

SECTION 16425000
LOW VOLTAGE SWITCHBOARDS - SPECTRA™

PART 1 GENERAL

A. The requirements of the Contract, Division 1, and Division 16 apply to work in this Section.

1.01 SECTION INCLUDES

A. Low Voltage, Front-Accessible and Front/Rear-Accessible switchboards with circuit breakers and/or fusible switches as specified below and shown on the contract drawings.

1.02 RELATED SECTIONS

1.03 REFERENCES

The low voltage switchboards and protection devices in this specification are designed and manufactured according to latest revision of the following standards (unless otherwise noted).

- A. ANSI 61
- B. ANSI/NEMA PB 2, Deadfront Distribution Switchboards
- C. ANSI/NEMA PB 2.1, General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less
- D. ANSI/NFPA 70, National Electrical Code
- E. NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches
- F. NEMA KS 1, Fused and Non - fused Switches
- G. UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures
- H. UL 891, Dead Front Switchboards
- I. UL 98, Enclosed and Dead Front Switches
- J. UL 977, Fused Power Circuit Devices

1.04 DEFINITIONS

A. Front-Accessible only shall be as defined by UL 891 standard which requires that all line and load connections for phase, neutral, and ground conductors can be made and maintained from the front of the switchboard without access to the rear.

1.05 SYSTEM DESCRIPTION

A. The power system feeding Switchboard (insert designation) is

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[[{208}{480}{575}]] volts, [[{50}{60}]] Hertz, 3 phase, [[{3-}{4-}]]wire, [[{solidly grounded wye}{ungrounded delta}{corner grounded delta}{mid - phase grounded delta}{low resistance grounded wye}{high resistance grounded wye}]].

B. Switchboard(s) shall have [[{front access and rear alignment for mounting against a wall}{front and rear access}]]. <Switchboards shall be front and rear aligned.>

1.06 SUBMITTALS

A. Manufacturer shall provide [3] copies of the following documents to owner for review and evaluation in accordance with general requirements of Division 1 and Division 16:

1. Product Data on specified product;
2. Shop Drawings on specified product;
3. Trip curves for each specified product.

1.07 PROJECT RECORD DOCUMENTS N/A

1.08 INSTALLATION, OPERATION AND MAINTENANCE DATA

A. Manufacturer shall provide [3] copies of installation, operation and maintenance procedures to owner in accordance with general requirements of Division 1 and Division 16.

1.09 QUALITY ASSURANCE (QUALIFICATIONS)

A. Manufacturer shall have specialized in the manufacture and assembly of low voltage switchboards for [25] years.

B. Low voltage switchboards shall be listed and/or classified by Underwriters Laboratories in accordance with standards listed in Article 1.03 of this specification.

1.10 REGULATORY REQUIREMENTS N/A

1.11 MOCK - UPS (FIELD SAMPLES) N/A

1.12 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

B. Ship each switchboard section in individual shipping splits for ease of handling. Each section shall be mounted on shipping skids and wrapped for protection.

C. Contractor shall inspect and report concealed damage to carrier within 48 hours.

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D. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.

E. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish. <Lift only by installed lifting eyes.>

1.13 PROJECT CONDITIONS (SITE ENVIRONMENTAL CONDITIONS)

A. Follow (standards) service conditions before, during and after switchboard installation.

B. Low voltage switchboards shall be located in well - ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area will be between minus [30] and plus [25] degrees C (which is the maximum ambient temperature per UL 891 without the requirement to derate the switchboard). Indoor locations shall be protected to prevent moisture from entering enclosure.

1.14 SEQUENCING AND SCHEDULING N/A

1.15 WARRANTY

A. Manufacturer warrants equipment to be free from defects in materials and workmanship for 1 year from date of installation or 18 months from date of purchase, whichever occurs first.

1.16 MAINTENANCE SERVICE N/A

1.17 EXTRA MATERIALS N/A

1.18 FIELD MEASUREMENTS

A. Contractor shall make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

2.02 EQUIPMENT

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A. Furnish GE Spectra Series™ Switchboards (or approved equal).

