ENCLOSURE TYPES

TYPE 1–General Purpose, Indoor

Intended for use indoors, primarily to prevent accidental contact of personnel with the enclosed equipment, in areas where unusual service conditions do not exist. In addition, they provide protection against falling dirt.

TYPE 1 GASKETED–Semi Dust-tight, Indoor

Intended to restrict the entrance of dust and dirt into Type 1 enclosures, but are **not** dust-tight. Standard is closed-cell gasketing material.

TYPE 2–Drip-proof, Indoor

Intended for use indoors to protect the enclosed equipment against falling noncorrosive liquids and falling dirt. These enclosures have provision for drainage. Dripshields on top of the motor control center and neoprene closed–cell gasketing afford protection from falling and splashing liquids. They are **not** water-tight.

TYPE 3R–Rain-proof, Outdoor

Intended for use outdoors to protect the enclosed equipment against rain. They are not dust-proof, snow-proof nor sleet-proof (ice-proof).

TYPE 12–Industrial Use–Dust-tight and Drip-tight, Indoor

Intended for use indoors to protect the enclosed equipment against fibers, flyings, lint, dust and dirt, and light splashing, seepage, dripping, and external condensation of noncorrosive liquids.

INDOOR ENCLOSURES

GE motor control centers are made up of standardized vertical sections housing vertical and horizontal bus, wiring channels and compartmented control units. Sections may be bolted together to form a single panel assembly powered by line connection at a single point. Normal shipping split is three sections maximum.

STANDARD NEMA 1 or NEMA 1 (GASKETED) ENCLOSURES

Standard finish is light-gray ANSI 61 over a phosphate rust inhibitor. All unpainted parts are zinc-chromate electroplated. 20- and 22-inch deep enclosures are furnished with hinged doors on the rear, while the 13-inch deep enclosures are supplied with bolt-on rear covers. Pan-type doors utilize quarter-turn fasteners. Gasketed doors, cover plates, and operating handles are available as an option. Two heavy-duty 3-inch-by-$1\frac{1}{2}$-inch,12-gauge floor sills and 3-inch full-length lifting beam are included. Open bottom is standard.

NEMA 2 DRIP-PROOF CONSTRUCTION

Similar to NEMA 12 gasketed construction except with pan-type dripshield on top and with open bottom. Dripshield extends four inches beyond front of motor control center. Standard finish: light gray ANSI 61. Furnished with removable conduit cover plates unless otherwise specified.

NEMA 12

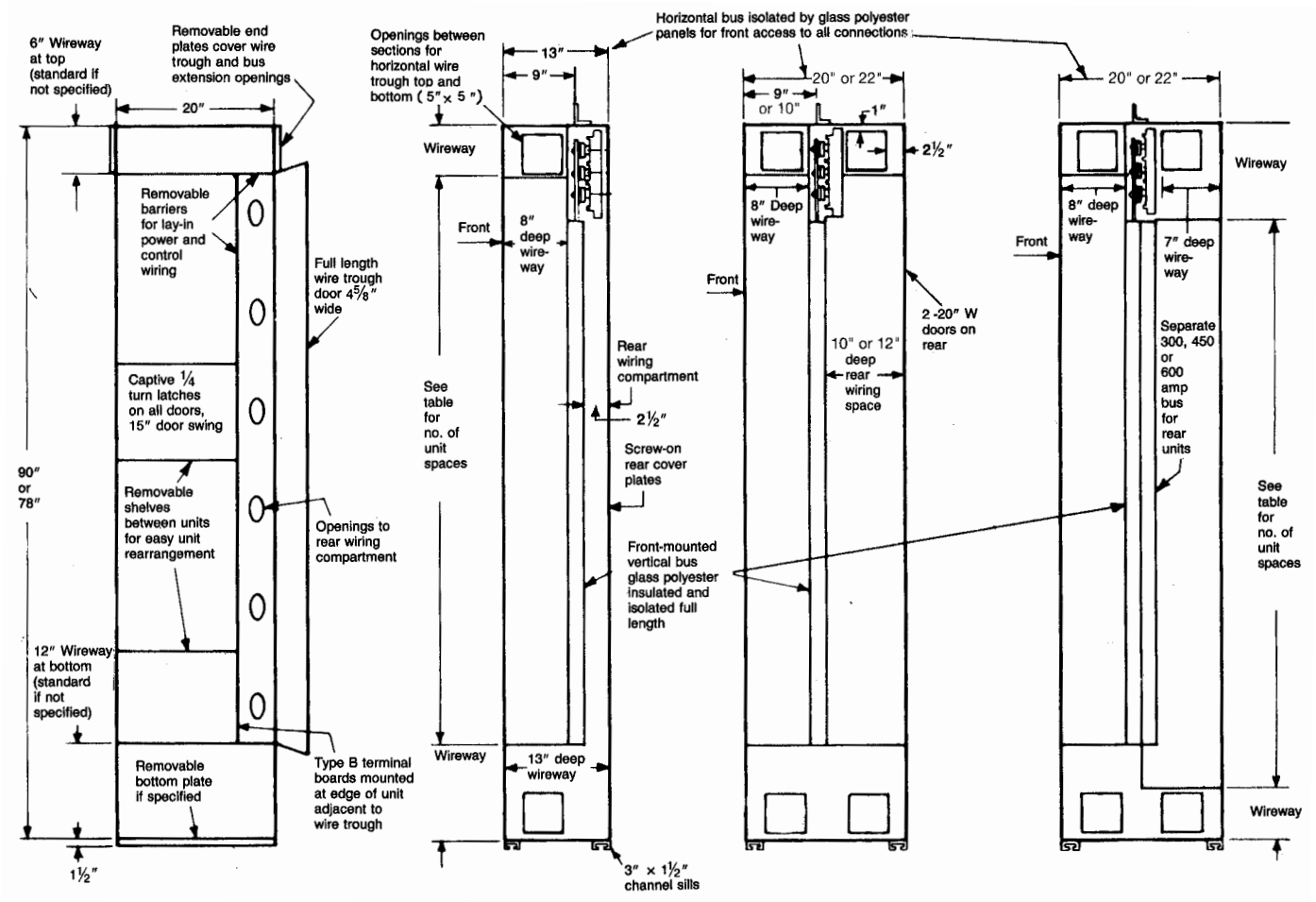
Similar to NEMA 1 gasketed construction except that bottom plates are furnished and all removable plates are gasketed.

