SIEMENS

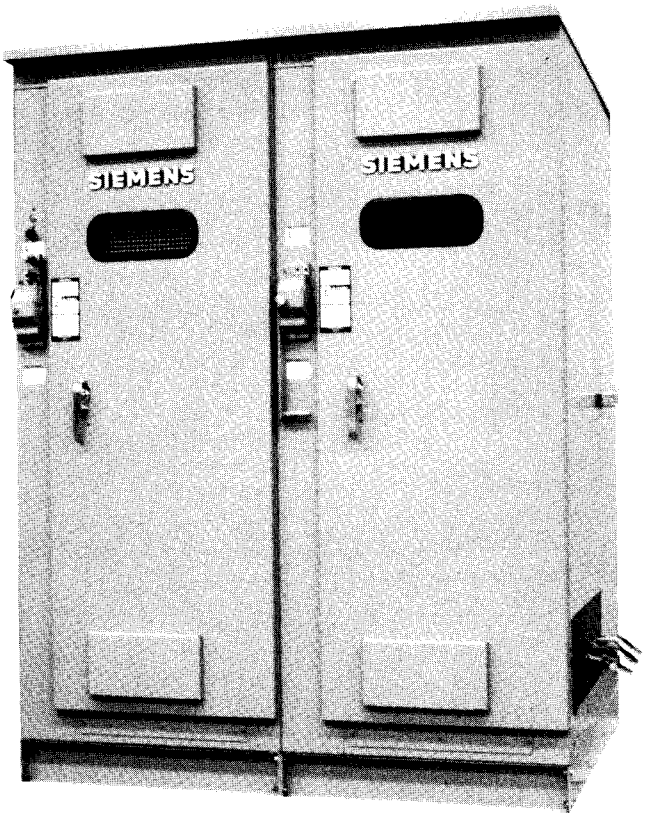
Type QR Metal -Enclosed Load Interrupter Switchgear

SGSA-3111A

Electrical Apparatus Division

(5 & 15 kV/600 and 1200 AMP)
(Stationary, Manually Operated)

Description



General Index

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Description

Features

- Quick-make, quick-break, stored energy operation.
- Operator safety and high reliability.
- Easy maintenance, inspection and accessibility.
- Simplicity of operation.
- Clean uncluttered appearance.
- Lightweight, sturdy metal enclosure.
- Full height front door with 3-point latch.

Application

Typical applications include switching and protection for the following circuits:

1. Transformer primaries in secondary unit substations.
2. Service entrances.
3. Manual throw-over from preferred to emergency circuits.
4. Loop circuit sectionalizing.
5. Isolation of plant feeders.

Switch Ratings

Load Interrupter

kV	Amperes				Bil
Max.	Cont.	Int.	Moment	Fault Closing	kV
4.76	600	600	40,000	40,000	60
4.76	600	600	61,000	61,000	60
4.76	600	600	80,000	80,000	60
15.0	600	600	40,000	40,000	95
15.0	600	600	61,000	61,000	95
15.0	600	600	80,000	80,000	95
4.76	1200	1200	61,000	61,000	60
4.76	1200	1200	80,000	61,000	60
15.0	1200	1200	61,000	61,000	95
15.0	1200	1200	80,000	61,000	95

Selector

4.76	600	—	40,000	—	60
15.0	600	—	40,000	—	95

General

Type QR metal-enclosed load interrupter switchgear provides manually operated, single throw, gang operated switches which can be used as a disconnect and circuit interrupter. A quick-make, quick-break blade combined with an arc chute, provides positive, three-phase interruption of transformer magnetizing and load currents. The switches employ a quick make/break stored energy operator.

Available in either fused or unfused arrangements, type QR load interrupter switchgear is rated to interrupt load current at distribution voltages from 2.4 through 13.8 kV. An interrupter switch differs from a circuit breaker in that it will interrupt load current, but not overload or fault currents.

Opening and closing energy is supplied by rotating the operating handle through 180°; straight up to the closed position and straight down to the open position. The switch is available in 40,000 and 61,000 ampere momentary and close and latch asymmetrical current ratings. An optional 80,000 ampere momentary rating is available for the 61,000 ampere switch.

A single movement of the operating handle charges the operator and closes the switch by upward movement and conversely, opens the switch by downward movement. The

Figure 1. Indoor Duplex with Dry Type Transformer Connection.

resulting high-speed closing and opening assures safe operation and long life. Opening the switch is not possible without a minimum delay after closing of 15 cycles. The operator handle is mounted on the left front of the unit at chest level with a maximum upward swing of 70 inches (indoor units) or 76 inches (outdoor units) above floor or ground level. The maximum operating force is approximately 70 pounds.

The operating handle may be padlocked in the full open or closed position. Key interlocking is optionally available in a multiplicity of arrangements. Mechanical safety interlocking is provided as standard. Inspection windows are located at eye level through which position of the switch blades may be visually checked.

As the switch is closed, the main stationary contacts are engaged slightly prior to the quick-acting arcing contacts inside the arc chute. This reduces the possibility of damage or welding of the interrupter blades if the switch is closed on a fault current. As the switch is fully closed, the quick-acting blade passes between, and is restrained by, the stationary arcing contacts within the arc chute. The closing operation is completed and current is shunted through the main contacts, with very little passing through the quick-acting blade.

Switch life is increased since the arc is drawn within the arc chute between the quick acting blade and stationary arcing contact, preventing arc damage to the main contacts during opening. In the arc chute a dielectric gas is evolved as the arc is elongated, cooled and reduced in cross section causing rapid arc extension.

The metal-enclosed interrupter switch is suited for light duty switching and when fused, fault current protection on modern industrial power distribution systems.

A standard 36-in cubicle can be used individually with an open dry-type transformer, or adjacent to any auxiliary high voltage unit in which proper bus entry and alignment can be made. A 14-in wide transition unit is added when the 36-in wide cubicle is used with liquid-filled or sealed dry-type transformers. Load interrupter switches used as transformer primary disconnects have a unit depth of 60 inches, and are accessible from front and rear.

Selector switches provide both front and rear access to properly terminate cable.

Indoor equipment has a nominal height of 90 inches. Outdoor units are 97 inches high.

Component Construction Features

QR Switch Module Figure 2—all switch components are sub-assembled into a rugged module which can be installed as a unit in the switchgear cubicle.

Insulators—5 kV and 15 kV switch components are mounted on a porcelain stand-off insulator with the necessary clearance from the module framework. Insulators are securely bolted to the module framework and terminals to prevent live parts from rotating on the insulators.

Stationary Main Contacts—are high-pressure, silver-to-copper line contacts with a mass backup. A heavy build-up of copper immediately adjacent to the contacts serves to conduct heat generated by momentary overcurrents away from the contact surfaces, preventing melting and welding of contact surfaces.

