent (0.3%). The highest available CT ratio shall match or exceed all line equipment ratings, which shall be in line with the metering current transformer. The highest CT ratio shall also match or exceed the maximum expected emergency loading of the circuit. All CT's shall be provided with a thermal rating factor (RF) of two (2.0). To preserve the accuracy of the waveforms and signals, the manufacturer recommended burdens for current transformers shall not be exceeded.
- 12.3. Meter current transformers (CT) shall have a shorting terminal block that shall short and ground each phase current that is accessible at the meter location. This shorting terminal block shall be electrically inserted before the meter disconnects. (reference section 10)
- 12.4. Western does not routinely test or request the customer to test metering CTs once they are placed into service unless there is a suspected accuracy problem determined under section 17. All expenses for testing request by any party, not validated as an accuracy issue under section 17, will be paid for by the requesting entity.

13. Drawings and Equipment Data Requirements

- 13.1. Western requires drawings and equipment data for its historical files and compliance documentation for every meter installation. These drawings and documents shall be provided to Western at the customer's expense unless noted otherwise in a contractual agreement. If these drawings and equipment data are not provided, Western reserves the right to generate its own drawings and collect the pertinent equipment data, charging the expense to the customer's funding account.
- 13.2. All drawings shall be standard D-size, electronic format AutoCAD or PDF. All data documentation with be electronic format PDF.
- 13.3. Engineering review requires a minimum of forty-five (45) days prior to the meter's scheduled in-service date.
- 13.4. All revisions (as-built) of the installation drawings or documentation are required within thirty (30) days following the meter's in-service date.



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- 13.5. Any meter or meter system equipment that is upgraded, modified, or replaced requires a new set of engineering drawings and data documentation or revisions to the original drawings and documentation.
- 13.6. Provide a system type drawing showing the meter point location in Western’s power system including all substation or line tap breaker and switch numbers, PT and CT device identifiers and power transformer identifiers.
- 13.7. Provide schematic drawings of meter system equipment including auxiliary power and communication circuits. Wiring drawings are required when Western maintains any meter system equipment in a customer’s facility.
- 13.8. Provide metering PT schematic drawings, single line or three lines, nameplate data, manufacturer’s PT accuracy test reports, transformer turns ratio test reports. Winding insulation or power factor testing is required on Western owned or maintained equipment. PT’s that are used or stored more than 2 years will require re-testing, prior to placing them in-service at a new location.
- 13.9. Provide metering CT schematic drawings, single line or three lines, nameplate data, manufacturer’s CT accuracy test reports, transformer turns ratio test reports. Winding insulation or power factor testing is required on Western owned or maintained equipment. CT’s that are used or stored more than 2 years will require re-testing, prior to placing them in-service at a new location.
- 13.10. Provide meter configuration data, MV-90 configuration data and nameplate data. Data shall include, but is not limited to, manufacturer, model, type, form, number of elements, serial number, meter and channel multipliers, data channel configuration and labels, programmed PT and CT ratios, meter ID, phone number, and port switch number.

14. Boundary Meter Data

- 14.1. A Western BMP requires a dedicated communication channel for the meter real-time Automatic Generation Control (AGC) data to the Western Operations Center. The primary meter data channel shall carry real-time megawatt power (MW) and kilowatt-hour (kWh) pulse accumulator data. Real-time reactive megavar power (Mvar) may be required. Western may require routing this data through intermediate data accumulators, concentrators, or nodes located locally and/or at Western field offices. The communications path will be owned, operated and maintained by the utility providing the data communication channel(s) or its contractors, and will not utilize public communications circuits that are not maintained by the utility.



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- 14.2. Western may approve an alternative method to receive its AGC data from BMP's by contractual agreement. This may include manual readings for small loads (<250kw) or data supplied through intermediate data accumulators, concentrators, or nodes located at another utility's facility. The alternative method requires a communication path that is owned, operated and maintained by the utility supplying the data or its contractors, and will not utilize public communication circuits.
- 14.3. All Western BMPs require an Alternate Data Source (ADS) for the real-time data that is not connected to the same CT source as the primary meter. Relay quality CTs are acceptable for the ADS. The ADS shall be transmitted via a second data channel, such as within the station SCADA RTU, or as a posted Inter-Control Center Communications Protocol (ICCP) value.
- 14.4. Western requires that the primary AGC data be duplicated and transmitted independently to its Alternate Control Center (ACC). This may require an additional communications channel or other means approved by Western.
- 14.5. BA's or other utilities may install a second backup meter or other backup metering devices. Western will not use these as the primary ADS, but may acquire these data points as an alternate, third data resource, if available.