HOW TO DEFINE UNUSED SPACES

Future Unit Space–	Unit space specified and equipped to accept a future unit.
Blank Unit Space–	Unit space not equipped to accept a future unit.
Unuseable Unit Space–	Unit space not suitable to accept accept a future unit.

B

INDOOR ENCLOSURES



Front view

Side view
13-inch-deep section
(1200 amp max.)

Side view
20- or 22-inch-deep section
(Front mounted only)
(20" - 1600 amp max.)
(22" - 2000/2500 amp only)

Side view
20- or 22-inch-deep section
(Back-to-Back)
(20" - 1200 amp max.)
(22" - 2000/2500 amp only)

Enclosure Height	90"						78"					
Horizontal Bus	2" Bus			4" Bus			2" Bus			4" Bus		
Top Wireway	6"①	12"	12"	12"①	12"①	18"	6"①	12"	12"	12"①	12"①	18"
Bottom wireway	12"	6"	12"	6"	12"	6"	12"	6"	12"	6"	12"	6"
No S.U.'s②	6	6	5½	6	5½	5½	5	5	4½	5	4½	4½

Notes:
- One S.U. = 12-inch vertical height.
- Average weight per vertical section including units–500 lbs.

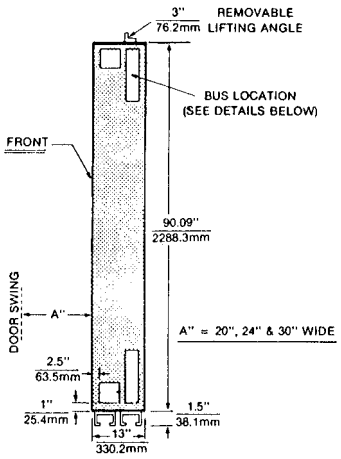
① A ½ S.U. unit cannot be mounted immediately below a 6-inch top wireway with 2-inch bus, or immediately below a 12-inch wireway with 4-inch bus.

② On back-to-back sections, the rear side must always have a 12-inch top wireway with 2-inch bus and an 18-inch top wireway with 4-inch bus.

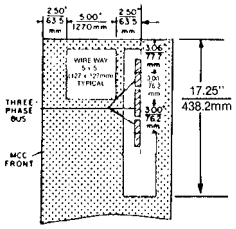
INDOOR ENCLOSURES

13" DEEP SECTION

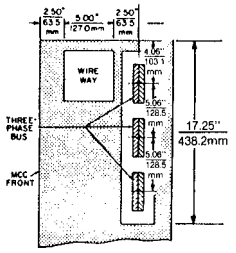
END VIEW STANDARD 13" DEEP



BUS DETAILS STANDARD 13" DEEP

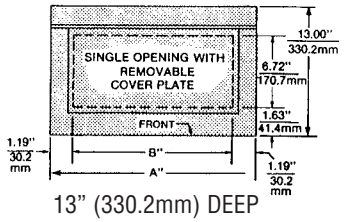


END VIEW WITH 2" (50.8mm) BUS BAR



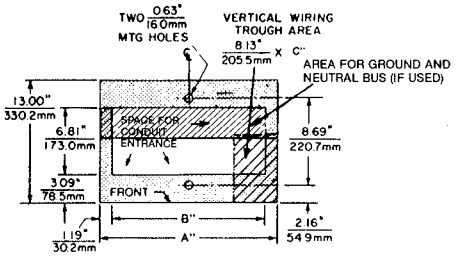
END VIEW WITH 4" (101.6mm) BUS BAR

TOP CONDUIT ENTRANCE DETAILS FOR STD. 13"