Stationary Arcing Contacts—the extended tip of the stationary main contact is the first to make during closing. The movable main switch blade contacts the extended tip on closing prior to the making of the arcing contact within the arc chute. Any arc that occurs on closing is drawn between the upper portion of the main blades and the extended tip, protecting the interrupter from high fault currents. The main contact surfaces are unharmed by arcing—the switch will then carry its full rated current and will still interrupt its full rating.

Main Switch Blade—is of high conductivity (98% or better I.A.C.S.), hard drawn, electrolytic tough pitch copper bars with rounded edges.

Quick-Acting Blade—is of phosphor bronze with a liberal amount of silver tungsten on the interrupter tip and restraining contacts. Silver is used for its high conductivity and tungsten because of its high melting point. The quick-break blades are pivot-mounted to one side of the main blades with a steel spring mounted parallel to the main blades.

Arc Chute—is formed from a urea formaldehyde compound, especially selected for its gas-evolving, arc extinguishing properties. The chute contains a pair of silver tungsten tipped restraining contacts that engage the quick-acting blade when in the closed position. The necessary spring pressure is supplied by a pair of small compression springs inside the arc chute.

Operating Mechanism

Rapid, decisive opening and closing of switch blades is provided by a quick-make, quick-break stored energy

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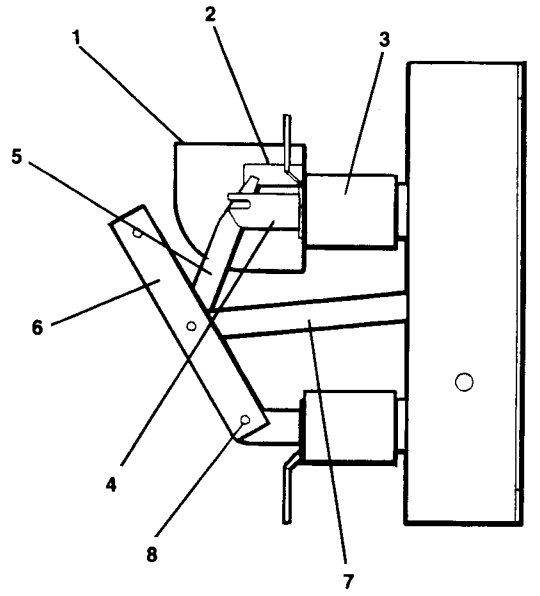

1. Arc Chute
2. Stationary Contact
3. Insulator
4. Stationary Main Contact
5. Quick-Acting Blade
6. Main Switch Blade
7. Operating Bar
8. Hinge Contact

Figure 2. Switch Components

operator. The design incorporates the over-center toggle principle of stored energy spring charging, which permits rapid closing or opening of the switch by a single upward or downward movement of the operating handle. Thus, independent spring charging is not necessary prior to closing or tripping the switch.

Operator Panel Components (Figure 4)

Opening or Closing Operation—When the switch is in either the open or closed position the springs are not charged. The full height front panel must be closed to operate the switch. To close the switch from the open position, pull on the knob located in the center of the operator casting to release the handle. While momentarily holding the knob, the operator handle is rotated slightly to prevent the knob and locating pin from resetting. Continued 180° rotation of the operating handle (2) charges the stored energy springs and thereby actuates closing of the switch. Conversely, switch opening is accomplished by the same procedure by downward rotation of the operating handle.

The powerful stored energy springs assure switch closing or opening at the high speed necessary to achieve the close and latch ratings. Opening and closing speed is independent of the operator handle speed. High speed opening reduces contact wear when interrupting load current.

Position Indicators—Position indicators (3) are included on the operator assembly to indicate switch position, open or closed. Operating springs are discharged in either position.

Key Interlock—The operating mechanism has provisions for key interlocking (1) with remote devices such as transformer secondary breakers and other switches.

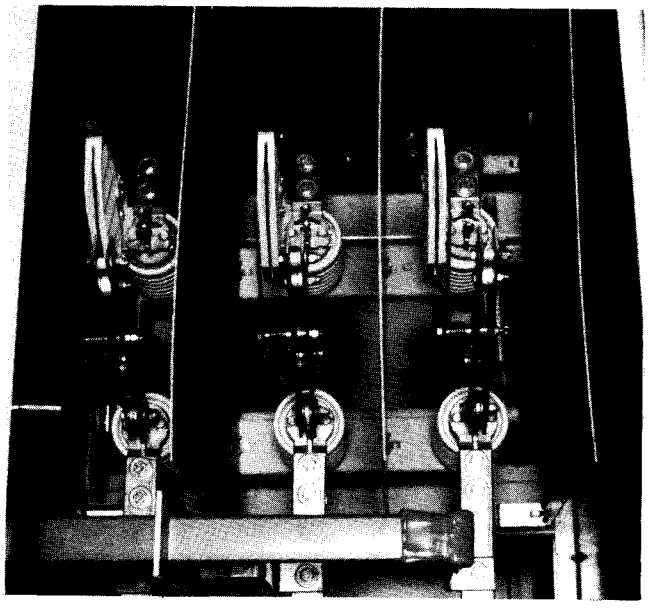

Figure 3. Switch Blades in Open Position

Safety Mechanical Interlocks—Mechanical interlocking is provided as standard to:

- Prevent access to the switch or fuse compartment while the switch is in the closed position.
- Prevent closing the switch with the front panel open.

Operating Handle—The operating handle (2) is permanently attached.

Fused Switches

A load break interrupter switch mounted in series with fuses affords a combination that provides both load switching and short circuit protection.

To prevent any of the fuse discharge gases from contaminating the switch and arc chute area, fuses are mounted below the switch. A fused switch should not be used on circuits sensitive to single phasing.

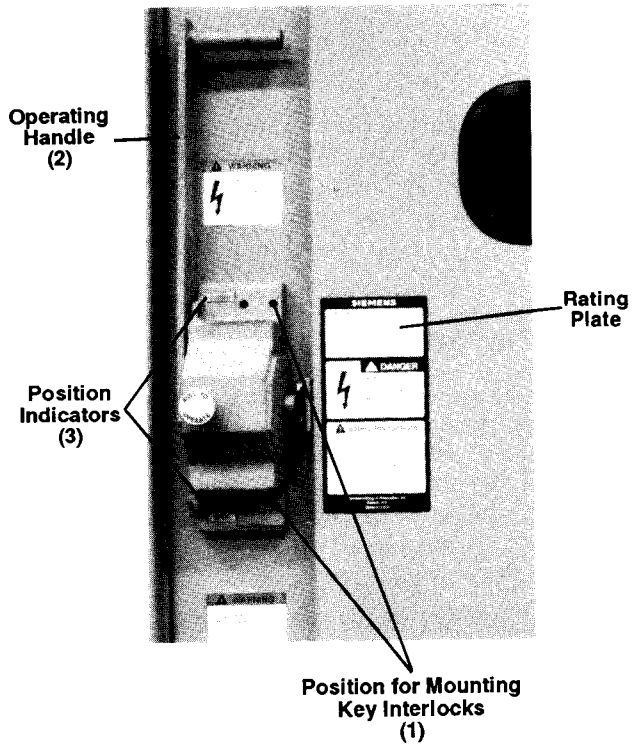

Figure 4. Operator Panel Components

Either power expulsion or current-limiting fuses are available for protection of all standard secondary unit substation transformer from 112.5 through 2500 kVA, 2.4 through 13.8 kV.