15. Revenue Meter (Intrastate Generation or Load) Real-Time Data

- 15.1. Meters used within Western's BA that provide power accounting or ancillary service data including, but not limited to, load control, regulation or energy accounting or other transmission services, require real-time power (Watt) and hourly kilowatt pulse accumulator data, KYZ. Real-Time reactive power (Var) data may be required. These data may be transmitted via a utility owned data channel, contained within the RTU SCADA source or as a posted ICCP value.
- 15.2. Western requires that the primary real-time data be duplicated and transmitted independently to its Alternate Control Center (ACC). This may require a second communications channel or other means approved by Western.



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16. Maintenance Notification

- 16.1. All maintenance requests for meters, including meter system equipment, supplying real-time data, will be coordinated with Western's DSW Outage Coordinator (WALCoutage@wapa.gov) or RMR Outage Coordinator (RMROUTAG@wapa.gov) no less than ten (10) business days prior to any scheduled work. The Outage Coordinators will notify all interested parties by their electronic e-mail notification process. A shorter notification period may be permitted, if agreed to by all parties.
- 16.2. Meters supplying only kWh data, with no real-time data connection, require a three (3) day notification of any routine maintenance. Western's Settlements Departments and the load customer(s) should be notified prior to any testing or maintenance. A shorter notification period may be permitted, if agreed to by all parties.

17. Meter Testing Requirements and Responsibilities

- 17.1. This Meter Policy, Sections 17.2, modifies the meter testing and testing requested by other parties, requirements of Western's, General Power Contract Provisions (GPCP), dated September 1, 2007 or subsequent revisions, Section II, Delivery of Service, Subsection #6 (Metering), #6.2. "Metering equipment shall be inspected and tested each year by the party responsible for meter maintenance, unless a different test interval is determined in accordance with good utility practices by an applicable regional metering policy, or as agreed upon by the parties. Meters shall also be tested at any reasonable time upon request by a party hereto, or by an affected supplemental power supplier, transmission agent, or control area operator."

Link: <http://ww2.wapa.gov/sites/Western/powerm/pmgpcp/Pages/default.aspx>

- 17.2. Western owned or customer shared meters shall be tested once every three (3) years unless a more frequent interval is required by WECC or NERC standards. While the meter is out-of-service, technicians will inject test voltage and current to simulate real-time meter data to each party's operation center to confirm correct scaling and data values. Data validation is a unique testing requirement for Boundary Meters and other meters supplying real-time operational data. Western will not test meters it owns or maintains by contract agreement out-of-sequence of the 3 year time interval. Any utility requesting out-of-sequence testing will need to initiate a written request to the appropriate Regional Maintenance Manager. Maintenance will then work with Contracts and Finance to draft a letter agreement and



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invoice to cover our labor for this work. The only exception will be to troubleshoot a bad meter data point or incorrect meter values.

- 17.3. Western will troubleshoot and repair any reported or suspected problem or error with any Western owned meter system equipment or meter communication connectivity at its own expense, provided that all parties have validated their data with each party and it is agreed that the meter system equipment is the source of the problem or error.
- 17.4. The customer (owner or maintenance responsible party) will troubleshoot and repair any reported or suspected problem or error with any meter or meter communication connectivity at its own expense, provided that all parties have validated their data with each party and it is agreed that the meter system equipment is the source of the problem or error.
- 17.5. MV-90 and other remote access connectivity and data validation shall be performed before and after any meter system equipment maintenance.
- 17.6. In-service or commissioning testing shall be performed at the time of installation and subsequent meter tests. This testing will include 3-phase voltage and current magnitude, load phase angles and power quantities. CT burden testing for existing electro-mechanical or electronic meter installations may be required.
- 17.7. Meter data errors determined through testing shall follow Western's General Power Contract Provisions (GPCP) Sections 6.3 through 6.5 to resolve the billing errors. Link: <http://ww2.wapa.gov/sites/Western/powerm/pmgpcp/Pages/default.aspx>
- 17.8. Western will archive its meter test reports in the maintenance data directory and distribute copies of these test reports to customers upon request. Presently, there is no NERC/WECC requirement to maintain these records, but it is required by Western's contractual relationship with its customers and the historical business practice for documentation of metering billing accuracy.



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18. Acronyms

Acronym	Long Name
ACC	Alternate Control Center
ACE	Area Control Error
ADS	Alternate Data Source
AGC	Automatic Generation Control
ANSI	American National Standards Institute
BA	Balancing Authority
BMP	Boundary Meter Point (interchange between BA's)
CIP	Critical Infrastructure Protection (NERC standards)
CT	Current Transformer
DNP3	Distributed Network Protocol Level 3
DSW	Desert Southwest Region (Referred to as Western)
GPCP	General Power Contract Provisions
ICCP	Inter-Control Center Communications Protocol
KWh, KVARh	KiloWatt Hour, KiloVar Hour
LOTO	Lock Out, Tag Out
MV-90, MV-WEB	Itron Inc. Billing data program and web based customer data access.
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety & Health Administration
POD	Point of Delivery
POI	Point of Interconnection or Point of Interchange
PT	Potential Transformer
RMR	Rocky Mountain Region (Referred to as Western)
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
TCP/IP	Transmission Control Protocol/Internet Protocol
TOU	Time of Use
VAC	Voltage Alternating Current
VAR	Volt-Ampere-Reactive (Reactive Power)
VDC	Voltage Direct Current
VT	Voltage Transformer
W	Watt (Real Power)
WECC	Western Electricity Coordinating Council
Western	Refers to Desert Southwest and Rocky Mountain Regions in this document, only.