2.03 COMPONENTS

A. Refer to Contract Drawings for actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; interrupting and withstand ratings of devices, buses, and components; and other required details.

B. Standard Features

1. Switchboards shall be fully self-supporting structures with [90]{78} inch tall vertical sections (excluding lifting eyes and pull boxes) bolted together to form required arrangement.
2. Switchboard(s) (insert switchboard designation) shall be [{NEMA 1}{NEMA 3R non walk-in}{NEMA 3R walk-in}] deadfront construction. NEMA 3R construction shall be as listed below.
3. Switchboard frame shall be die formed, 12 gauge steel with reinforced corner gussets. Frame shall be rigidly bolted to support cover plates (code gauge steel), bus bars and installed devices during shipment and installation.
4. All sections may be rolled, moved or lifted into position. Switchboards shall be capable of being bolted directly to the floor without the use of floor sills.
5. All switchboard sections shall have open bottoms and removable top plate(s) to install conduit.
6. Front-Access only switchboard sections shall be [{rear aligned}{front and rear aligned}] for placement against a wall. Front/Rear-Access switchboards shall be front and rear aligned.
7. Switchboards shall be UL listed to accept a combination of circuit breakers and fusible switches, factory or field installed.
8. Switchboards that are series rated to short circuit requirements shall be appropriately labeled. Tested UL listed combination ratings shall be included in UL recognized Component Directory (DKSY2).
9. All covers shall be fastened by hex head bolts.
10. Provide hinged doors over metering compartments and individually mounted device compartments. All doors shall have concealed hinges and be fastened by hex head bolts.

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11. Switchboard protective devices shall be furnished as listed on drawings and specified herein, including interconnections, instrumentation and control wiring. Switchboards and devices shall be rated for the voltage and frequency listed on the drawings.

12. Switchboard current ratings, including all devices, shall be based on a maximum ambient temperature of 25 degree C per UL Standard 891. With no derating required, temperature rise of switchboards and devices shall not exceed 65 degrees C in a 25 degree C ambient environment.

13. Switchboard Service Entrance sections shall comply with UL Service Entrance requirements including a UL service entrance label, incoming line isolation barriers, and a removable neutral bond to switchboard ground for solidly grounded wye systems.

C. Bus Bars

1. Bus bars shall be continuously [{tin-plated aluminum}{silver-plated copper}]. Bus bars shall be rated for current density of [{750 amperes per square inch (aluminum)} {1000 amperes per square inch (copper)}] or shall have sufficient cross sectional area to meet UL 891 temperature rise requirements. Phase< and neutral> bus ampacity shall be as shown in plans. For 4-wire systems, neutral shall have same ampacity as phase bus bar.

2. Bus bars shall be mounted on high impact, non-tracking insulated supports. Joints in the vertical bus are not permitted.

3. Bus bars shall be braced to withstand mechanical forces exerted during short circuit conditions as indicated in drawings, but in no case less than 65KA RMS SYM.

4. Bus joints shall be bolted with high tensile steel [Grade 5] bolts. Belleville type washers shall be provided with aluminum bus. Welded connections are unacceptable.

5. Ground Bus shall be sized to meet UL 891. Ground bus shall extend full length of switchboard.

6. A-B-C bus arrangement (left to right, top to bottom, front to rear) shall be used throughout to assure convenient and safe testing and maintenance. Where special circuitry precludes this arrangement, bus bars shall be labeled.

7. All feeder device line and load connection straps shall be rated to carry current rating of device frame (not trip rating).

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8. The main incoming bus bars shall be rated for the main protection device frame size or main incoming conductors, if there is no main device.

9. Main horizontal bus bars shall be [standard tapered per UL]{fully rated and arranged for future extensions}].

D. Utility Metering Compartments (**NOTE:** Select either 1 or 2 below)

[1. A utility metering compartment is not required within the switchboard.]