Unit Enclosures

Switch and fuse equipment is mounted within a ventilated metal enclosure for indoor installation (NEMA Type 1). For outdoor installation, the equipment is mounted in a weatherproof metal enclosure (NEMA Type 3R).

Standard fuses are mounted in stationary fuse clips. Storage facilities for most spare fuses can be provided as an option.

Figure 5. Unit Enclosure with Switch Module and Fuses Installed

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The frame of the cubicles is constructed of 11 gauge steel side sheets and angles bolted together and reinforced to form a rigid, self-supporting structure.

Adjacent switch cubicles are separated by a double thickness of 11 gauge steel. The top and rear of the switch units are fitted with removable plates of sheet steel securely bolted to the frame. Rear plates, bolted to the frame, can be removed during installation and for inspection and maintenance. Hinged rear doors are available options. Side plates are solid except for openings through which the bus and the interconnecting heater wiring can pass. The enclosure is completed by the addition of a formed full height front panel. Windows are conveniently located for visual inspection of switch position.

Provision for top or bottom cable entrance is available. Clamp type cable lugs are standard; however, compression type cable lugs, potheads, or terminators may be provided.

A space heater in each outdoor unit controls excessive condensation and is optionally available for indoor units. Access to the heaters for test or maintenance is available without opening the main access door, i.e. without opening the primary switch. **Figure 7**. Filters are also mounted in the door vent protective covers and can be maintained without opening the main access door. **Figure 8**. Thermostatic controls for space heaters are available as an option. All panels on outdoor units are gasketed, while the underside of the steel flooring is coated with a corrosion-resistant compound. Optional equipment for each unit includes fuses, potheads, surge arresters, current transformers and potential transformers and barriers between switch/fuse.

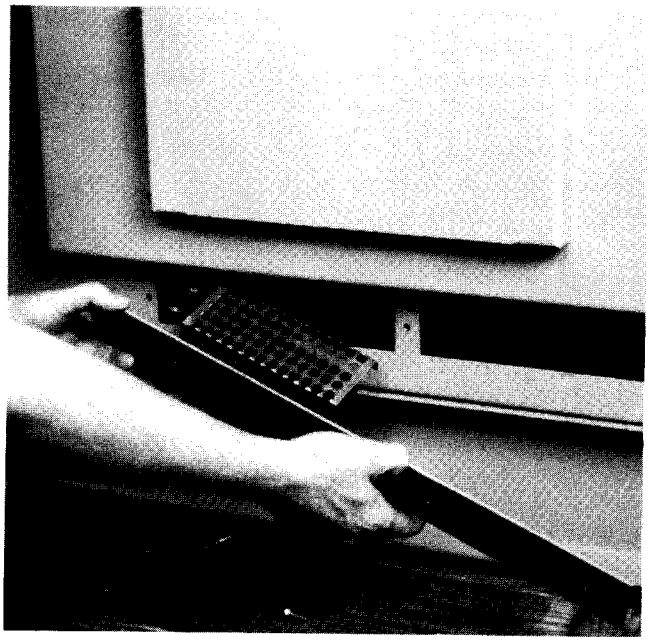

Figure 7. Space Heater Location

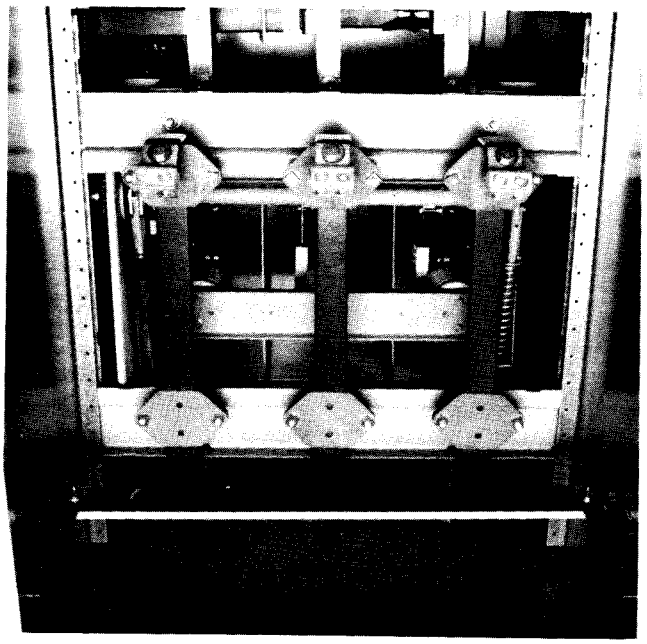

Figure 6. Rear View Showing Cable Lug Location

Conductor and Insulation

The standard conductors for incoming connections and to interconnect the switch and fuses are bare tin plated aluminum bus bars with bolted joints. Copper bus bars with silver or tin plated bolted joints are optionally available. Bus bars are supported on glass polyester insulation. Porcelain supports are optionally available. Insulated bus is optionally available.

The standard conductors to connect from the switch or fuses to a close coupled transformer are insulated cables, braced and spaced on glass polyester supports. Solid aluminum or copper bus is optionally available.

Incoming Line Sections

Single Switch (3-pole, 2-position)-Primary Radial or Loop Systems—A standard switch unit is commonly used on the primary of transformers to permit disconnecting and de-energizing the transformers. The units can switch the full load current of the transformers up to 600 amperes when necessary. In addition, Key interlocking with the transformer secondary breaker is recommended to eliminate the possibility of opening the switch during overload or short circuit conditions. Fuses may be desired to provide short circuit protection for the transformer and cables.

Duplex Switch for Primary Selectivity (two 3-pole, 2-position)—Incoming line circuits can be brought into two separate switch units to provide a primary selective system, while eliminating the possible hazard caused by the failure of one incoming circuit affecting the other circuit. One primary incoming line circuit can be de-energized and isolated by a clearly visible air gap for cable maintenance with the alternate circuit energized and supplying the load. Fusing of the outgoing feeders practically eliminates the possibility of closing onto a faulted transformer, bus or outgoing cable. Key interlocking may be provided between the switches to prevent paralleling the two incoming lines, if desired.

Selector Switch (3-pole, 2-position)—A 3-pole, 2-position 600-amp selector may be applied when a primary selective arrangement with a single, space-saving cubicle is desired. Like the duplex switch arrangement, one primary incoming line circuit can be de-energized and isolated by a clearly visible air gap with the alternate circuit energized and supplying the load.

The selector switch—with two visually identified positions of "line 1," and "line 2"—consists of a type QR—2-position (open/close) 600-amp interrupter switch in series with a 2-position (line 1/line 2) disconnect. The selector switch is mechanically interlocked to prevent it being operated when the interrupter is closed. The type QR interrupter is identical to single feed units and interrupts any load current. The selector switch is mounted in the cable compartment and is operated from the front of the unit.

