



Low Voltage 480V Switchgear

General Description

Low Voltage metal-enclosed switchgear is used in electric power distribution systems for the control and protection of circuits and equipment. The switchgear employs drawout type low voltage power circuit breakers.

Switchgear is typically installed in:

Industrial Plants – for power and lighting networks and feeders, power generation and other auxiliaries, and to provide power for machine tools and material handling equipment drivers.

Utility and Co-generation Facilities – for motor control centers to protect and distribute power to electrical devices such as blowers, compressors, fans, pumps, and motors.

Commercial and Residential Buildings – for protection and distribution of power for lighting, elevators, air conditioning, blowers, fans, motors, and pumps.

Available Types

CP switchgear is available in two types:

- Indoor (NEMA 1)
- Outdoor (NEMA 3R)

Low voltage switchgear can be applied on distribution systems with:

- Three phase, 3- or 4-wire feeders, 50 or 60 Hertz
- Voltages of 208, 240, 480, or 600 volts
- Currents up to 5000 amperes

The circuit breakers may be either manually or electrically operated, fused or unfused. CPC utilizes General Electric circuit breakers and can offer Cutler Hammer, or Siemens air magnetic circuit breakers for an additional cost.

CP does not manufacture switchboards or panelboards using molded case circuit breakers.

Static Trip units are provided on all low voltage circuit breakers. All circuit breakers are UL listed. Tables 1 and 2 show the maximum nominal ratings for circuit breakers.

Industry Standards

CP's switchgear with power circuit breakers is designed, tested, and constructed to be in accordance with:

- ANSI C37.20.1 – Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
- ANSI C37.50 – Test Procedure for Low Voltage AC Power Circuit Breakers Used in Enclosures
- ANSI C37.51 – Conformance Testing of Metal-Enclosed Low Voltage AC Power Circuit Breaker Switchgear Assemblies

- Applicable standards of IEEE and NEMA
- UL 1558 – Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear

Drawout circuit breakers are in accordance with: ANSI C37.13 – Low Voltage AC Power Circuit Breakers Used in Enclosures

- ANSI C37.16 – Preferred Ratings, Related Requirements, and Application for Low Voltage Power Circuit Breakers and AC Power Circuit Protectors
- ANSI C37.17 – Trip Devices for AC and General Purpose DC Low-Voltage Power Circuit Breakers
- UL 1066 – Low Voltage AC & DC Power Circuit Breakers Used in Enclosures

Features and Benefits

Circuit Protection and Reliability

CP switchgear provides efficient and safe power distribution and control. All applicable ANSI, NEMA, and IEEE standards are met.

Closed-door racking is standard. Mechanical interlocks prevent racking a closed circuit breaker or mismatching a breaker and a compartment. Each compartment is also enclosed with grounded steel barriers.

Harmonics-induced trips are avoided with the static trip unit, standard on all circuit breakers. By using RMS current sensing, accurate load protection is provided without causing unnecessary shutdowns or jeopardizing system integrity due to high trip settings.

All switchgear is manufactured, assembled, and tested in one location. This assures an integrated fit and high quality. The overall effect is guaranteed reliability.

Application Flexibility

Circuit breaker sizes are available with ratings from 800A to 5000A. Extended interruption ratings are optional with up to 130kA without fuses and 200kA with fuses.

Frames rated up to 2000A can be stacked four high and can include integrally mounted fuses. A single vertical section can accommodate a fused 3200A, 4000A, or 5000A circuit breaker. Three widths of vertical sections are available to simplify planning and design: 22, 30, and 38 inches. The 22 inch and 30 inch sections have a uniform depth of 60 inches, while the 38 inch section is 74 inches deep. Rear extensions are available as needed for additional cabling area. All breaker sizes can be housed in a combination of these sections.