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19. Definitions

Term	Definition
Accumulator	Digital counter that is normally referred in metering as a SCADA hourly pulse counter, collecting meter kW digital pulses at a predetermined pulse rate that equals kW-hour.
Alternate Data Source (ADS)	Back-up data source, from a different current transformer, for all real-time meter data used for Boundary meters. Revenue meters may also require ADS, depending on Western's operational requirements. Relay quality current transformers are acceptable for the ADS requirement.
Balancing Authority (BA).	The responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports Interconnection frequency in real-time.
Boundary Meter	Boundary meters are NERC compliant equipment located at Western's interconnected or interchange points with other Balancing Authorities (BA). This is a power meter with the primary function of providing real-time watt (W), reactive power (Var) and digital kWh pulse data to Western Operations Centers and ACC. The meter provides accounting for power values for Western's AGC and to calculate the ACE required by NERC and WECC standards. Demand power data is recorded, stored and remotely interrogated for billing and energy accounting purposes by Western's MV-90 data system
Boundary Meter Point (BMP)	The metered interchange point between Western and other Balancing Authorities. The BMP maybe located in other customer's facilities.
Customer	Any entity that receives contractual firm electric power, transmission, power or maintenance services from Western.
Facility	Generation station, utility substation, transmission or distribution line tap. Typically the location of the POD, POI or BMP.
General Power Contract Provisions (GPCP)	Standard terms and conditions included in Western's power delivery and transmission service contracts.
Meter Systems	The collective equipment required to meter a customer interconnection or delivery point. This may include, but not limited to, the Meter, Current Transformers (CTs), Potential Transformers (PTs), coupling capacitor voltage transformers, (CCVT's) combination CT and PT transformer packages, modem, port sharing device, phone line sharing device, AC and/or DC power source, AC power protection devices and phone line protective devices, as required.
MV-90 (Itron, Inc.)	Meter interrogation, data collection, and data management program, used by Western's Settlements department.
MV-WEB (Itron, Inc.)	Online tool that provides secure and reliable access to customer load data.
Point of Delivery (POD):	The place where the customer's facilities connect with Western for the provision of firm electric service. POD is not bi-directional. The POD may be located at a customer's facility.



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Term	Definition
Point of Interconnection (POI)	The location where the utility connects to the Western's power system that may allow bi-directional flow of power between Western's and another party's power system. The POI may be located in a customer's facility.
Real-time Data	Instantaneous Megawatts, Mega-Vars, and KWH digital pulses transmitted over a communication data channel
Revenue Meter (Generation)	An energy meter that provides real-time watt and reactive (var) power flow, Kilowatt-hour (kWh) and demand data to RMR Operations and RMR or DSW Settlements Departments. It is used for the purpose of scheduling power resources into Western's Balancing Authority and to provide regulation services. Demand power data is recorded, stored and transmitted to Western's MV-90 data system.
Revenue Meter (Intratie)	An energy meter that provides real-time watt and reactive (var) power flow, Kilowatt-hour (kWh) and demand data to RMR Operations and RMR or DSW Settlements Departments. It is used for the purpose of billing energy and demand use, as provided by Western, to a customer within the balancing authority. Demand power data is recorded, stored and transmitted to Western's MV-90 data system.
Revenue Meter (Load)	Revenue meter with the primary function of providing kWh, watt and var demand data to the RMR or DSW Settlements Department for the purpose of accounting for loads within the balancing authority area. Demand power data is recorded, stored and transmitted to Western's MV-90 data system.
SCADA	Supervisory Control and Data Acquisition. A proprietary software program used to remotely control equipment, acquire equipment status, monitor system information and provide alarms for equipment malfunctions and problems for operational purposes.

