Utility Meter Setup Guide
The University of North Carolina at Greensboro
Facilities Operations
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Version 2.1

The purpose of this document is to communicate fundamental information for setting up utility meters for The University of North Carolina at Greensboro. This document covers the units to be displayed for each different utility meter, parameters for setting up electricity meters on the University's campus-wide Ethernet utility network, and communications with the University's building automation/utility monitoring system.

A. Integration of Utility Meter Readings into UNCG's Building Automation System (Tridium server) and Vykon Energy Suite (VES).

1. It is the meter supplier/integrator's responsibility to ensure that each meter's readings shown and trended in Tridium match the readings displayed on the face of the meter. Also, the readings displayed on the meter are to be verified as correct.
2. The definition of the word "integrate" in all its forms as used in this document includes not only running conduit, pulling and connecting wiring, loading software, etc. but also ensuring and confirming that the readings shown and trended in the University's Tridium Building Automation System (BAS) match the readings displayed on the face of the meter. Without such confirmation, which includes more than just the initial setup, the integration effort is incomplete and will not be accepted by the University regardless of the recommendations, opinions, or decisions of other parties besides the University. The University's preferred method of integration for all meters is via the Modbus, BACnet, or LonWorks protocol whereby the BAS reads the number(s) directly from the meter's storage register(s). This implies, of course, that all meters are preferred to be digital meters with electronic storage registers. If connecting to an existing system, then just match the existing protocol.
3. UNCG uses its BAS as a data collection system for utility meters. The Designer is to ensure that all utility meters furnished and installed by the project are integrated properly into the BAS, including confirming proper trending of meter readings every fifteen (15) minutes. Trends are to be stored in the University's server in the McNutt Data Center, not in the local control panels in the building. The Designer is to require the meter supplier/integrator to ensure that each meter's readings shown and trended in the BAS match the readings displayed on the meter.

B. Natural Gas Meter

1. These are rare, but the reading (point) to be integrated into the University's Building Automation System, Tridium, is **cumulative** cubic feet (cu. ft.). This reading is to be obtained directly from the meter's storage register via the Modbus protocol, which is now available from Piedmont Natural Gas. The University does NOT want to own, operate, or maintain any natural gas meters; therefore, the Designer should consult with Piedmont Natural Gas for provision of multiple meters or service points as required.

C. Electricity Meters

1. Electricity meters are typically installed when a building is fed from UNCG's 12,470 Volt underground electrical distribution system or when fed directly from Duke Energy and submetering is required.

2. The University's preferred electricity meters are both manufactured by Electro Industries/GaugeTech: Nexus 1262 main meter and the Shark 200 submeter. The Nexus 1262 meter is to be used for metering an entire building and the Shark 200 submeter is to be used for submetering loads such as mechanical equipment and lighting.
3. All electricity meters are to "reside" on the University's campus-wide Ethernet utility network, which means that each meter must have an Ethernet port (data drop) to plug into. This configuration is necessary so that both the Building Automation System (BAS) and a separate direct-access meter reading software application can communicate with each electricity meter simultaneously. Full integration into the University's BAS, Tridium, is required.
4. Each electricity meter must be "registered" with the UNCG Information Technology Services Department before it can be connected to the University's network. In order to be registered, the installer of the electricity meter(s) must provide a list [preferred format is an Excel spreadsheet] of each electricity meter, the manufacturer, the model name and model number, the designated installation location including the room number and load served, and the MAC address (Ethernet address) unique to each meter which is assigned by the manufacturer and never changes. The load served description should include not only a panel designation (if applicable), but also a description in English that people unfamiliar with the project or building can understand. UNCG ITS will assign an IP address for each meter which allows other devices connected to the utility network to locate each specific meter and know what load that meter is measuring. UNCG Facilities Operations will assign a Meter ID for internal use. The Excel spreadsheet can be forwarded via e-mail to the next recipient and will facilitate capturing all of the key information in one document, including UNCG ITS adding the IP addresses.
    a. Note: The Calibration Reports for both the Nexus 1262 and Shark 200 meters are shipped with the meter and are to be provided to the University. The "Device Profile Report" shipped with the Nexus 1262 meter includes key data and the MAC Address for that meter and is to be provided to the University.
    b. Note: The MAC addresses for the Shark 200 meters are NOT provided on the Calibration Reports. They are found on the network card that is in the meter when shipped.
5. EACH ELECTRICITY METER MUST BE INSTALLED IN THE SAME LOCATION AS DESIGNATED AT THE TIME OF REGISTRATION. Otherwise, the pre-installation assignment of meters to loads gets scrambled.
6. Nexus 1262 Main Electricity Meter
    a. IP address: Provided by UNCG ITS. Each meter is to be set as DHCP (Dynamic Host Configuration Protocol).
    b. Units: kWh (kiloWatt-hours, **<u>whole number</u>** [no decimals], maximum number of digits)
       kW (kiloWatt demand)
    c. Scrolling Meter Display: To be set up to automatically and continuously scroll through the following screens for about seven (7) seconds per screen:
        1. Building Name (Meter Name)
        2. kWh Received (kiloWatt-hours, whole number [no decimals], maximum number of digits)
        3. Peak kW Demand Received (whole number, no digits to the right of a decimal)
        4. Date/Time kW Demand was Last Reset
        5. Optical Port Settings
        6. Blank Screen/Screen Test