Breaker ratings summary

Rated AC Voltage, Nominal (max)	Breaker Type	Frame Size (amps)	Short-Circuit RMS Symmetrical kA		
			Short-Time Withstand	With Instantaneous Trip	Without Instantaneous Trip
600 (635)	WPS-08	800	30	30	30
	WPH-08	800	42	42	42
	WPX-08	800	50	50	50
	WPS-16	1600	42	42	42
	WPH-16	1600	65	65	65
	WPS-20	2000	65	65	65
	WPS-32	3200	65	65	65
	WPH-32	3200	85	85	85
480 (508)	WPS-40	4000	85	85	85
	WPS-50	5000	85	85	85
	WPS-08	800	30	30	30
	WPH-08	800	42	42	42
	WPX-08	800	65	65	65
	WPS-16	1600	50	50	50
	WPH-16	1600	65	65	65
	WPS-20	2000	65	65	65
240 (254)	WPS-32	3200	65	65	65
	WPH-32	3200	85	85	85
	WPS-40	4000	85	85	85
	WPS-50	5000	85	85	85
	WPS-08	800	30	42	30
	WPH-08	800	42	50	42
	WPX-08	800	65	65	65
	WPS-16	1600	50	65	50
	WPH-16	1600	65	65	65
	WPS-20	2000	65	65	65
	WPS-32	3200	65	85	65
	WPH-32	3200	85	130	85
	WPS-40	4000	85	130	85
	WPS-50	5000	85	130	85

Switchgear Assembly

Description

The switchgear assembly consists of multiple metal-enclosed, vertical sections. Normally the end sections are designed to allow for installation of future sections. Each vertical section consists of up to four individually enclosed breaker or auxiliary compartments. Compartments are sized to provide uniform height of each switchgear assembly.

Various components such as circuit breakers, instrumentation and control equipment, transformers, relays, three-phase bus work, all internal wiring, connectors, and other supporting equipment are included in each assembly. These units can be direct coupled to 480V motor control centers if desired.

In accordance with ANSI C37.20.1, the maximum temperature for parts that are handled is 50°C. The main bus maximum temperature rise is 65°C above 40°C ambient. The temperature rise of the air surrounding the cable connection points is limited to 45°C above 40°C ambient.

Assembly Construction

The metal-enclosed power switchgear is constructed of preformed, full-depth, 14 gauge steel sheets bolted together and reinforced with cross-member braces to form a rigid, self-supporting compact assembly. The top and rear plates, and side sheets are all 14 gauge steel. When two vertical sections are mounted together, two sheets of 14 gauge steel separate adjacent circuit breaker compartments.

Bolted steel-glass polyester compartments housing each power circuit breaker are mounted in the vertical section to form the switchgear assembly. This assembly isolates the circuit breakers from the bus/cable section and from adjacent circuit breaker compartments.

The bus/cable section includes the main horizontal bus, riser bus, connections from the main bus to each set of primary disconnects, and load side copper run-back bus. The cable lugs are accessible without reaching over the main bus. Grounded metal barriers can be provided to isolate the main bus from the cable connections. Barriers are also available to isolate the incoming line of the main circuit breakers from the main load bus of the switchgear.

Main and Ground Bus

The standard main bus is silver plated copper.

The main three-phase horizontal bus is arranged vertically one phase above the other with edge-to-edge alignment to provide high, short circuit strength. An insulated main and vertical bus are optionally available.

The main bus ratings available are 1600, 2000, 3200, 4000, or 5000 amperes continuous current. A neutral bus is furnished when specified, and can be rated 1600, 2000, 3200, or 4000 amperes continuous current.

A standard ¼ x 2 inch copper ground bus extends through all sections and is securely bolted. A cable lug can be mounted to the ground bus in each section. Minimum bus bracing is 65,000 amperes RMS symmetrical. Higher symmetrical bracings are available based on the highest breaker short circuit rating in the group.

Load side run-backs for feeder circuits are one-piece copper construction. Run-backs are insulated with sleeve tubing in the main bus area and supported by high strength, glass polyester moldings.