{2. Provide a utility metering compartment per} <(enter Power Company name) standards.> [Compartment shall be barriered] from the rest of the section, have a hinged lockable front cover, removable bus links with provisions for mounting current transformers, and when required, provisions for mounting voltage transformers. Current and voltage transformers shall be supplied by [the utility company]{ the switchboard vendor} [and installed by] [the utility company.]{ an electrical contractor.}{ the switchboard vendor.}]

E. Main Incoming Compartment

[1. Furnish switchboard(s)] (List each by designation) arranged for [bottom entry of incoming cable.]{ top entry of incoming cable.}]

[a. All lugs shall be tin-plated aluminum and UL listed] for use with [copper cable.]{aluminum cable.}] [Lugs shall be rated for 75 degree C. Cable.]

[b. Provide mechanical]{b. Provide crimp compression type} [lugs in the quantity and size required] per the contract drawings.]

[2. Furnish switchboard(s)] (List each by designation) with provisions for a terminating [bottom entry bus duct.]{ top entry bus duct.}]

[3. Furnish switchboard(s)] (List each by designation) with a transition for close - coupled connection to a transformer.]

F. Main, Tie, and Feeder Devices

1. Main device shall be [individually mounted, insulated case circuit breaker]{individually mounted high pressure contact fusible switch}{group mounted molded case circuit breaker} {group mounted quick make, quick break fusible switch}]. Provide device as specified in appropriate article

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below.

2. Tie device(s), if included, shall be the same as the main device.

3. Feeder devices shall be [{"group mount molded case circuit breakers"}{"group mounted quick - make, quick break switches"}] or when larger than 1200 amps shall be [{"individually mounted insulated case circuit breakers"}{"individually mounted high pressure contact switches"}]. Provide devices as specified in appropriate article below.

4. All circuit protective devices shall have the following minimum symmetrical current interrupting capacity: [{"18kA"}{"25kA"}{"35kA"}{"50kA"}{"65kA"}{"100kA"}{"200kA"}][{"as listed on the contract drawings"}].

<{5. Series rated feeders are acceptable.} Tested UL listed combination ratings shall be included in UL recognized Component Directory (DKSY2).>

G. Molded Case Circuit Breakers

1. Molded case circuit breaker shall have the following symmetrical current interrupting capacity: [{"18kA"}{"25kA"}{"35kA"}{"50kA"}{"65kA"}{"100kA"}][{"as listed on the contract drawings"}].

2. Furnish GE Spectra RMS™ Molded Case Circuit Breakers. <{Thermal magnetic molded case circuit breakers} may be provided for trip ratings 150 amps and below.>

3. Group mounted breakers shall be modular mounted. The module shall be electrically connected to the switchboard bus by spring reinforced jaws. Mechanical connections to panel frame shall be separate from electrical connections. Mechanical connections shall be self-aligning, spring loaded locking devices. Locking device handles shall be able to be bolted to each side of the device to prevent accidental release of electrical connections.

4. Individually mounted molded case circuit breakers shall be stationary mounted.

5. Circuit breaker frames shall be constructed of a high-strength, molded, glass-reinforced polyester case and cover. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.

6. Breakers shall have ON and OFF position clearly marked on escutcheon. Breakers shall include a trip-to-test means on

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the escutcheon for manually tripping the breaker and exercising the mechanism and trip latch.

7. Breakers shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 or 60/75 degrees C as appropriate. Breakers shall be standard, or 80 percent rated.

8. Breakers[$\{$ larger than 150 amps $\}$] shall use digital true RMS sensing trip units and a rating plug to determine the breaker trip rating.

< $\{$ 9. Each $\}$ main $\}$, $\}$ and $\}$ feeder $\}$, $\}$ and $\}$ tie $\}$ breaker with a frame size 400 amps and larger $\}$ shall have digital electronic trip units $\}$ as described in Article 2.03.I.>

< $\{$ 10. Where indicated on the drawings, $\}$ circuit breakers with trip ratings greater than 250 amperes to 1000 amperes shall be UL listed as 100 percent continuous duty rated.>

H. Insulated Case Circuit Breakers

1. Insulated case circuit breakers shall be GE type [$\{$ Power Break I $\}$ Power Break® II $\}$]. Breakers shall be individually mounted.