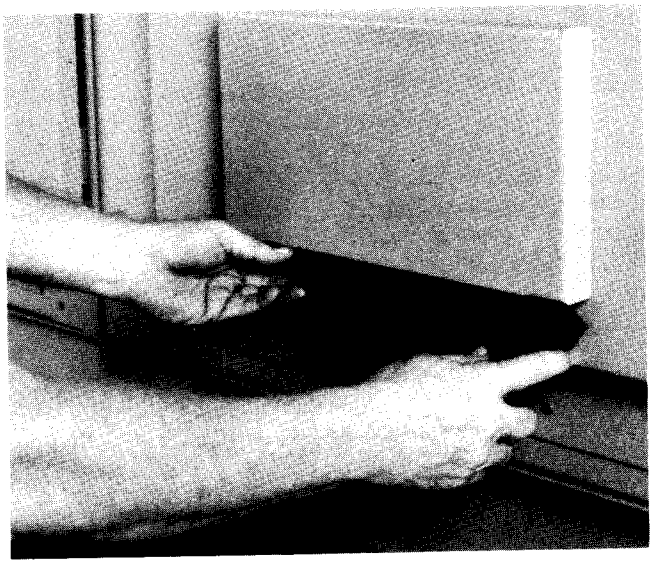

Figure 8. Door Vent Protective Filter

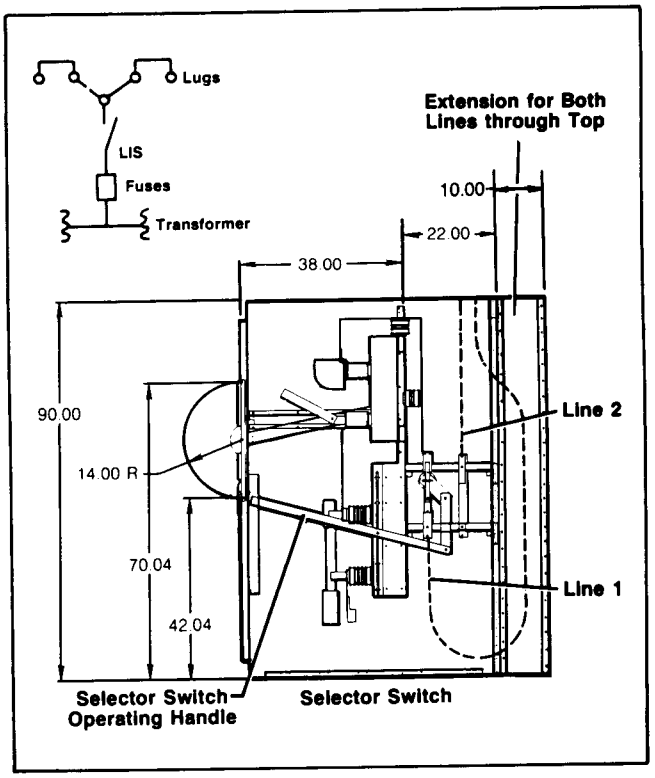

Figure 9. Installation—600 Amp

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Service Entrance

The service entrance arrangement is a special incoming line section, serving only one outgoing feeder and is not close-coupled to a transformer. It is the incoming service terminations of an industrial power user. The outgoing cable, protected by power fuses, can be switched under full load. The service entrance unit may be arranged for either a single supply source or a selective system involving two sources.

