

San Diego Community College District

District-Wide Smart Metering

Guidelines for

NEW & RENOVATED BUILDINGS

City College, Mesa College, and Miramar College

Prepared by: **Randall Lamb** | September 20, 2011

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I. INTRODUCTION – *Program Description*

As part of its Green Building Policy, the San Diego Community College District (SCDDC) is deploying a District Wide Smart Metering System (SMS). This program is expected to generate specific energy consumption information for each of the three campuses, all buildings within those campuses and certain systems within those buildings. The information will be used to 1) confirm building performance for LEED compliance, 2) compare campuses and buildings for operational efficiencies, and 3) develop operational and maintenance programs that will reduce energy consumption and cost.

All new and remodeled facilities on the three campuses will require “smart meters” to be installed as part of their design and construction process. These meters will be connected to a Tridium based gateway interface module. The gateways on each campus will interface with a single Java Application Control Engine (J.A.C.E) module for each campus. These J.A.C.E. modules are then connected through the campus data networks and the District wide data network to the Tridium Niagara server located in the SDCCD Data Processing Center.

Existing buildings on the three campuses will be retrofitted to comply with these same SMS requirements.

The purpose of this document is to provide the SMS guidelines for all new and remodeled buildings located on the three District campuses.

II. METER LOCATION GUIDELINES

Meters shall be installed to measure building's electrical, gas, chilled water and heating hot water loads. These meters shall measure, where possible, the following loads:

A. Electrical

1. Building main electrical service
2. Indoor lighting
3. Exterior lighting
4. Air handling equipment
5. Fume hoods or other laboratory equipment
6. Any special or unique power loads

Meters may be positioned to determine the above categories in an additive or subtractive configuration.

B. Gas

1. Building main gas service
2. Kitchens
3. Any special or unique gas loads

C. Chilled Water

1. Building main chilled water service

D. Heating Hot Water

1. Building main hot water service

III. METER TYPES

A. Electrical – Main Building Service

Measured Quantities:	<ol style="list-style-type: none">1. Voltage per phase2. Voltage line to line3. Voltage line to neutral4. Current per phase5. Power factor per phase6. kWh, Consumption7. kW, Demand8. Frequency9. kVA per phase10. kVar per phase11. THD, Voltage line to neutral12. THD, Voltage line to line13. THD, current per phase
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Measurement Configuration:	For 3-phase application, 208-600V, 3 wire delta or 4 wire wye.
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Operating Temperature:	20 degrees C. to +70 degrees C. For exterior mounting, consider the local ambient temperature extremes and moisture proof enclosures.
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Humidity Operating Range:	5% to 90% RH (non-condensing)
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Accuracy:	ANSI C12.20 (0.5% Accuracy)
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Frequency:	60 Hz
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Output:	Modbus RTU/RS485/RS232
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Display:	Background-illuminated graphic display
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Manufacturer:	<ol style="list-style-type: none">1. Siemens
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B. Electrical – All other Electrical Loads (*lighting, mechanical, any special power*)

- Measured Quantities:
1. Voltage per phase
 2. Current per phase
 3. kWh
 4. Real-time load in kW
 5. Power factor per phase

Measurement Configuration: For 3-phase application, 208-600V, 3 wire delta or 4 wire wye.

Operating Temperature: 20 degrees C. to +70 degrees C. For exterior mounting, consider the local ambient temperature extremes and moisture proof enclosures.

Humidity Operating Range: 5% to 90% RH (non-condensing)

Accuracy: ANSI C12.20 (0.5% Accuracy)

Frequency: 60 Hz

Output: Modbus RTU/RS485/RS232

Display: None

Manufacturer: 1. Siemens

C. **Gas – Main Building Service**

Measured Quantities: Cubic Feet of Natural Gas

Measurement Configuration: Natural Gas service to a building

Operating Temperature: -40 degrees F to +140 degrees F.

Humidity Operating Range: 5% to 90% RH (non-condensing)

Accuracy: ± 1% of scale

Pulse Frequency: Not less than two pulses per revolution. Meter pulser shall be coupled to meter dial to provide a pulse rate of not less than one pulse for every 100 cubic feet of gas.

Output: Pulse Output

Rotary Type: Rotary type meter shall conform to AGA B109.3

Meters shall be pipe or pedestal mounted and provided with a strainer immediately upstream. Meters shall be provided with over-pressure protection as specified in ASME B31.8. Meters shall be suitable for accurately measuring and handling gas at pressures, temperatures, and flow rates present. Meters shall have a pulse switch initiator capable of operating up to speeds of 500 pulses per minute with no false pulses and shall require no field adjustments or calibration. Initiator shall provide the maximum number of pulses up to 500 per minute that is obtainable from the manufacturer. The minimum pulse rate shall not be less than one pulse per 100 cubic feet of gas.

Manufacturer: 1. Elster – American Meter

D. Chilled Water and Heating Hot Water – BTU Meters

- Measured Quantities:
1. Total Energy
 2. Total Flow
 3. Energy Rate
 4. Flow Rate
 5. Supply Temperature
 6. Return Temperature

Measurement Configuration: Chilled water , heating hot water, Domestic Hot Water, and condenser water

Liquid Temperature Range: 32 degrees F to 200 degrees F.

Humidity Operating Range: 5% to 90% RH (non-condensing)

Accuracy: Differential temperature accuracy $\pm 0.15^\circ$ F over calibrated range. Computing nonlinearity within $\pm 0.05\%$.

Frequency: 60 Hz

Output: Modbus RTU/RS485

Display: Alphanumerical LCD Display

Manufacturer: 1. Dynasonics

E. Chilled Water and Heating Hot Water – Flow Meters

Flow meter should be ultrasonic or electromagnetic type

Measured Quantities:	Flow Rate (gpm)
Measurement Configuration:	Chilled water , heating hot water, Domestic Hot Water, and condenser water
Liquid Temperature Range:	32 degrees F to 200 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	±2% accuracy with minimum flow rate of 1 fps.
Output:	Analog Output
Display:	Digital LCD Display
Manufacturer:	1. Dynasonics

F. Chilled Water and Heating Hot Water – Temperature Sensors

Measured Quantities:	Temperature (°F)
Temperature Range:	-32 degrees F to 200 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	±0.1% accuracy

Output: Analog Output

Manufacturer: 1. Dynasonics

IV. INSTALLATION GUIDELINES

Install meters in accordance with NECA 1-2000 Standard Practices for Good Workmanship in Electrical Construction and other ANSI approved installation standards. Meter's output terminals shall be connected to gateway interface module using #18AWG shielded twisted pair (STP) cable, Belden #9841 or equal, in 3/4" conduit by the building contractor. Gateways and J.A.C.E.'s shall be installed by the District Tridium contractor. Tridium contractor shall terminate the #18 STP to the gateway. Coordinate the location of gateway modules with new meter locations and existing conditions. The District shall provide connection between gateways and the J.A.C.E.'s.

Refer to diagram below for the general overall connection of the meters and areas of responsibility.