20. References

- American National Standards Institute
- General Power Contract Provisions (GPCP), dated September 1, 2007
- National Electric Manufactures Association
- National Electric Reliability Corporation
- Occupational Safety and Health Administration
- Rocky Mountain Meter Policy 03/15/2011



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21. Exhibits

Exhibits	Rev	Title
Exhibit A	01	Boundary Meter Typical Block Diagram
Exhibit B	01	Intratie or Generation Meter Typical Block Diagram
Exhibit C	01	Revenue Meter Typical Block Diagram
Exhibit D	01	SEL-735V Standard Vertical Case Model Configuration
Exhibit E	01	SEL-735H Standard Horizontal Case Model Configuration
Exhibit F	01	SEL-735H_DSW Standard Horizontal Case Model Configuration
Exhibit G	01	SEL-735EX Standard Easy Extractable Model Configuration
Exhibit H	01	Form 5 and Form 9 Wiring Diagram

22. Revision History

Effective Date	Version Number	Revised By	Revision History
08/08/2012	1.0	G5311, Wheeler	Approved
08/08/2012	1.0	J5050, Ferner	Approved

23. Author / Point of Contact

Author / Point of Contact	Organization Code	Phone
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24. Reviewers / SMEs

5 year review required

Reviewer(s) / SME(s)	Organization Code	Phone
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Matt Caldwell	G5350	602-605-2578

25. Approvers

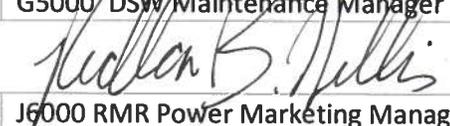
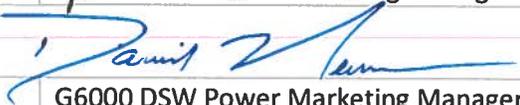
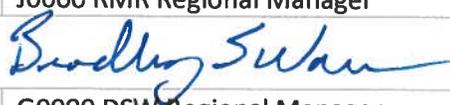
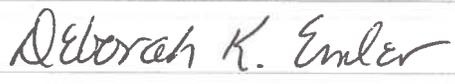
Signature	Title	Date
Darren Buck	J4000 RMR Operations Manager	08/08/2012
Signature		
Kevin Howard	J5000 RMR Maintenance Manager	08/08/2012
Signature		
Ricklan Hillis	G5000 DSW Maintenance Manager	08/08/2012
Signature		
David Neumayer	J6000 RMR Power Marketing Manager	08/08/2012
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Deborah Emler	G6000 DSW Power Marketing Manager	08/08/2012
Signature		
Bradley Warren	J0000 RMR Regional Manager	08/08/2012
Signature		
Darrick Moe	G0000 DSW Regional Manager	08/08/2012
Signature		