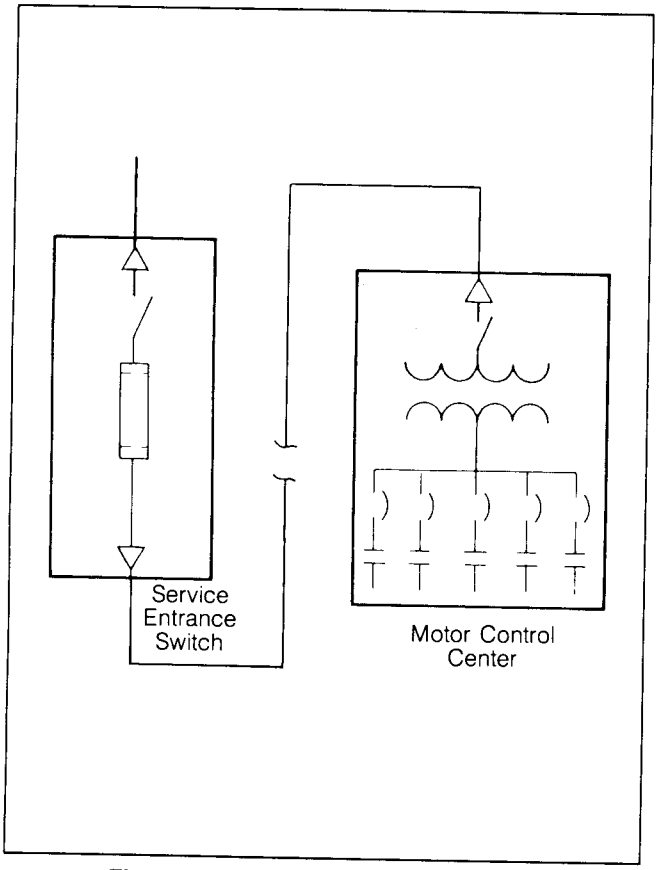


Figure 10. Service Entrance Application

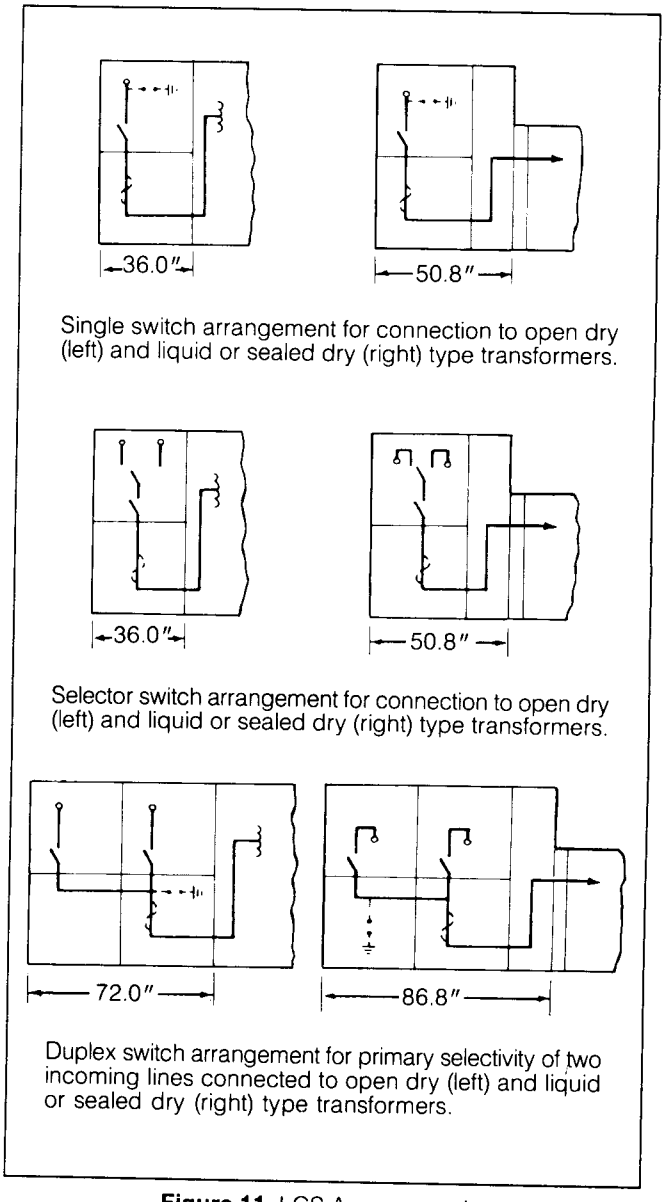


Figure 11. LCS Arrangements

Fuse Selection Guide for Transformer Protection (Partial Listing)

System Voltage	Fuse Type (1)	Symmetrical Interrupting Ratings (50-60 Hz)		All fuses are "E" rated and meet all NEMA standards. Fuse Size for Various Substation Sizes, Continuous Current Rating in Amperes (4)																
		Total RMS kA (2)	Max. 3-Phase MVA (3)	500 kVA			750 kVA			1000 kVA			1500 kVA			2000 kVA			2500 kVA	
				Min.	133%	Max.	Min.	133%	Max.	Min.	133%	Max.	Min.	133%	Max.	Min.	133%	Max.	Min.	133%	Max.
2,400	CS-3	60.0	250	125	200	200	200	250	250	250	350	350	400	—	450	—	—	—	—	—	—
	CL-14	60.0	250	125	200	200	200	250	250	250	400	400	400	500	500	600	—	600	—	—	—
	EJO-1	50.0	207	150	175	175	200	250	300	250	350	350	400	—	450	—	—	—	—	—	—
	CLE-750	40.0	166	—	—	—	—	—	—	—	—	—	—	—	—	600	—	600	750	—	750
	SM-4Z	17.2	70	125	175	200	200	—	200	—	—	—	—	—	—	—	—	—	—	—	—
	SM-5S	37.5	155	125	175	300	200	250	400	250	400	400	400	—	400	—	—	—	—	—	—
	RBA-200	19.0	79	125	200	200	200	—	200	—	—	—	—	—	—	—	—	—	—	—	—
	RBA-400	37.5	155	125	200	250	200	250	300	250	400	400	400	—	400	—	—	—	—	—	—
	RBA-800	37.5	155	—	—	—	—	—	—	—	—	—	450	540	720	540	720	720	720	—	720
4,160	CS-3	60.0	430	80	100	125	125	150	150	150	200	200	250	300	300	300	400	400	400	—	450
	CL-14	60.0	430	80	100	100	125	150	150	150	200	200	250	300	300	300	400	400	400	500	500
	EJO-1	50.0	360	80	100	125	125	150	150	150	200	200	250	300	300	300	400	400	400	—	450
	SM-4Z	17.2	123	80	100	200	125	150	200	150	200	200	—	—	—	—	—	—	—	—	—
	SM-5S	37.5	270	80	100	200	125	150	250	150	200	300	250	300	400	300	400	400	400	—	400
	RBA-200	19.0	136	80	100	150	125	150	200	150	200	200	—	—	—	—	—	—	—	—	—
	RBA-400	37.5	270	80	100	150	125	150	200	150	200	250	250	300	400	300	400	400	400	—	400
	RBA-800	37.5	270	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	450	540	540
4,800	CS-3	60.0	498	65	80	100	100	125	125	125	200	200	200	250	250	250	350	350	350	400	450
	CL-14	60.0	498	65	80	100	100	125	125	125	200	200	200	250	250	250	400	400	400	400	450
	EJO-1	50.0	415	80	80	100	100	125	125	125	175	175	200	250	300	250	350	350	350	450	450
	SM-4Z	17.2	142	65	80	175	100	125	200	125	200	200	200	—	200	—	—	—	—	—	—
	SM-5S	27.0	224	65	80	175	100	125	200	125	200	300	200	250	400	250	400	400	300	400	400
	RBA-200	19.0	157	65	80	125	100	125	150	125	200	200	200	—	200	—	—	—	—	—	—
	RBA-400	37.5	311	65	80	125	100	125	150	125	200	250	200	250	300	250	400	400	300	400	400
7,200	CS-3	48.0	598	50	65	80	65	80	100	100	125	125	125	200	200	200	—	200	—	—	—
	CL-14	39.0	486	50	65	80	65	80	100	100	125	125	125	200	200	200	—	200	—	—	—
	EJO-1	50.0	623	50	65	65	65	80	80	100	125	125	125	175	200	175	250	250	250	300	300
	SM-4Z	17.2	214	40	65	100	65	80	150	80	125	200	125	200	200	175	—	200	200	—	200
	SM-5S	27.0	336	40	65	100	65	80	150	80	125	200	125	200	300	175	250	400	250	300	400
	SM-5SS	34.6	431	40	65	100	65	80	150	80	125	200	125	200	300	175	250	400	250	300	400
	RBA-200	16.6	207	40	65	100	65	80	125	80	125	150	125	200	200	200	—	200	200	—	200
	RBA-400	29.4	366	40	65	100	65	80	125	80	125	150	125	200	250	200	250	300	250	300	400
12,470	CS-3	39.0	842	25	40	50	40	50	50	50	65	80	80	100	100	100	125	125	125	175	175
	CL-14	39.0	842	25	40	50	40	50	65	50	65	80	80	100	100	100	125	125	125	200	200
	EJO-1	50.0	1079	25	50	50	50	50	50	50	65	65	80	100	100	100	125	125	125	175	175
	SM-4Z	12.5	269	25	40	65	40	50	80	50	65	100	80	100	175	100	125	200	125	200	200
	SM-5S	25.0	539	25	40	65	40	50	80	50	65	100	80	100	175	100	125	200	125	200	250
	SM-5SS	34.6	747	25	40	65	40	50	80	50	65	100	80	100	175	100	125	200	125	200	250
	RBA-200	14.4	311	25	40	65	40	50	80	50	65	100	80	100	125	100	125	150	125	200	200
	RBA-400	29.4	635	25	40	65	40	50	80	50	65	100	80	100	125	100	125	150	125	200	200
13,200	CS-3	39.0	891	25	30	40	40	50	50	50	65	80	80	100	100	100	125	125	125	150	175
	CL-14	39.0	891	25	30	40	40	50	50	50	65	80	80	100	100	100	125	125	125	150	150
	EJO-1	50.0	1143	25	30	30	50	50	50	50	65	65	80	100	100	100	125	125	125	150	175
	SM-4Z	12.5	285	25	40	65	40	50	80	50	65	100	80	100	150	100	125	200	125	150	200
	SM-5S	25.0	571	25	40	65	40	50	80	50	65	100	80	100	150	100	125	200	125	150	250
	SM-5SS	34.0	777	25	40	65	40	50	80	50	65	100	80	100	150	100	125	200	125	150	250
	RBA-200	14.4	329	25	40	65	40	50	80	50	65	100	80	100	125	100	125	150	125	150	200
	RBA-400	29.4	672	25	40	65	40	50	80	50	65	100	80	100	125	100	125	150	125	150	200
13,800	CS-3	39.0	932	25	30	40	40	50	50	50	65	80	80	100	100	100	125	125	125	150	150
	CL-14	39.0	932	25	30	40	40	50	50	50	65	65	80	100	100	100	125	125	125	150	150
	EJO-1	50.0	1195	25	30	30	50	50	50	50	65	65	65	100	100	100	125	125	150	150	150
	SM-4Z	12.5	298	25	40	50	40	50	80	50	65	100	65	100	150	100	125	200	125	150	200
	SM-5S	25.0	597	25	40	50	40	50	80	50	65	100	65	100	150	100	125	200	125	150	250
	SM-5SS	34.0	812	25	40	50	40	50	80	50	65	100	65	100	150	100	125	200	125	150	250
	RBA-200	14.4	344	25	40	65	40	50	80	50	65	80	65	100	125	100	125	150	125	150	200
	RBA-400	29.4	702	25	40	65	40	50	80	50	65	80	65	100	125	100	125	150	125	150	200

