

Electrical - Standard Specifications

ELECTRICAL METER AND SCADA INTEGRATION AND COMMISSIONING

STANDARD SPECIFICATIONS

This standard specification is intended to be integrated into the project specifications. The Consultant shall write the specifications to meet the project needs in consultation with the Owner and in accordance with the attached design information section.

PART 1 - GENERAL

1.01 DESCRIPTION

A. Purpose

1. The purpose of this section is to specify Contractor responsibilities and participation in the electrical meter integration and commissioning process.

B. General

1. Commissioning support is the responsibility of the Contractor (including subcontractors and vendors).
 - a. The commissioning process requires Contractor participation to ensure all portions of the work have been completed in a satisfactory and fully operational manner. The Contractor is responsible to provide all support required for start-up, testing, and commissioning.
2. Work of this section includes the following:
 - a. Start-up and testing of the equipment
 - b. Assistance in testing, adjusting and balancing
 - c. Operating equipment and systems as required for commissioning tests
 - d. Provide Testing Plans to the Owner for review and approval prior to commissioning.
 - e. Providing qualified personnel for participation in commissioning test, including seasonal testing required after the initial commissioning
 - f. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process, which fulfill contract and warranty requirements
 - g. Providing operation and maintenance information and as-built drawings to the Owner for verification.

- h. Providing training for the systems specified in this Division with the Owner's Representative.

1.02 RELATED SECTIONS

- A. All start-up and testing procedures and documentation requirements specified within Division 26 00 00.

1.03 REFERENCES

- A. Applicable codes, standards, and references - All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein:

1. International Electrical Testing Association - NETA
2. National Electrical Manufacturer's Association - NEMA
3. American Society for Testing and Materials - ASTM
4. Institute of Electrical and Electronic Engineers - IEEE
5. American National Standards Institute - ANSI
6. National Electrical Safety Code - C2
7. State and local codes and ordinances
8. Insulated Power Cable Engineers Association - IPCEA
9. Association of Edison Illuminating Companies - AEIC
10. Occupational Safety and Health Administration - OSHA 29CFR Part 1910.269
11. National Fire Protection Association - NFPA
 - a. ANSI/NFPA 70: National Electrical Code
 - b. ANSI/NFPA 70B: Electrical Equipment Maintenance
 - c. NFPA 70E: Electrical Safety Requirements for Employee Workplaces
 - d. ANSI/NFPA 78: Lightning Protection Code
 - e. ANSI/NFPA 101: Life Safety Code
 - f. NFPA 99: Health Care Facilities

- B. All inspections and tests shall utilize the following references:

1. Project design drawings and specifications
2. Shop drawings and submittals
3. Approved manufacturer's instruction manuals applicable to each particular apparatus
4. Applicable NETA acceptance testing work scope sections per NETA ATS 1999

1.04 COORDINATION

- A. Coordinate the completion of all electrical testing, inspection, and calibration prior to the start of commissioning activities.
- B. Coordinate factory field-testing and assistance per the requirements of this section.
- C. The Contractor to coordinate and cooperate in the following manner:
 1. Allow a minimum of 10 working days before final commissioning dates to complete electrical testing, inspection, and calibration to avoid delays in the commissioning process.

2. During the commissioning activities, provide labor and material to make corrections when required, without undue delay.

1.05 UW NETWORK INTEGRATION

- A. Owner's System Integrator (SI) contractor will program the Owner's aggregation software to read the installed electrical metering and SCADA equipment. Contractor to coordinate this work with the Owner and Owner's SI contractor to ensure all programming is complete prior to commissioning.

1.06 SUBMITTALS

- A. General
 1. Submitted in accordance with all Contract Documents and Division 01 Specification Sections.
 2. Contractor to provide information required on form in Appendix A and submit to Owner.

1.07 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals to be in accordance with Conditions of the Contract and Division 01 Specification Sections.

1.08 SCHEDULE

- A. Complete and make fully functional all phases of electrical work pertinent to the Commissioning Tests, prior to the testing date.

1.09 MEETINGS

- A. Attend Commissioning Meetings as required by the Owner.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide test equipment as necessary for start-up and commissioning of the electrical equipment and systems.

2.02 TEST EQUIPMENT - PROPRIETARY

- A. Proprietary test equipment required by the manufacturer, to be provided by the manufacturer of the equipment.
 1. Manufacturer to demonstrate its use, and assist the Contractor in the commissioning process.

2. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
- B. Identify the proprietary test equipment required in the test procedure submittals and in a separate list of equipment to be included in the Operations and Maintenance Manuals.

PART 3 - EXECUTION

3.01 REQUIREMENTS

- A. Work prior to commissioning:
1. Complete all phases of work so the system can be started, tested, adjusted, balanced, and otherwise commissioned.
 - a. Contractor has primary start-up responsibilities with obligations to complete systems, including all sub-systems so they are fully functional.
 - b. This includes the complete installation of all equipment, materials, conduit, wire, controls, labeling etc., per the contract documents and related directives, clarifications, change orders, etc.
 2. Complete all equipment programming prior to commissioning.
 - a. Electrical Meters
 - i. Meters shall be programmed prior to connecting the meter to the facility network.
 - ii. Meter program parameters shall be approved by the Owner or the System Integrator.
 - iii. All wiring shall be approved before being connected to the Owner's facility network.
 - b. Aggregation Software
 - i. Aggregation software to be programmed by the SI.
 - ii. Aggregation software program parameters shall be approved by the Owner.
 3. A commissioning plan will be developed by the Owner's Representative and approved by the Owner.
 - a. Minimum requirements for the commissioning plan shall include the following:
 - i. Verify meter part number
 - ii. Review of the electrical meter's programming parameters:
 - (a) Verify CT and PT ratios
 - (b) Verify wiring configuration
 - (c) Verify display screens are in accordance with Owner's requirements
 - iii. Verify meter readings

- (a) Contractor shall provide personnel support and a calibrated digital multimeter for verification of meter readings
 - iv. Verify electrical equipment is properly connected to the facility network.
 - v. Verify communication between the electrical equipment and the facility network at the facility network server.
 - vi. Verify all electrical equipment are being read by the Owner's Aggregation software
 - vii. Verify new screens are created in the aggregation software for the new electrical meters.
 - viii. Verify Owner's aggregation software power readings
 - (a) Contractor to provide personnel support and a calibrated digital multimeter for verification of meter readings
 - b. If system modifications/clarifications are in the contractual requirements of this and related sections of work, they will be made at no additional cost to the Owner.
 - c. If Contractor-initiated system changes have been made that alter the commissioning process, the Contractor will notify the Owner's Representative for approval.
- 4. The Contractor is responsible for the installation of all equipment prior to commissioning the system. The Contractor verifies at a minimum that the following equipment is installed:
 - a. Electrical meters (includes automatic transfer switches)
 - b. Communication cable
 - c. SCADA equipment (includes automatic transfer switches).
- 5. Normal start-up services required to bring each system into a fully operational state:
 - a. These include cleaning, testing, phase rotation check, control sequences of operation, full and part load performance, etc.
 - b. The Contractor will not begin the commissioning process until each system is complete
- 6. Commissioning is intended to begin upon completion of a system.
 - a. Commissioning may proceed prior to the completion of systems, or sub-systems, and will be coordinated with the Electrical Contractor and Electrical Testing Contractor.
 - b. Contractor shall coordinate with the SI to provide programming and configuration prior to commissioning.
 - c. Start of commissioning before system completion will not relieve Contractor from completing those systems as per the schedule.

3.02 PARTICIPATION IN COMMISSIONING

- A. Provide skilled technicians to start up all systems within Division 26.

1. Contractor will ensure that the qualified technician(s) are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustment, and/or problem resolutions.
- B. System problems and discrepancies may require additional Contractor time, redesign and/or reconstruction of systems and system components.
- C. The Owner's Representative reserves the right to judge the appropriateness and qualifications of the Contractor's technicians relative to each item of equipment or system. Qualifications of Contractor's technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to get the job done in a timely manner.
- D. Contractor is responsible for the removal and replacement of covers of electrical equipment, open access panels, etc., to permit Owner's Representative to observe equipment and controllers provided.
- E. Furnish ladders, flashlights, tools and equipment as necessary.

3.03 WORK TO RESOLVE DEFICIENCIES

- A. In some systems, misadjustments, misapplied equipment and/or deficient performance under varying loads will result in additional work being required to commission the systems.
 1. This work will be completed under the direction of the Owner's Representative, with input from the Contractor and equipment supplier.
 2. Whereas all members will have input and the opportunity to discuss the work and resolve problems, the Owner's Representative will have final jurisdiction over the work necessary to achieve performance.
- B. Corrective work shall be completed in a timely fashion to permit timely completion of the commissioning process.
 1. Experimentation to render system performance will be permitted.
 2. If the Owner's Representative deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Contractor shall schedule a meeting with the Owner to discuss the nature of the problem, expected steps to be taken, and the deadline for completion of activities.
 3. If deadlines pass without resolution of the problem, the Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem.
 4. Any costs incurred to solve the problems in an expeditious manner shall be the Contractor's responsibility.