Exhibit A: Boundary Meter Typical Block Diagram

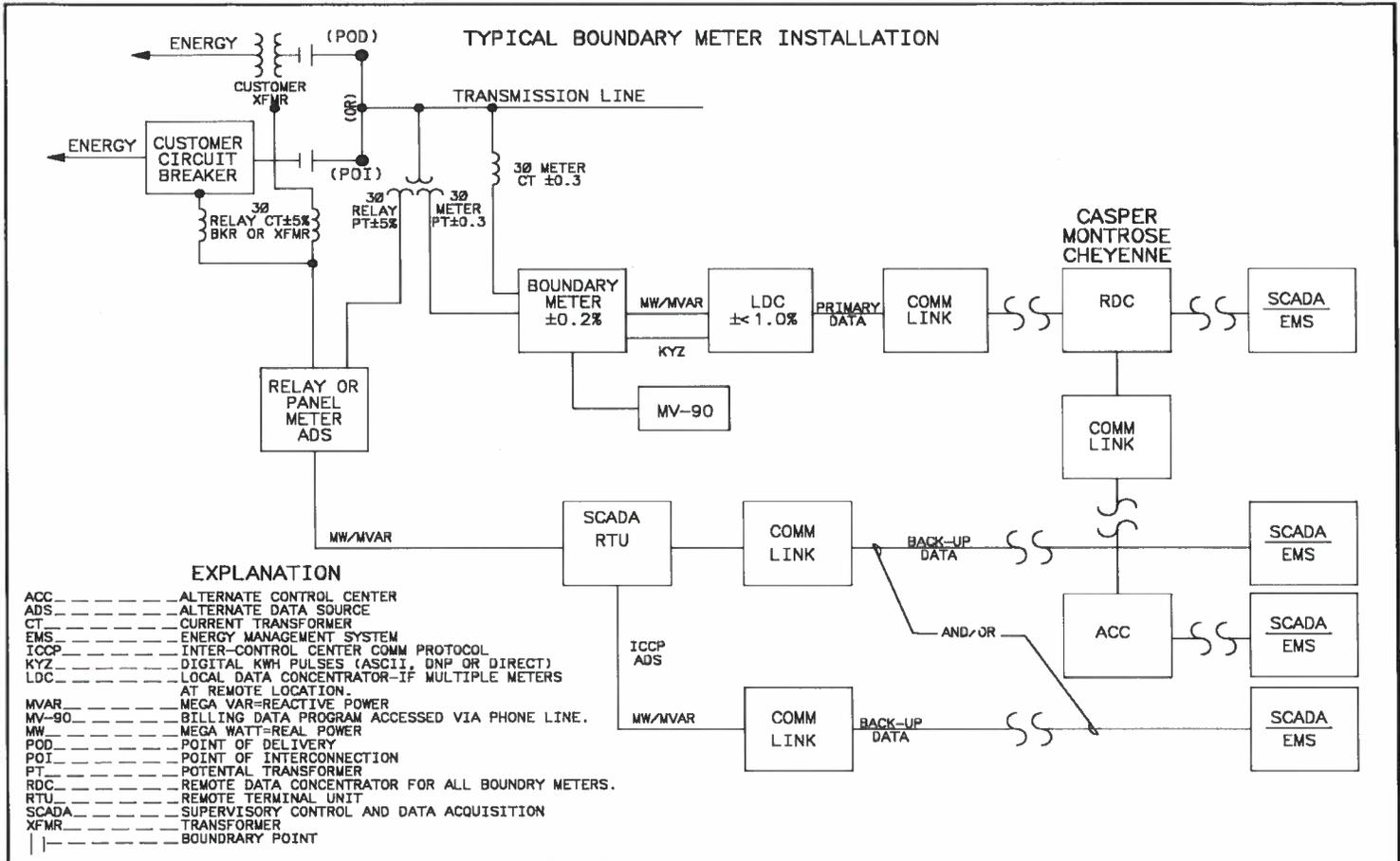




Exhibit B: Intratie or Generation Meter Typical Block Diagram

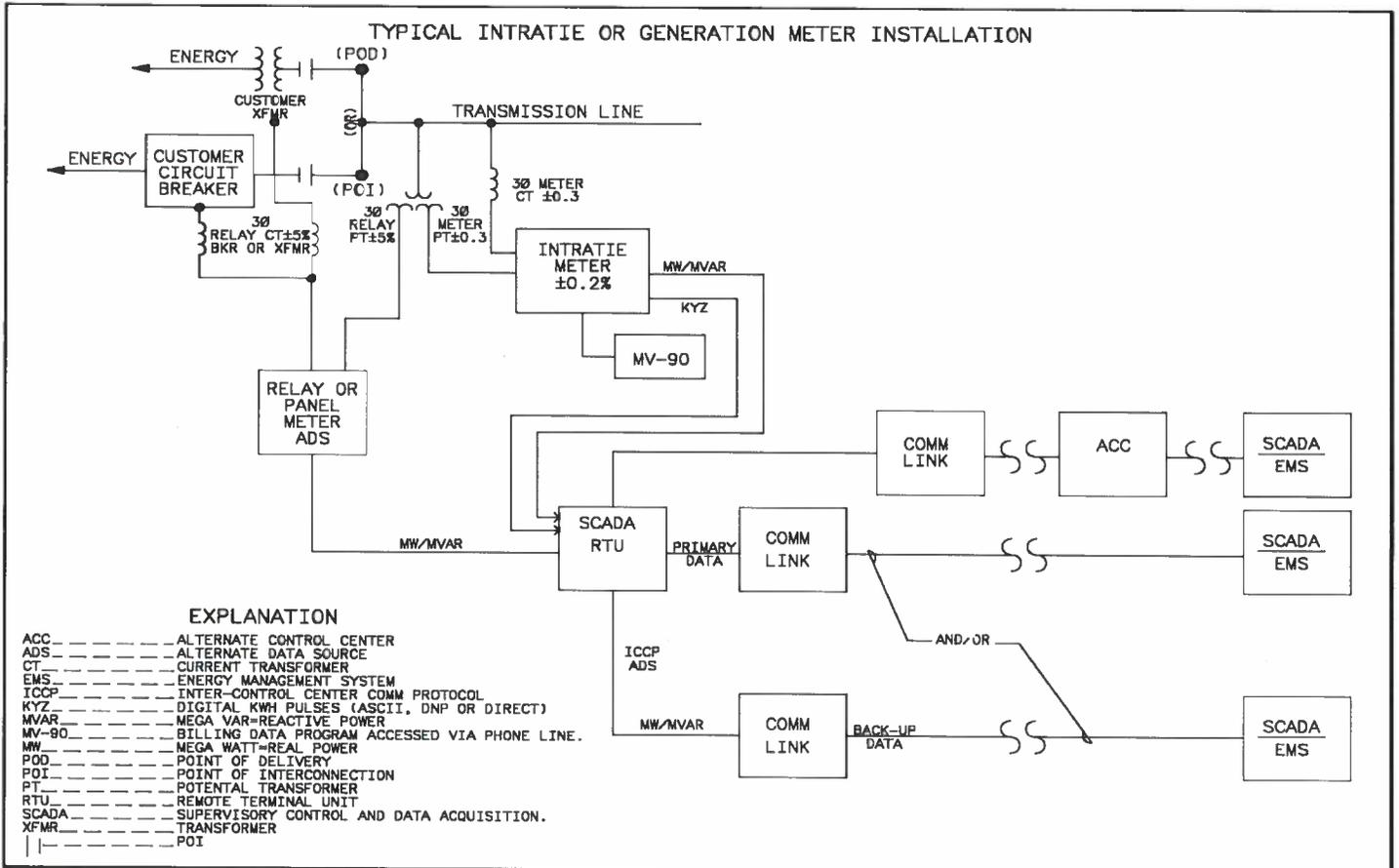