① Type CL-14 and CS-3 is GOULD current limiting type. Type EJO-1 is General Electric current limiting type. Type CLE-750 is WGH current limiting type. Type SM-4 and SM-5 are S & C expulsion type. Type RBA-200, 400 & 800 are WGH expulsion type. (Use RBA fuses for *liquid* transformer substation application only, except with switches having 3 insulators per pole.)

② These values for fuses correspond to momentary ratings for breakers. ③ The 3-phase MVA = 1.73 (kV) (fuse interrupting kA).

④ The minimum fuse size indicated will not operate on transformer inrush. (Fuse min. melt curve falls to right of inrush @ 0.1 sec. and is based on inrush of 8x FLC.) The 133% fuse size indicated will permit operation of transformer at up to 133% of rating. The maximum fuse size indicated will provide transformer fault protection for phase to phase, 3-phase and phase to ground faults on secondary windings of transformer. It is selected so that fuse curve falls to left of 58% ANSI point (applicable point for Δ-Δ, Y-Y, or Y-Δ connected units, larger fuses might possibly be used without sacrifice of thru-fault protection.)

The kVA value listed is the self-cooled rating. To select fuse for forced-cooled units, the 133% rating is applicable. TX impedance is 5.75% except 500 kVA at 5.0%.

Electrical Apparatus Division

(5 & 15 kV/600 and 1200 AMP)
(Stationary, Manually Operated)

Dimensions

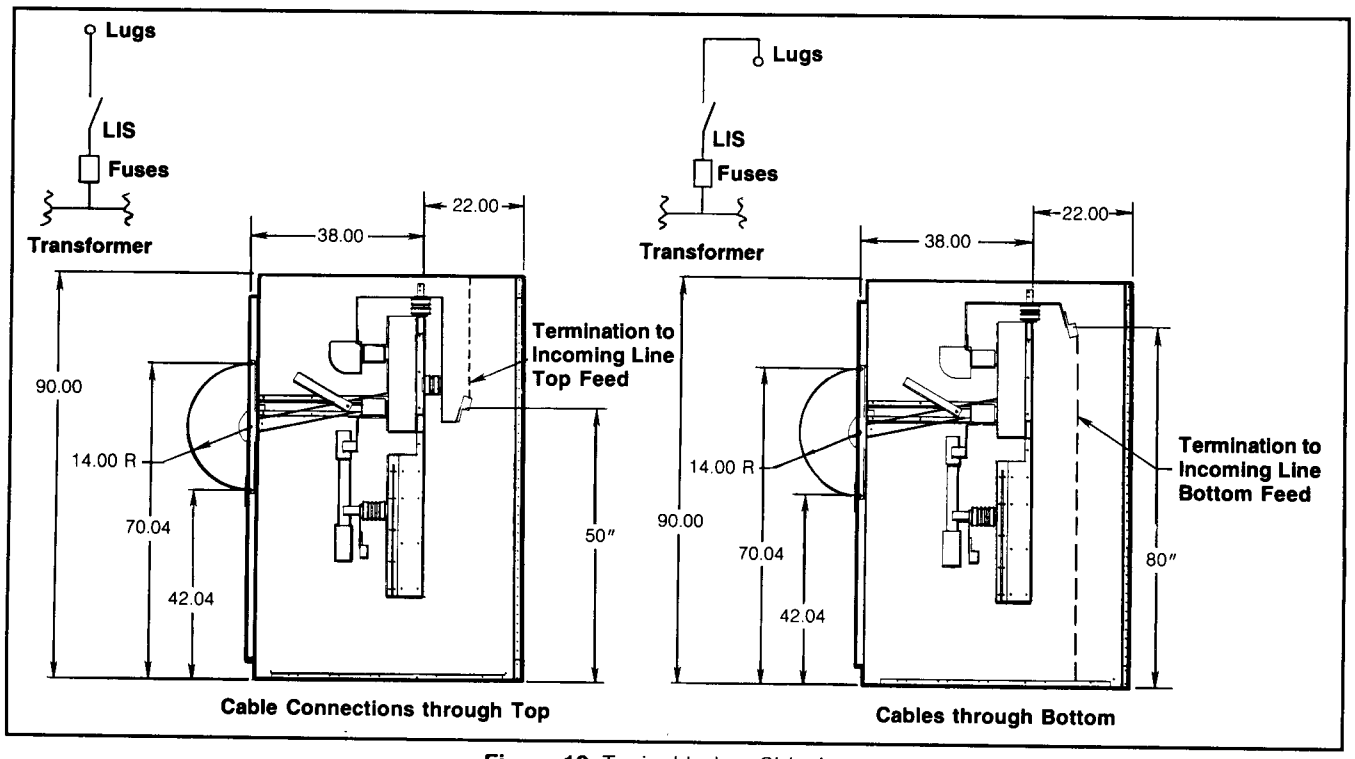


Figure 12. Typical Indoor Sideviews

Weights

INDOOR	
QR36	1400 lbs.
QR Duplex	2400 lbs.
OUTDOOR	
OQR36	1600 lbs.
OQR Duplex	2800 lbs.
ADDITIONS	
Selector Switch	300 lbs.
14" Transition Unit	300 lbs.