2. Main <and tie> breakers shall be [$\{$ manually $\}$ electrically $\}$] operated, [$\{$ stationary $\}$ drawout $\}$] mounted. Feeder breakers (larger than 1200 amps) shall be [$\{$ manually $\}$ electrically $\}$] operated, [$\{$ stationary $\}$ drawout $\}$] mounted.

3. Breakers shall be constructed of a high dielectric strength, glass reinforced insulating case. The interrupting mechanism shall be arc chutes. Steel vent grids shall be used to suppress arcs and cool vented gases. Interphase barriers shall to isolate completely each pole.

4. Breakers shall contain a true two-step stored energy operating mechanism which shall provide quick make, quick break operation with a maximum five cycle closing time. Breakers shall be trip free at all times. Common tripping of all poles shall be standard.

5. Insulated Case circuit breakers shall be rated to carry 100 percent of their frame ampacity continuously.

6. A charging handle, close push-button, open push-button, and Off/On/Charge indicator shall be located on the breaker escutcheon and shall be visible with the breaker compartment door closed.

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7. Where drawout breakers are specified, the drawout design shall permit the breaker to be withdrawn from an engaged position, to a test position, and to a disengaged position.

8. Breaker digital electronic trip units shall be as described in Article 2.03.I.

I. Digital Electronic Trip Unit for Circuit Breakers

1. Furnish GE MicroVersaTrip® Plus or PM digital electronic trip units as specified below.

2. Each <{main}{, }{ and }{feeder}{, }{ and }{tie}> circuit breaker shall be equipped with a digital electronic trip unit. The trip unit shall provide protection from overloads<{, }{ and }> short circuits< and ground faults>. The protective trip unit shall consist of a solid state, microprocessor based programmer; tripping means; current sensors; power supply and other devices as required for proper operation.

3. As a minimum, the trip unit shall have the following protective functions:

- a. adjustable current setting or long time pickup;
- b. adjustable long time delay;
- c. adjustable instantaneous pickup;

<{d. adjustable ground fault pickup and delay} for {main}{, }{ and }{tie}{, }{ and }{feeder};>

<{e. adjustable short time pickup and delay} for {main}{, }{ and }{tie}{, }{ and }{feeder}.>

4. As a minimum, the trip unit shall include the following features:

- a. Long time and short time protective functions, if provided, shall have true RMS sensing technology.
- b. Ground fault protective function, if provided, shall contain a memory circuit to integrate low level arcing fault currents with time, to sum the intermittent ground fault spikes.
- c. High contrast liquid crystal display (LCD) unit shall display settings, trip targets, and the specified metering displays.

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- d. Multi-button keypad to provide local setup and readout of all trip settings on the LCD.
- e. UL Listed interchangeable rating plug. It shall not be necessary to remove the trip unit to change the rating plug.
- f. An integral test jack for testing via a portable test set and connection to a battery source.
- g. A mechanism for sealing the rating plug and the trip unit.
- h. Noise immunity shall meet the requirements of IEEE C37.90.
- i. Display trip targets for long time, short time, and ground fault, if included.

5. The trip unit shall include the following metering functions, which shall be displayed on the LCD (if the manufacturers trip unit can not incorporate the specified functions, separate device(s) with equal function shall be provided for each breaker):

- a. Current, RMS, each phase;
- <{b. Voltage, RMS, line - to - line, or line - to - neutral;}>
- c. Energy, KWH, total;
- d. Demand KWH, over an adjustable time period of 5 to 60 minutes;
- e. Peak demand, KW, user resettable;
- f. Real power, KW, line - to - line, line - to - neutral;
- g. Total (apparent) power, KVA, line to - line, line - to - neutral.>

<{6. The following protective relay functions} are optional for the trip unit. It shall be possible, by user programming, to disable any combination of the protective functions. If the manufacturers trip unit can not incorporate the specified functions, separate device(s) with equal function shall be provided for each breaker.

- a. Undervoltage, adj. pickup, 50 to 90 percent; adj. delay, 1 to 15 seconds.
- b. Overvoltage, adj. pickup, 110 to 150 percent; adj.