Control Wiring

Standard secondary and control wiring is #14 AWG extra-flexible, stranded copper type SIS. Terminations are made with compression-type, insulated terminals.

For devices not having screw-type terminals, locking spade-type lugs are used. Sleeve-type computer generated wire markers are provided as standard on each end of all control wires.

Insulation

The insulation used in the switchgear is fiberglass-reinforced, polyester material that has high impact strength and low moisture absorption. Other features include high flame retardance, high resistance to chemical fumes, and long life at high temperatures.

Circuit Breaker Compartments

Typical circuit breaker compartments include primary disconnects, ground disconnect, drawout rails, and associated safety interlocks and secondary disconnects, if appropriate. Compartments for electrically operated circuit breakers include secondary disconnects and control circuit fuses. The pullout fuse holder has a set of clips to store the holder in the fuse block when the circuit is disconnected. Up to three current transformers for metering or relaying can be mounted in each compartment.

Circuit breaker compartment front panels can be used to hold a variety of auxiliary devices. A typical compliment of devices includes a breaker control switch with red & green light, ammeter with switch, and test block.

Metering and Auxiliary Compartments

Metering and auxiliary compartments are available to house devices such as voltage transformers, metering, control power transformers, and supervisory devices that do not fit on a normal breaker door.

Instrument and Control Transformers

Voltage transformers and control power transformers are mounted in auxiliary compartments. These transformers are protected by primary pull-out type current-limiting fuses and secondary fuses.

Current transformers are normally mounted on the compartment primary disconnect studs where they are readily accessible.

Accessories

Each switchgear assembly includes the following standard accessories:

- Handle for circuit breaker racking
- Lifting bar assembly for all circuit breaker types
- Spring charging handle for electrically operated circuit breakers
- Container of touch-up paint

As an optional accessory, a test cabinet is available for indoor use that is wall mounted with necessary equipment for testing electrically operated breakers that have been removed from the breaker compartment.

Outdoor Switchgear

CPC's outdoor switchgear is enclosed in a weather resistant (NEMA 3R) steel housing. All exterior doors extend below the floor line and re sealed with synthetic rubber gaskets.

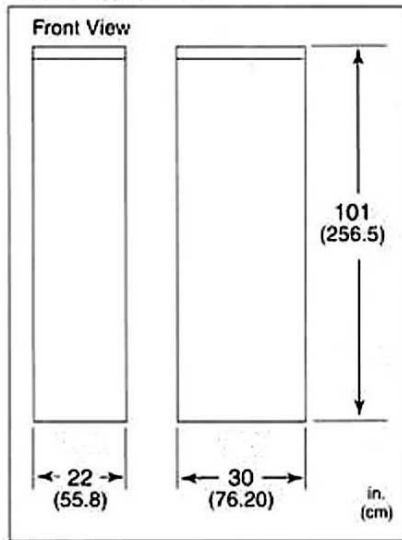
For protection from snow, rain, and dust, the switchgear rests on a six-inch, formed steel base, which provides rigid support and a tight bottom seal. A heavy duty, coal tar emulsion protective undercoating 1/32 inch thick is applied to the underside for protection against moisture and corrosion. Shielded ventilation housing permit proper air circulation while excluding dust, dirt, and foreign matter. The full-length front doors are hinged and may be padlocked. Rear doors are hinged and secured with captive bolts.

A lighted, unobstructive service aisle is provided at the front of the switchgear allowing inspection and maintenance without exposure to the elements. An access door equipped with an emergency bar release is at each end of the aisle. A GFI convenience outlet is included.

Climatized substation buildings

As with all of CPC manufactured equipment, low voltage switchgear can be mounted in one of our Power Control Centers and integrated with other power distribution equipment.