**(5 & 15 kV/600 and 1200 AMP)
(Stationary, Manually Operated)**

Dimensions

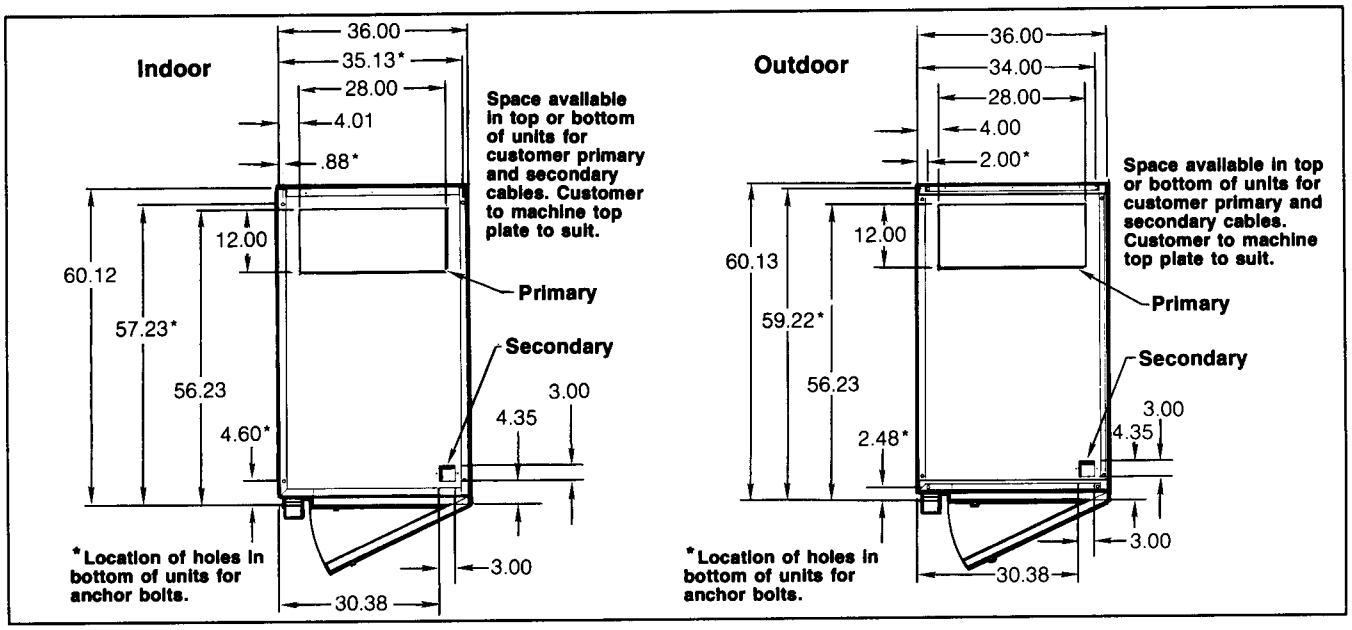
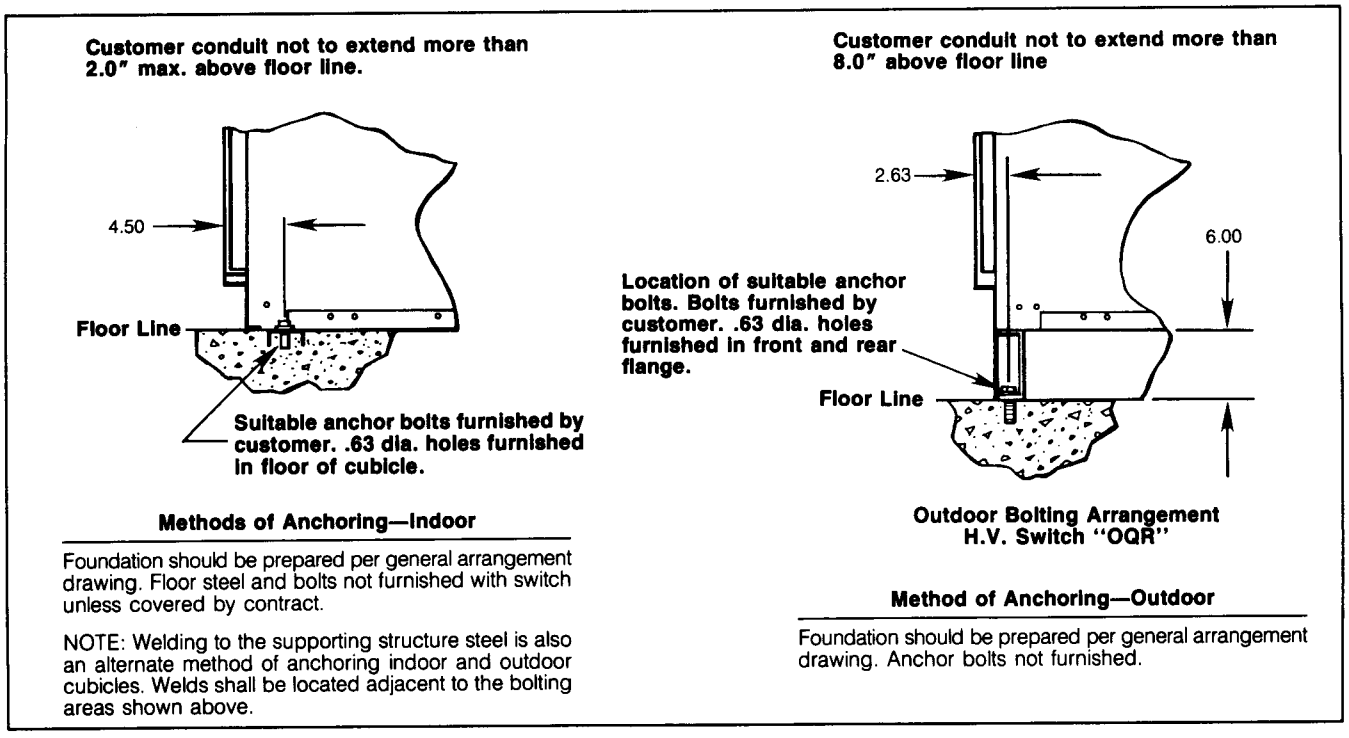


Figure 13. Plan View Cable Area, Rear Access



Methods of Anchoring—Indoor

Foundation should be prepared per general arrangement drawing. Floor steel and bolts not furnished with switch unless covered by contract.

NOTE: Welding to the supporting structure steel is also an alternate method of anchoring indoor and outdoor cubicles. Welds shall be located adjacent to the bolting areas shown above.

**Outdoor Bolting Arrangement
H.V. Switch "OQR"**

Method of Anchoring—Outdoor

Foundation should be prepared per general arrangement drawing. Anchor bolts not furnished.

Figure 14. Bolting Arrangements

Electrical Apparatus Division

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Specifications

NOTE: This preparation guide form requires information to be supplied by others. Those items proceeded by check box are optional. Those items denoted _____ require quantity or data to be added.