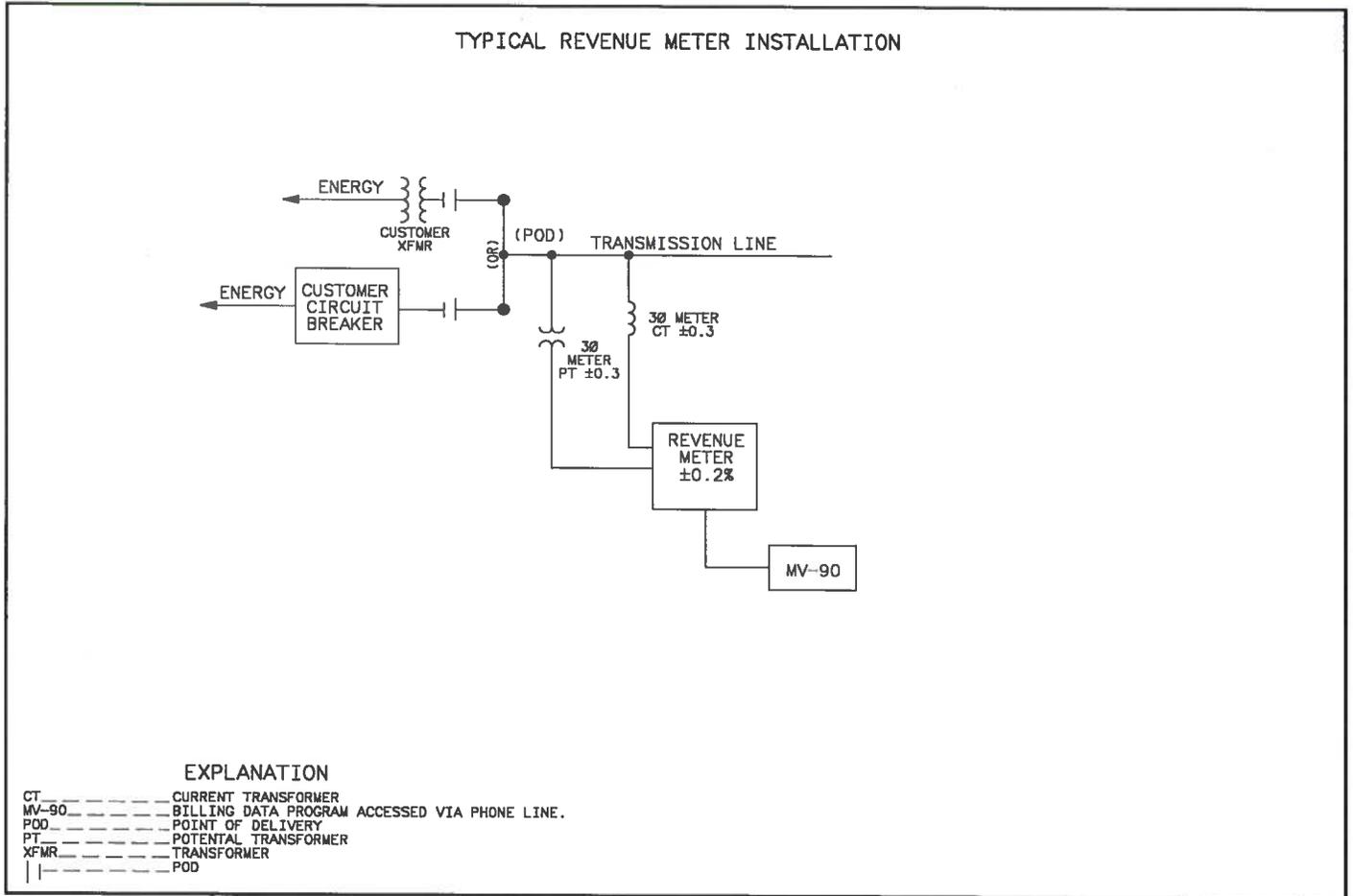




Exhibit C: Revenue Meter Typical Block Diagram





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Exhibit D: SEL-735V Standard Vertical Case Model Configuration