Figure 6. Auxiliary Sections



Weights for Figures 6*, 7* and 8*:

	Weights lb. (kg)	
	22"	30"
Indoor	1400 (635.0)	1900 (862.0)
Outdoor	2400 (1088.0)	3100 (1406.0)

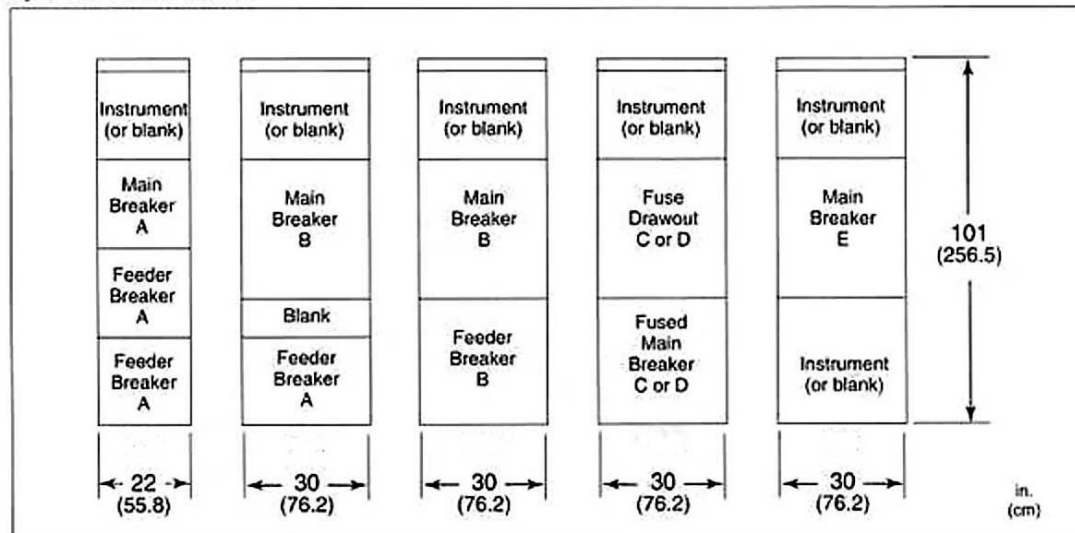
*Weights shown do not include weight of circuit breaker removable elements. All weights are approximate. For outdoor lineup, add 1200 lb. (544 kg) to total weight of individual sections for end walls and hoist.

Circuit breakers are coded on Figures 6, 7 and 8** as follows:

A = 800/1600/2000,
800/1600/2000,
800/2000
B = 3200
C = 3200 in one cell, with fuse
drawout in other cell
D = 4000 in one cell, with fuse
drawout in other cell
E = 4000.

**Feeder breakers located above tie breaker must be electrically on opposite side of tie breaker from feeder breaker which is located below the tie breaker.

Figure 7. Main Breaker Sections



Note: For 5000A Main or Tie circuit breakers, width of breaker enclosure is 38 inches wide and 74 inches deep. No other breakers or drawouts are permitted in the same section.