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delay, 1 to 15 seconds.

c. Voltage unbalance, adj. pickup, 10 to 50 percent;
adj. delay, 1 to 15 seconds.

d. Current unbalance, adj. pickup, 10 to 50 percent;
adj. delay, 1 to 15 seconds.

e. Reverse power, adj. pickup, 10 KW to 990 KW; adj.
delay, 1 to 15 seconds.>

J. Group Mounted Fusible Switches

1. Furnish GE type ADS group mounted fusible switches.
2. Fusible switches shall be quick make, quick break type with over center mechanism. Contacts and blades shall be self-aligning and spring reinforced.
3. Fusible switches rated 600 amps or less shall be equipped with UL class [J] fuse clips and fuses. Fusible switches rated above 600 amps shall be equipped with UL class L fuse clips and fuses. Provide a complete set of fuses for each switch.
4. External handle shall be padlockable in OFF position. Handle shall be interlocked with switch cover to prevent access to switch interior when switch is ON. Interlock shall have an override release.
5. Switches shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 or 60/75 degrees C as appropriate. Switches shall be standard, or 80 percent rated.
6. Switch and fuse assembly shall have an interrupting rating as indicated on the contract drawings.

K. Individually Mounted Fusible Switches

1. Furnish GE type HPC high pressure contact fusible switches.
2. High pressure contact fusible switches shall be butt type contact construction with multiple, spring loaded main arms and an arcing arm per pole. An over-center toggle mechanism shall provide quick make, quick break operation.
3. Switches shall have a molded insulating case and cover with integrally molded interphase partitions. All current carrying parts shall be silver plated copper.

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4. Fusible switches shall be equipped with mounting provisions for UL class L fuses. Switches shall have an interrupting rating of 200 kAIC RMS SYM at 600V when used with class L fuses. Provide a complete set of UL class L fuses for each switch.
5. Switches shall be rated for making and breaking 12 times nameplate rating current at 600 VAC. Switches shall be rated to carry 100 percent of their frame ampacity continuously.
6. Switches shall be manually operated and stationary mounted. Switches shall have a front mounted operating handle for charging the closing springs and closing the switch and a push-button for opening the switch. Switches shall include a visible external ON - OFF indicator.
7. Switches shall have defeatable, front access, coin proof interlocks. Interlocks shall prevent opening switch door when switch is ON and prevent turning switch ON when door is open. Switches shall include provisions for padlocking the switch in the open position.

2.04 METERING

A. Furnish [{a multi-function electronic meter}{analog meters}] as described below and where indicated on the drawings.

[{1. Multi-function electronic meter}

- a. The electronic meter shall be a drawout, semi-flush mounted, microprocessor based, programmable electronic device used for electrical metering. The meter shall be capable of being applied on systems up to 6,000 amps and 600V with required inputs from current transformers, voltage transformers, and/or control power. The display meter shall have built-in communications capability to expand into a comprehensive power management system (at a later date). The meter shall include a keypad for user programming and display selection.
- b. The meter shall have a two line LCD display with a minimum of 16 characters per line. The LCD display shall be backlit to facilitate easy reading.
- c. The meter shall be auto-ranging and capable of metering the following values: amps for each phase; voltage, L-L and L-N; watts; VARs; volt-amps; power factor; watt-hours; var-hours; current demand; peak current; watt demand; peak watt demand; frequency and harmonic distortion.
- d. The display meter shall permit the user to define a password to provide security protection. The device

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setup and all user defined values / settings shall be accomplished by entering the information into the device via a push-button keypad on the front of the face plate.

e. The meter shall be capable of communicating on a network and shall be able to communicate all recorded/calculated values to the host computer.

f. The meter shall meet applicable ANSI standards and be listed to UL 508 and UL 1244.]

<{g. The meter shall include five protective relay functions:} voltage unbalance; current unbalance; under - voltage; overvoltage; and power reversal. Each relay function shall have its own adjustable set point and adjustable time delay.