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Part Number: 0735VX10944CGXCXXX16101XX		Key: 1800
Product:	SEL-735	0 7 3 5 0 X X X X X
Category	Selection	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Chassis	Vertical Panel Mount, ANSI Optical Port	V
Enclosure	None	X
Power Quality and Recording Option	Intermediate PQ and Recording*	1
Meter Form	Form 9	9
Slot A, Power Supply	125/250 Vdc or Vac; 3 Contact Outputs, 2 Inputs	4
Slot A, Power Supply Control Input Voltage	125 Vdc or Vac	4
Slot B, Main Board Communications	Two EIA-232 Ports and One 10/100BASE-T Ethernet Port*	C
Slot C, SELect Boards	Telephone Modem plus Additional EIA-232 and EIA-485 Port*	G
Slot D, SELect Boards	4 ±1 mA Analog Outputs, 4 Solid-State Outputs*	C X
Slot D Control Input Voltage	Empty	X
Slot Z Current and Voltage Inputs	Current Class CL2/10/20, Optimized for Low-End Accuracy	1
System Frequency	60 Hz	6
Communications Protocol	SEL ASCII, SEL Distributed Port Switch Protocol, SEL Fast Meter, SEL Compressed ASCII, MV-90 Translation™, Modbus® RTU/TCP, MIRRORRED BITS® Communications, Telnet, and DNP3 Level 2 Slave Serial and LAN/WAN	1
Front-Panel Labeling	ANSI Labeling	0
Conformal Coat	None	1



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Exhibit E: SEL-735H Standard Horizontal Case Model Configuration

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Part Number: 0735HX10944CGXCXXX16101XX		Key: 1730
Product:	SEL-735	0 7 3 5 0 X X X X X
Category	Selection	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Chassis	Horizontal Panel Mount, ANSI Optical Port	H
Enclosure	None	X
Power Quality and Recording Option	Intermediate PQ and Recording*	1
Meter Form	Form 9	9
Slot A, Power Supply	125/250 Vdc or Vac; 3 Contact Outputs, 2 Inputs	4
Slot A, Power Supply Control Input Voltage	125 Vdc or Vac	4
Slot B, Main Board Communications	Two EIA-232 Ports and One 10/100BASE-T Ethernet Port*	C
Slot C, SELect Boards	Telephone Modem plus Additional EIA-232 and EIA-485 Port*	G
Slot D, SELect Boards	4 ±1 mA Analog Outputs, 4 Solid-State Outputs*	C X
Slot D Control Input Voltage	Empty	X
Slot Z Current and Voltage Inputs	Current Class CL2/10/20, Optimized for Low-End Accuracy	1
System Frequency	60 Hz	6
Communications Protocol	SEL ASCII, SEL Distributed Port Switch Protocol, SEL Fast Meter, SEL Compressed ASCII, MV-90 Translation™, Modbus® RTU/TCP, MIRRORRED BITS® Communications, Telnet, and DNP3 Level 2 Slave Serial and LAN/WAN	1
Front-Panel Labeling	ANSI Labeling	0
Conformal Coat	None	1

https://gates.selinc.com/onlinemot/Default.aspx?mot_value=0735HX10944CGXCXXX16... 5/14/2012



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Exhibit G: SEL-735EX Standard Easy Extractable Model Configuration