Dimensions & Configurations

Figure 8. Feeder Breaker Sections and Combinations

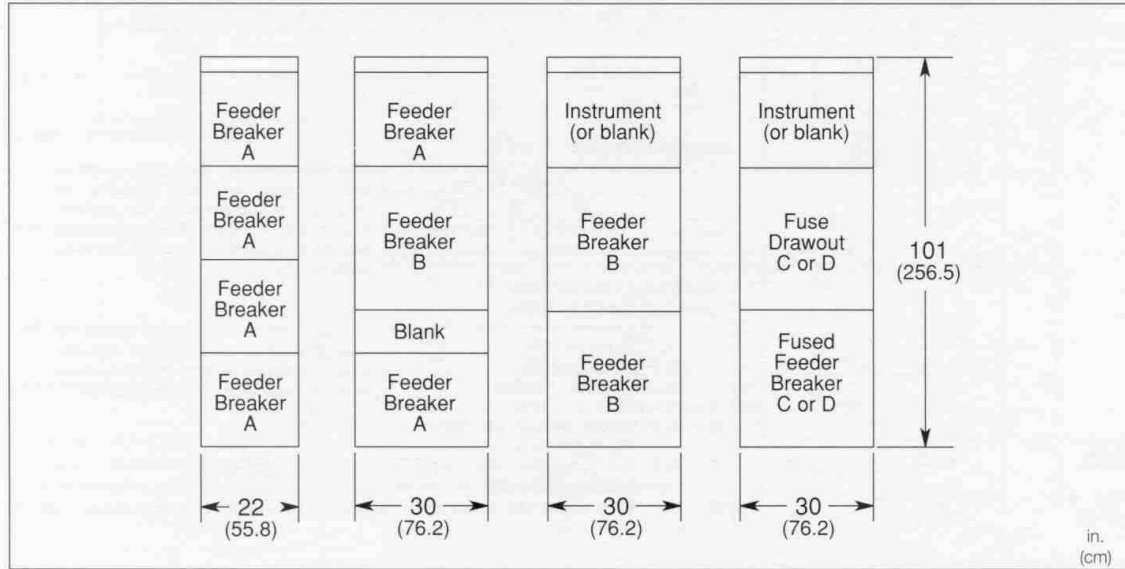