{h. Waveform capture shall be provided} as part of the meter electronics. The waveform shall be captured on demand or when the current exceeds a user - defined threshold. The threshold shall be defined via the keypad. It shall be possible to communicate the captured data to a host computer. The waveform analysis shall be accomplished by an algorithm running as part of the software.

{i. The meter shall include two programmable pulse outputs.} Pulses shall be programmable for KWH, KVAH, KVARH, or KQH. Output contacts shall be form C type rated for 100 milliamperes at 120 volts.

{j. The meter shall include five protective relay functions:} voltage unbalance; current unbalance; under - voltage; overvoltage; and power reversal. Each relay function shall have its own adjustable set point and adjustable time delay.>

[{2. Analog Meters}

a. Provide switchboard class ammeters, voltmeters, watt-hour demand meters, and switches where indicated on the drawings.

b. Ammeters and voltmeters shall be taut-band, indicating-type, switchboard class GE model AB-40 or equal. They shall have an accuracy in accordance with ANSI standards of two percent. Meters shall be four and one-half inches square with a 250 degree scale arc.

c. Ammeters shall have a 5 amp, full scale movement with a scale of zero to the primary rating of the CTs. Voltmeters shall be direct reading where PTs are not

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shown or have a 150 volt, full scale movement where PTs are shown. Scale of voltmeters shall be zero to 600V.

d. Watt-hour meters shall have two and one-half stators on 3 phase, 4-wire wye systems and 2 stators on 3 phase, 3-wire delta systems. Demand register interval shall be][{15}{30}][[{ minutes.}] <{ Meter shall include a pulse initiator} using a form C contact.>

2.05 METERING TRANSFORMERS

A. All instrument transformers shall be UL listed and classified as indicated in drawings.

B. Current Transformers shall be as shown on drawings with burden and accuracy to support connected meters and relays as required by [ANSI/IEEE C57.13].

C. Potential transformers shall be as shown on drawings with burden and accuracy to support connected meters and relays as required by [ANSI/IEEE C57.13].

2.06 FINISH

A. All steel surfaces shall be chemically cleaned prior to painting.

B. Exterior paint color shall be< ANSI 61> Light Gray over phosphate - type rust inhibitor.

2.07 ACCESSORIES

A. Fuses

1 Manufacturer: Gould - Shawmut (or equal).

2. Interrupting Rating of all fuses shall be [200,000] RMS amperes.

<{B. Molded Case Circuit Breaker Accessories}

{1. Provide breaker accessories}, UL listed for factory or field installation and common to all breaker frame sizes as indicated below and on the drawings:>

[{a. shunt trip}{a. undervoltage release}]

<{1) Shunt trip rated }{120 VAC}{480 VAC}>

<{b. auxiliary switch with }{1}{2}{ form C contacts;}>

<{c. bell alarm.}>

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<{C. Individually Mounted Fusible Switch Accessories}

1. Provide the following UL listed accessories:>

[a. {120}{240}{480}]<{ VAC Electric trip}{ and control power transformer}>.

<{b. Blown - fuse Protector.}

{c. Provision for Key Interlock.}>

<{d. Auxiliary Switches with }>[1]{2}{3}{4}]<{ single-pole, double-throw elements.}

{e. Integral, self-powered ground fault protection} relay with mechanical ground fault indicator, test function, adjustable current pick - up and time delay, and current sensors as required. Ground fault relay shall have an internal memory circuit that integrates intermittent arcing ground faults with time.>

<{D. Outdoor Enclosures}

1. Provide where shown on drawings or indicated in this specification.

2. Consist of standard indoor cubicles with a front frame and roof assembly to provide a weather resistant structure. Filtered front and rear roof vents. Space heaters >[fed from control power transformer in switchboard.]{fed from separate source as indicated on drawings.}]

<{3. Front hinged doors} with 3 point catch with padlocking provision and wind stop. Bolted rear covers.

4. Walk-in construction shall have a minimum 30 inch wide clear walk through space

5. Front to rear full depth lifting beams.>

<{6. Include the following options}

{a. Thermostatic control for space heaters.}

{b. Gasketing.}

{c. Fluorescent lighting and convenience outlets.}

{d. Rear hinged doors with 3 point catch} with padlocking provision and wind stop.>

<{E. Provide a monitor} as described in the following paragraphs.