3.04 SYSTEMS DOCUMENTATION

- A. In addition to the requirements of Division 1, update contract documents to incorporate field changes and revisions to system designs to account for actual constructed configurations.
 1. All drawings shall be red-lined on two sets.

2. Contractor as-built drawings to include architectural floor plans, elevations and details, and the individual electrical systems in relation to actual building layout. Dimensions from a wall or permanent structure shall be shown for any equipment, conduit, cable, etc. installed in a different location than identified in the Contract documents.
 3. All IP addresses issued to electrical meters shall be documented and included in the red-line drawings.
- B. Maintain as-built red-lines as required by Division 1.
1. Red-lining of drawings at completion of construction, based on memory of key personnel, is not satisfactory.
 2. Continuous and regular red-lining is considered essential and mandatory.

Device Profile Report

Device Profile Report

Model:	
ID Number:	
Name:	
NVRAM:	

Firmware Versions

Firmware	Boot	Runtime	Xilinx
Comm			
DSP			

Communication Settings

Item	Port 1	Optical	Port 4
Address			

Baud Rate			
Data Bits			
Parity			
Stop Bits 1			
Tx Delay			
Protocol			
Mode			

System Setup

Time Setup

CT Ratio:		Time Zone:	
PT Ratio:		DST Enabled:	
		DST Start:	
Form:		DST End:	
		Line Sync:	
Frequency Range:		Frequency:	
Voltage Back			
Power Direction Label:			
Power Factor Display:			

Demand Setup

Block Window Sync

Thermal Averaging Window:		Use Sync Pulse:	
Block Averaging Window:		High Speed Input #:	

Rolling Averaging Sub-Interval Window:		Generate End of Interval Pulse:			
Rolling Sub-Intervals:		Relay #:			
Predictive Rolling Window Average:		Pulse Width (ms):			

Limit Full Scales

Channels	Values
I A, B, C, Nc	
I Nm	
V AN, BN, CN	
V AB, BC, CA	
V Aux	
Power Phase	
Power Total	
Frequency	

Flicker Settings

Short Term Test Time (PST):	
Long Term Test Time (PLT):	
Frequency:	

I & V Squared T Thresholds

I Squared T:	
V Squared T:	

Energy, Pulses, and Accumulations in the Interval

Interval:	
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Block Window Max/Min Intervals

First (Interval 1):	
Second (Interval 2)	

Transformer/Line Loss Compensation

State:	
Apply:	

%LWFE	%LVFE	%LWCU	%LVCU
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Trending Log 1 Interval

Hours	Minutes	Seconds

Trending Log 2 Interval

Hours	Minutes	Seconds

Internal KYZ Settings Form C = KYC(Transition) | Form A = KY(Pulse)

KYZ Output	Assigned Channel	WattHour Per Pulse	Pulse Width (ms)	Mode	Form
1					
2					
3					
4					
Test LED					

Network Settings

IP Address	
Subnet Mask	
Default Gateway	

Gateway Port Baud Rate	
Gateway Port Delay	
MAC Address (IEEE Registered)	
Room Physical Port Address	
MDF Switch ID	
IDF Switch ID	

DNS Servers

DNS Server 1	
DNS Server 2	

Services

Modbus TCP Server	
Modbus TCP Client	
GE EDG Data Port Server	
Web Server	
SMTP Server	
SMTP Client	
FTP Server	
FTP Client	
HTTP/Modbus RTU Server	

Alarm/Email

Email Server IP Address/Name	
Email Server Port	

Email Monitor Address	
Return/Reply Address	
Email Subject Text	
Email Server Requires Authentication	
Username	
Password	

FTP Client

FTP Server IP Address/Name	
FTP Server Port	
Startup Remote Directory	
Username	
Password	

Network Card Firmware Update Via Network

Enabled	
Server Port	
Server IP Address	
Client IP Address	
Subnet Mask	
Default Gateway	
Download Filename	

GE Protocol (EDG)

IP Address for Multicast or Unicast	
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Connection Type	
Update Interval	

DNP LAN/WAN Settings

Mode:	
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Connection:

DNP over TCP:		Listen on Port:			
DNP over UDP:		Listen on Port:			
Respond to:					

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