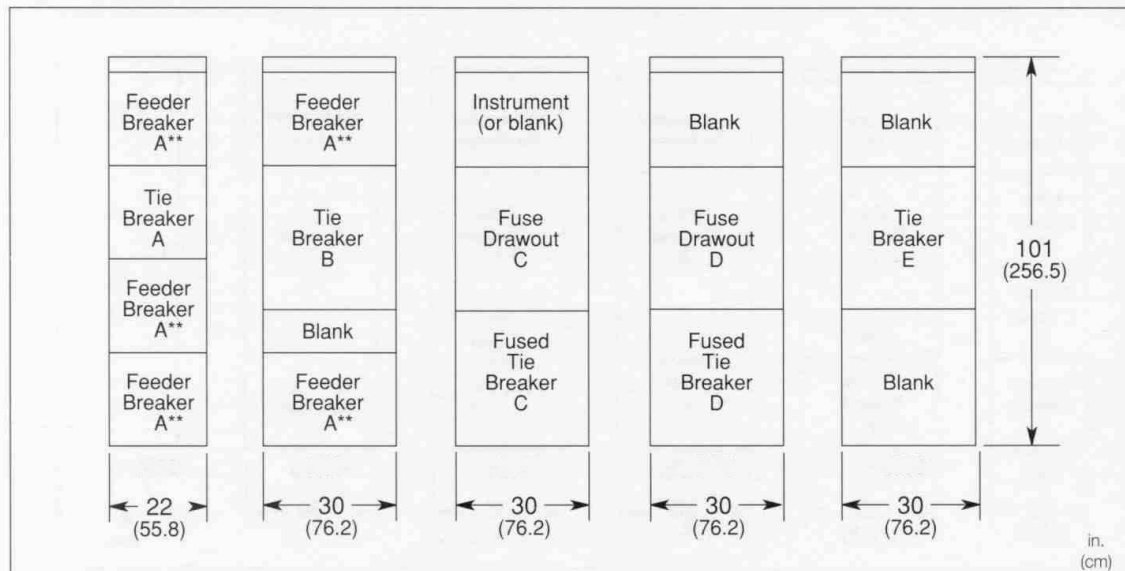
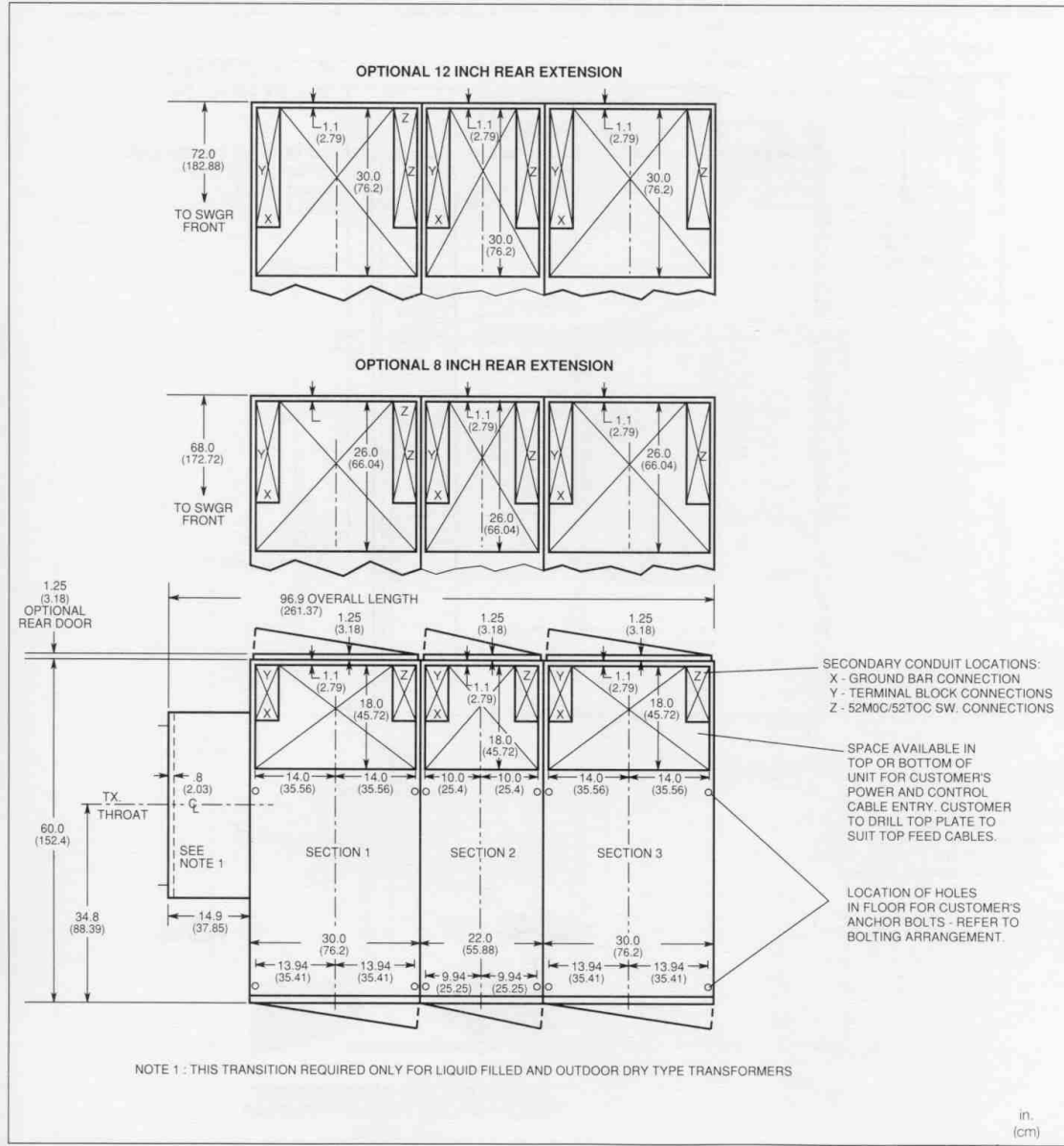