General

The equipment outlined in this specification will consist of Siemens type QR metal-enclosed load interrupter switchgear with 3-pole, 2-position air interrupter switches. General constructed features will be as described below. The complete switchgear sections will be of coordinated design so that shipping groups are easily connected together in the field. Necessary standard connection materials shall be furnished.

Suitable solderless cable lugs shall be provided for each of the power feeder cables. Nameplates shall be provided by each unit.

Codes and Standards

The load interrupter switchgear described in this specification shall be designed, manufactured and tested in accordance with the latest revisions of the following standards:

ANSI C37.20.3—Metal-Enclosed Interrupter Switchgear
ANSI C37.20.4—Proposed Standard for Indoor AC Medium Voltage Switches for use in Metal-Enclosed Switchgear.
NEMA SG-5—Power Switchgear Assemblies
NEMA SG-6—Power Switching Equipment
NEC—National Electric Code

Service

The switchgear sections shall be Siemens type ☐ QR indoor, ☐ OQR outdoor rated ☐ 4.76kV, ☐ 15kV. The equipment will operate on a system voltage of_____ volts, ☐ 50 Hertz, ☐ 60 Hertz, 3-phase, ☐ 3-wire, ☐ 4-wire, ☐ solidly grounded, ☐ resistance grounded, ☐ ungrounded.

Construction

The framework of the load interrupter switchgear units shall be constructed of steel channels, angles and side sheets which are bolted together and reinforced to form a rigid, self-supporting unit. Where more than one load interrupter switch unit is provided in an assembly a double thickness of 11 gauge steel shall be provided between units. Top plates and rear plates shall be 11 gauge steel.

Each load interrupter switch unit or auxiliary unit shall be equipped with a full height, hinged front door. A 3-point latching type handle shall be provided with provisions for padlocking. The unit door shall be mechanically interlocked with the interrupter switch operating handle such that the door cannot be opened with the switch closed and the switch cannot be closed with the door open. The hinged door shall be provided with a viewing window to allow the operator to view switch contacts.

A punched metal screen shall be provided behind the unit door to prevent accidental contact with energized interrupter switch contacts when the unit door is open. The interrupter switch operating handle shall be located on the front of the unit and shall include position indicators to show the position of the switch blades (open-closed). The operating handle shall have provisions for padlocking in the open or closed position.

Interrupter Switches

The air interrupter switches shall be 3-pole, 2-position with ratings as described in the detailed specifications. Each interrupter will be quick-make, quick-break, stored energy, manual or electric operator as indicated in the detailed specifications. Each switch pole shall include a quick-acting blade made of phosphor bronze with silver tungsten interrupter tip and restraining contact.

Weatherproof Housing (Optional)

Outdoor non-walk-in weatherproof construction shall be provided. Front doors shall be hinged and gasketed. Rear plates shall be gasketed and ventilation openings shall have filters. Space heaters of sufficient capacity to control condensation, when the interrupter switch is de-energized, shall be provided.

Space heater control power shall be provided from ☐ a remote source, ☐ a control power transformer located in the low voltage metal-enclosed switchgear, ☐ a control power transformer located in an auxiliary unit in the load interrupter switchgear assembly.

The complete assembly shall rest on a formed steel base built up from units provided under each vertical unit and running perpendicular to the length of the switchgear. The underside of the enclosure and base structure shall be undercoated with coal tar emulsion material.

Detailed Specifications

The equipment shall be ☐ indoor, ☐ outdoor.

The interrupter switch(es) shall be rated:

System Voltage_____kV

Voltage Class ☐ 4.16, ☐ 13.8kV

Impulse Level (BIL) ☐ 60, ☐ 95kV

Continuous Current ☐ 600, ☐ 1200 Amperes (selector switch available rated 600 amperes only)

Interrupting Rating ☐ 600, ☐ 1200 Amperes (selector switch unit rated 600 amperes only)

Momentary Rating ☐ 40,000; ☐ 61,000; ☐ 80,000 Amperes (selector switch rated 40,000 amperes only)

Fault Closing ☐ 40,000; ☐ 61,000 Amperes

Load Interrupter Switch shall be arranged as a:

____Single air interrupter switch, type QR, 3-pole, 2-position (open-closed)

____Duplex switch, consisting of two type QR, 3-pole, 2-position air interrupter switches. The two switches will provide three positions (line 1 - open - line 2). The switches will be key interlocked to prevent both being closed at the same time. (Key interlocking shall be standard when the switches are fused.)

____Selector switch, consisting of one type QR, 3-pole, 2-position (open-closed) 600 ampere air interrupter switch and one 3-pole, 2-position (line 1 - line 2) disconnect switch, both mounted in a single cubicle. The interrupter switch is to be located in the front of the unit and connected in series with the rear mounted disconnect switch. The disconnect switch operating handle is to be located behind the front panel. The panel will be mechanically interlocked with the interrupter switch so that the disconnect switch cannot be operated unless the interrupter switch is open. The disconnect switch operating handle will have indicating targets (line 1 - line 2) to show position of switch blades. (Two windows—one each on the upper front and rear panels—will be provided for visual inspection of switch blades.)

Incoming connections shall be:

☐ From Above ☐ From Below

☐ Clamp Type Lugs (Standard), ☐ Compression Lugs, ☐ Potheads, ☐ Roof Bushings (Outdoor Only)

Cable Size_____, Type_____, # Per Phase_____.

☐ Single Cable, ☐ Loop Feed

Connector Bus Plating: ☐ Tin Plated Aluminum (Standard)
☐ Silver Plated Copper
☐ Tin Plated Copper

☐ Insulated Bus

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(Stationary, Manually Operated)

Specifications

The units will also include:

* Power fuses, ☐ expulsion type ☐ current limiting type, ____rating, ____equivalent kVA at ____volts.

* Current transformer,____/5 ratio.

* Ground current transformer.

* Surge arresters, ☐ station type, ☐ intermediate type, ☐ distribution type.

* Key interlocks for____ (describe interlock requirements).

* Ammeter.

* Ammeter selector switch.

* Overcurrent relays(s).

* Ground overcurrent relay.

* Watthour meter, ____-element, drawout type, semiflush mounted, with demand attachment.

Space heater(s) (standard on outdoor units, optional on indoor). ☐ with Thermostat ☐

Provision for direct connection to the adjacent____kVA transformer section.

Hinged rear doors ☐

☐ Shunt trip (electrical) control voltage ____volts ☐ DC ☐ AC

Load side connection shall be:

☐ Incoming line, ☐ load power cables will enter through the ☐ top, ☐ bottom of the unit and will terminate at suitable ☐ clamp cable lugs, ☐ potheads, ☐ crimp type lugs ☐ roof bushings (outdoor only)

Close coupled to:

☐ Dry Coat Coil Type Transformer
☐ LQP Type Transformer with ☐ Cable (standard for CL Fuses)
☐ Bus (standard for Expulsion Fuses)

*This combination of options may not be accommodated in all units—Contact Electrical Apparatus Division for details.