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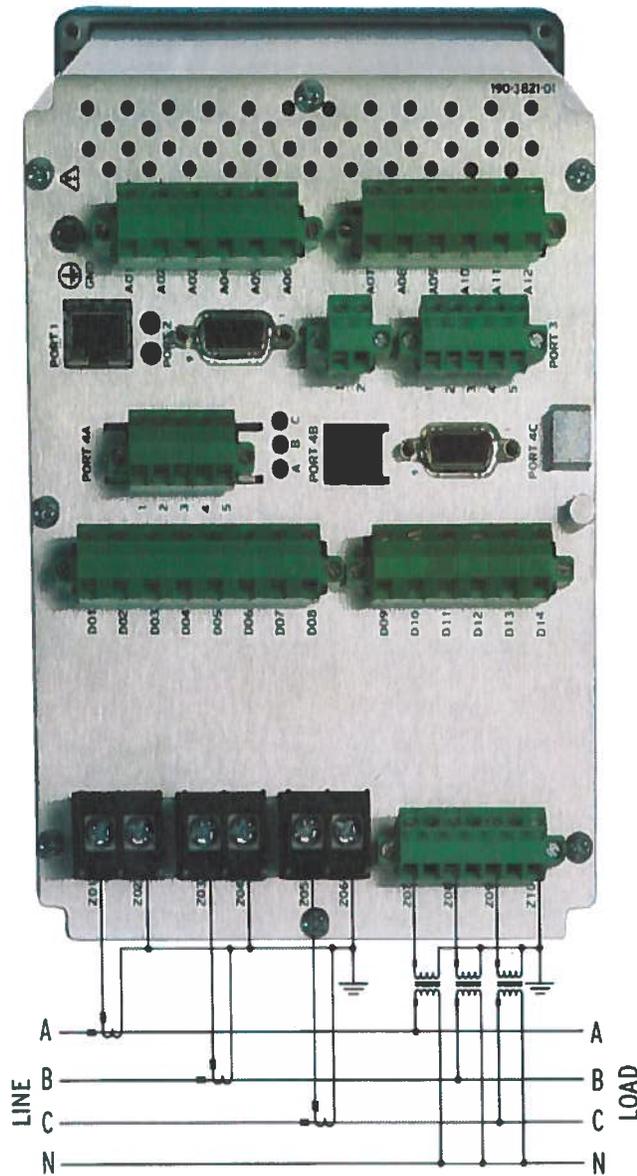
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Part Number: 0735EX10944CGXCXXX16101XX		Key: 1715
Product:	SEL-735	0 7 3 5 0 X X X X X
Category	Selection	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Chassis	Easily Extractable Meter (EXM), Vertical Panel Mount, ANSI Optical Port*	E X
Enclosure	None	X
Power Quality and Recording Option	Intermediate PQ and Recording*	1
Meter Form	Form 9	9
Slot A, Power Supply	125/250 Vdc or Vac; 3 Contact Outputs, 2 Inputs	4
Slot A, Power Supply Control Input Voltage	125 Vdc or Vac	4
Slot B, Main Board Communications	Two EIA-232 Ports and One 10/100BASE-T Ethernet Port*	C
Slot C, SELEct Boards	Telephone Modem plus Additional EIA-232 and EIA-485 Port*	G
Slot D, SELEct Boards	4 ±1 mA Analog Outputs, 4 Solid-State Outputs*	C X
Slot D Control Input Voltage	Empty	X
Slot Z Current and Voltage Inputs	Current Class CL2/10/20, Optimized for Low-End Accuracy	1
System Frequency	60 Hz	6
Communications Protocol	SEL ASCII, SEL Distributed Port Switch Protocol, SEL Fast Meter, SEL Compressed ASCII, MV-90 Translation™, Modbus® RTU/TCP, MIRRORED BITS® Communications, Telnet, and DNP3 Level 2 Slave Serial and LAN/WAN	1
Front-Panel Labeling	ANSI Labeling	0
Conformal Coat	None	1

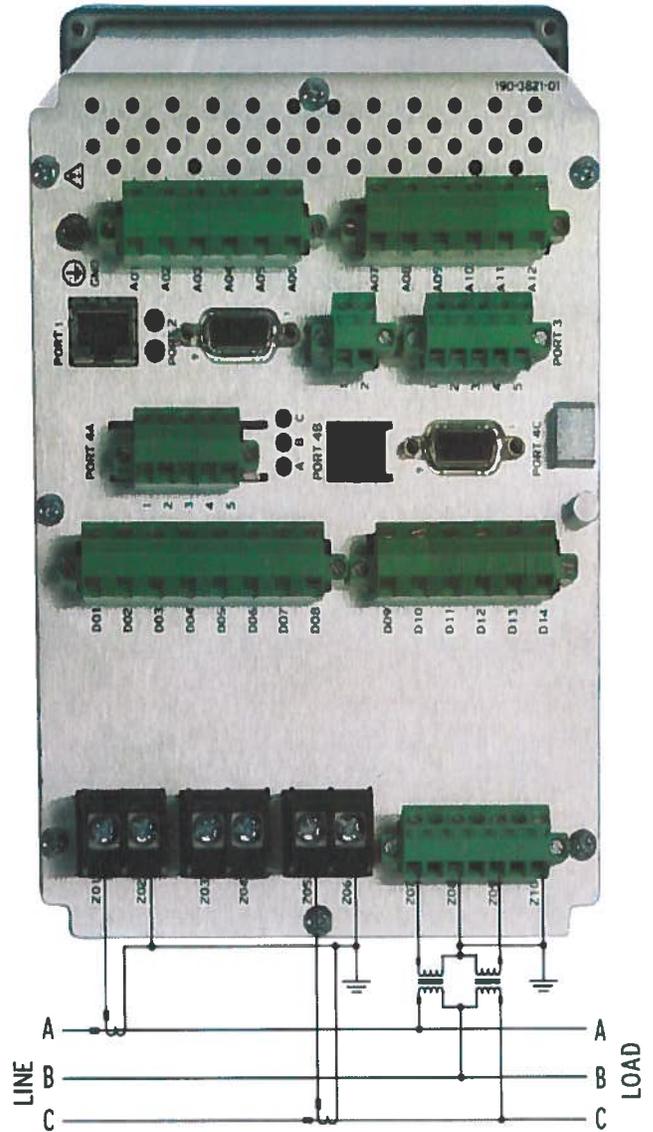
https://gates.selinc.com/online/mot/Default.aspx?mot_value=0735EX10944CGXCXXX16... 5/14/2012



Exhibit H: SEL-735 Wiring Connections



Form 9, 3-Element, Four-Wire Wye



Form 5, 2-Element, Three-Wire Delta