Figure 9. Tie Breaker Sections and Combinations



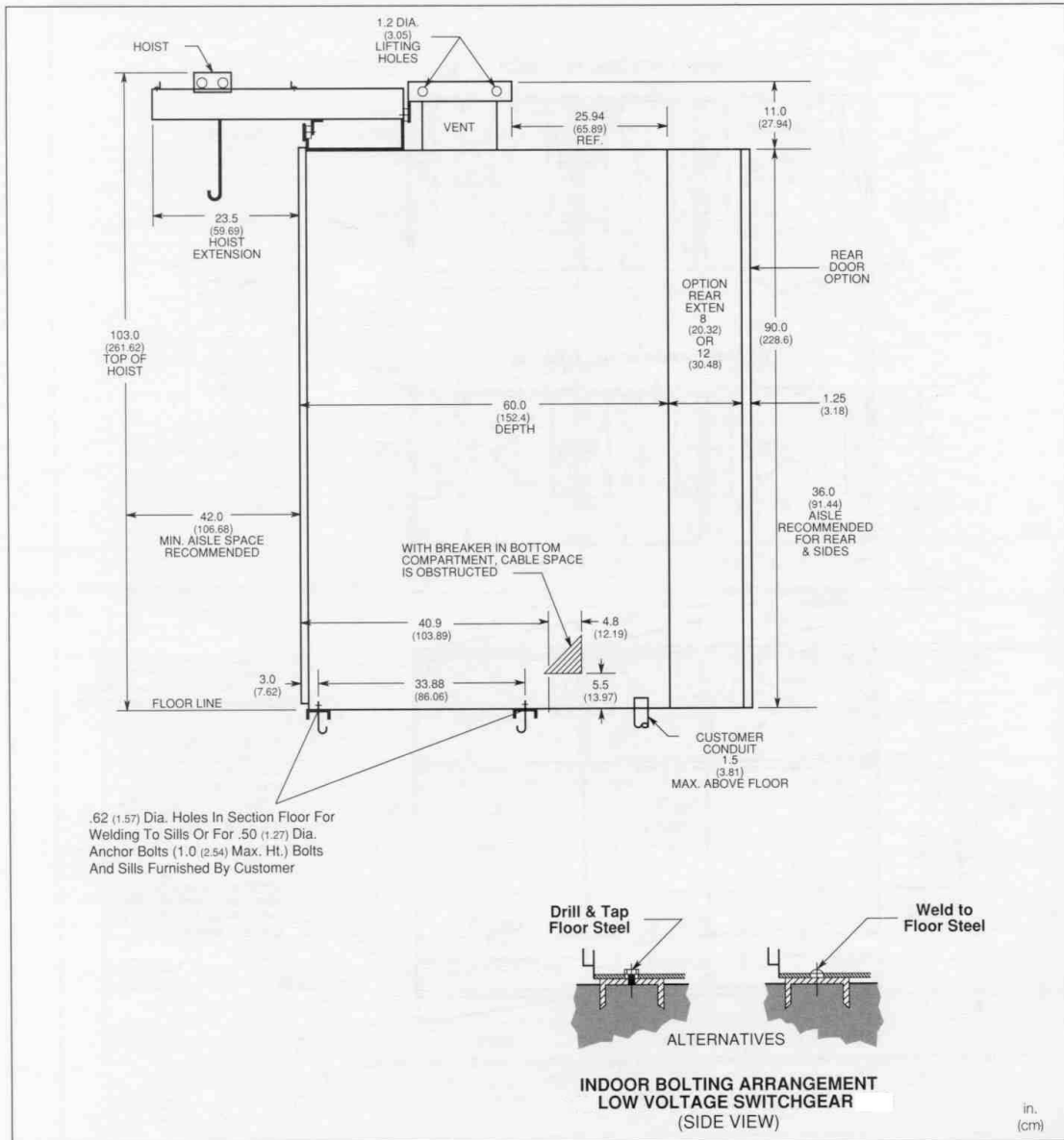
Dimensions & Configurations

Figure 10. Indoor Floor Plan



Dimensions & Configurations

Figure 11. Indoor Side View



Dimensions & Configurations

Figure 12. Outdoor Floor Plan