7. Shark 200 Electricity Submeter
   a. IP address: Provided by UNCG ITS and is NOT to be statically programmed into the meter. Shark 200 submeters are to be set to perform DHCP (Dynamic Host Configuration Protocol). Failure to set the submeter to DHCP will cause network errors and will result in a notification from UNCG ITS to fix the problem.
   b. Units: kWh (kiloWatt-hours, **whole number**, maximum number of digits with NO DIGITS to the right of a decimal point).
      kW (kiloWatt demand)
   c. Other readings to display include voltage, current, power factor, etc. and the submeter is to be set up to automatically and continuously scroll through all available data screens that are selectable on the meter's face.

D. Domestic Water Meter

1. The reading to be integrated into the University's Tridium server is **cumulative** cubic feet (cu.ft.). If the meter display includes a fixed zero or two fixed zeros, be sure to multiply the reading by 10 or 100 as needed to display the correct reading in Tridium. THE WATER METER SHOULD BE SPECIFIED TO MEASURE CUBIC FEET SO THAT NO CONVERSION FACTOR IS NEEDED TO CONVERT FROM GALLONS TO CUBIC FEET.

2. If digital, electronic water meters with Modbus, BACnet, or LonWorks protocol are not available, then it is acceptable to use a contact closure (switch) to indicate, for example, that ten (10) cubic feet of water have passed through the water meter. The water meter can then be integrated into the University's Tridium BAS by counting each switch closure as ten (10) cubic feet and adding that to the running cumulative total cubic feet consumption. Water meter manufacturers have a specific register to generate this switch closure (Neptune TRICON/S is preferred).

3. The Designer is to incorporate water submeters as needed to measure the quantity of water that is NOT discharged into the City of Greensboro's sewer system. This non-sewered water typically includes water used for irrigation, make-up water to a cooling tower, makeup water to a chilled water system, makeup water to mechanical equipment, and the like. These water submeters are read by the University on a monthly basis and the readings are provided to the City of Greensboro Water Resources Department in order to obtain a credit on the University's water bill.

E. Chilled Water Meter

1. The UNCG campus standard chilled water meter is the Onicon Incorporated (Clearwater, FL) System-10 Btu Meter with F-1200 Series Dual Turbine Flow Meter and RTD insertion temperature sensors.

2. The following readings are typically integrated into the University's Tridium server and Vykon Energy Suite (VES):
   a. Chilled Water Supply Temperature (degrees F).
   b. Chilled Water Return Temperature (degrees F).
   c. Delta T (degrees F).
   d. Chilled Water Flow in gallons per minute (gal/min.).
   e. Current or Instantaneous tons.
   f. **Cumulative** "ton-hours" (NOT "ton-hours X 1K" or "tons/hr" or "Btu").

F. Steam Meter

1. The UNCG campus standard steam meter is the Spirax Sarco TVA Saturated Steam meter with board (part number 9380115) to convert the communications protocol to RS-485. The factory representative is to commission the meter on-site as required and the Controls Contractor is to integrate the steam meter into the BAS. When integrated into the BAS, the readings are to be checked and verified as accurate by comparing the numbers shown on the visual display of the steam meter to the numbers displayed in the BAS.
2. The two readings to be integrated into the University's Tridium server and Vykon Energy Suite (VES) are Steam Flow in pounds per hour (lb./hr) and **Cumulative** Steam Usage in pounds (lb.).

G. Steam Condensate Meter

1. The two readings to be integrated into the University's Tridium server and Vykon Energy Suite (VES) are Condensate Flow in gallons per minute (gal/min) and **Cumulative** Condensate Usage in gallons (gal).

H. The Physical Location of each utility meter in the building must be such that a meter reader can read the meter's display **while standing on the floor**.

I. Once the utility meters are set up they generally should NOT be reset. The University reads the utility meters monthly and uses many of the readings for on-campus billing purposes. If any meters have to be "pulled" to be repaired or replaced, the last readings on the meter being removed are to be written down and provided to the University along with the date and time that the meter was "pulled". This should be performed by a qualified individual and coordinated with UNCG Facilities Operations Controls Shop personnel for re-integration of the replacement meter to ensure accuracy and prevent loss of data.

Referenced in Design Guidelines Sections(s):
15170. METERING
15900. HVAC CONTROLS AND INSTRUMENTATION
16440. METERING