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1. The solid state monitor shall be provided where indicated on the plans. The monitor shall be capable of being installed in the switchboard or remotely mounted in a NEMA 1 enclosure.
2. The solid state monitor shall be capable of accessing metered values and event data from circuit breaker trip units and multifunction electronic display meters. The monitor shall have a 2 line LCD display with 16 characters each. The monitor(s) shall be mounted where shown on the plans. Interface with the monitor shall be through a four button keypad and the 2 line LCD display. The monitor shall allow the user to view all data on each circuit breaker trip without opening each circuit breaker door.
3. Metering values available for display by the monitor shall be: RMS current for each phase; RMS voltage (L-L and L-N); watts; VARs; volt-amps; power factor; watt-hours; watt demand and frequency from each of the devices on the communication network. In addition the monitor shall indicate breaker status: open/closed/tripped.
4. Events shall be defined by the devices that are connected to the communication network. Events shall include circuit breaker trips and meter alarm and relay trips. The monitor shall have an event log that is automatically updated when an event occurs. The event log shall be capable of storing up to fifty events. The updated event log shall contain the device alphanumeric name and the type of event. Indication of a new event shall be by an LED on the front of the monitor panel. In addition to the new event LED, a relay contact shall be available to provide external indication of an event. The event relay contact shall be rated 10 amperes at 30 VDC or 120 VAC.
5. The monitor shall permit the user to define a password to provide security protection.
6. Monitor setup and all user defined values and / or settings shall be accomplished by entering the data with a four button keypad. Dip switches are not acceptable for this function.
7. Communication between the monitor and its assigned devices shall be by a Belden shielded twisted pair. It shall be possible for the monitor to communicate directly with circuit breaker trip units without the use of interface modules or PLC type equipment. The monitor shall not prohibit the use of software and a PC for system monitoring and data collection. Conversely the use of software and a PC shall not prohibit the use of a monitor.
8. Each monitor shall be recognized to UL 508. Each monitor shall also meet IEEE C37.90 and CSA C22.2 No. 0 and No. 14.

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9. Environment

- a. Operating temperature range: 0 to 70 degrees C
- b. Humidity: 5 to 95 percent, non-condensing
- c. Control power: 120VAC, 10 watts

10. All internal wiring for the communications and control power internally wired and tested at the factory. The monitor shall be configured at the factory to communicate with the devices located in the switchboard lineup. Each low voltage switchboard lineup shall be tested as a system, all low voltage trip units and the monitor shall be tested for communication configuration and the ability to communicate.>

<{F. Furnish adhesive plastic strip mimic bus for switchboards.}>

<{G. Furnish nameplates for each device} as indicated in drawings. Color schemes shall be as indicated on drawings.>

<{H. Furnish automatic breaker throwover equipment.} System shall be PLC based.>

<{I. Provide Transient Voltage Surge Suppression} system as specified in Section 16479010. >

<{J. Provide Automatic Throwover PLC 9030, system} as specified in Section 16912000.>

2.08 TESTING

PART 3 EXECUTION

3.01 EXAMINATION

A. The following procedures shall be performed by the Contractor.

- 1. Examine installation area to assure there is enough clearance to install switchboard.
- 2. Check concrete pads for uniformity and level surface.
- 3. Verify that Spectra Series™ switchboards are ready to install.
- 4. Verify field measurements are as [{shown on Drawings}]{instructed by manufacturer}].
- 5. Verify that required utilities are available, in proper location and ready for use.

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6. Beginning of installation means installer accepts conditions.

3.02 LOCATION

3.03 INSTALLATION

Additional provisions and editing may be required for this part.

A. Installation shall be performed by the Contractor.

1. Install per manufacturer's instructions.

2. Install required safety labels.

3.04 FIELD QUALITY CONTROL N/A

3.05 ADJUSTING N/A

3.06 CLEANING N/A

END OF SECTION