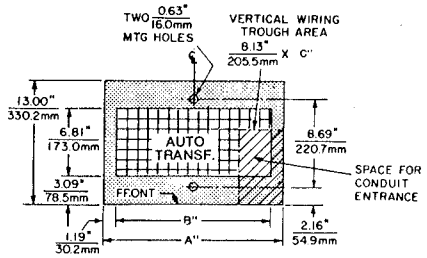
13" (330.2mm) DEEP

BOTTOM CONDUIT ENTRANCE DETAILS FOR STD. 13"



13" (330.2mm) DEEP

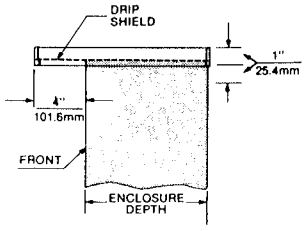
BOTTOM CONDUIT ENTRANCE DETAILS WHEN AUTO—TRANSFORMER IS FURNISHED



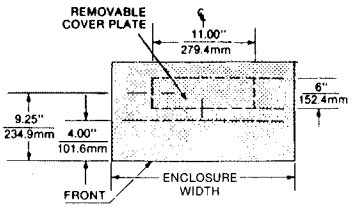
13" (330.2mm) DEEP

GENERAL DIMENSIONS

REF. DIM.	20" WIDE ENCLOSURE	24" WIDE ENCLOSURE	30" WIDE ENCLOSURE
A" =	20" / 508.0mm	24" / 609.6mm	30" / 762.0mm
B" =	17.63" / 447.8mm	21.63" / 549.4mm	27.63" / 701.8mm
C" =	4.63" / 117.6mm	8.63" / 219.4mm	NOT APPLICABLE

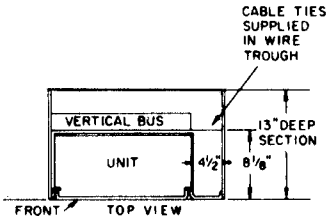


END VIEW



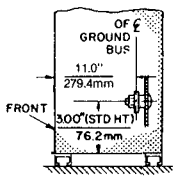
TOP VIEW

NEMA II DRIP SHIELD

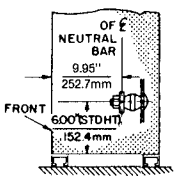


VERTICAL WIRING TROUGHS

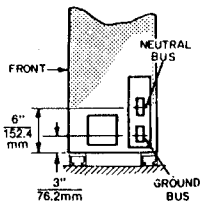
STANDARD GROUND AND NEUTRAL BUS DETAILS



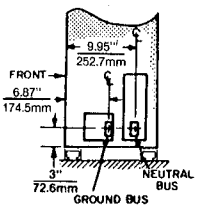
Ground bus bolted directly to section frame



Insulated neutral bus

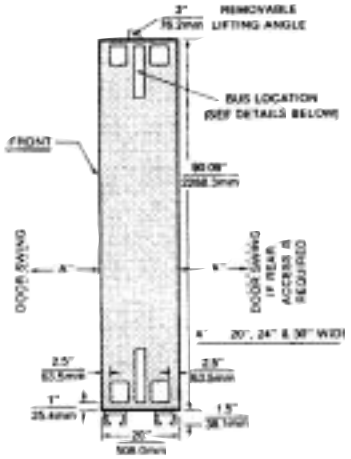


Standard location of ground and neutral bus with a 12-in. (304.8 mm) compartment at the bottom of MCC

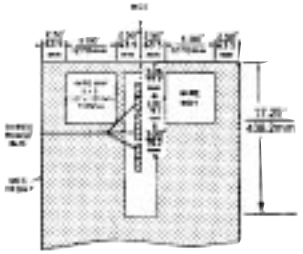


Standard location of ground and neutral bus with a 6-in. (152.4 mm) compartment at the bottom of MCC

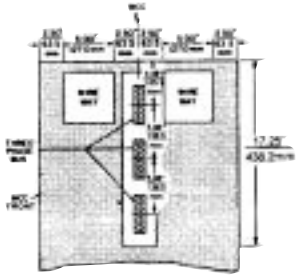
END VIEW STANDARD 20" DEEP



BUS DETAILS STANDARD 20" DEEP

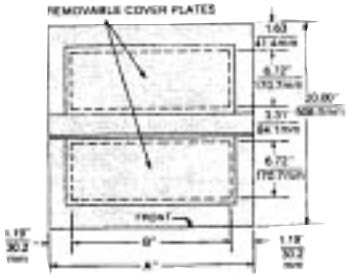


END VIEW WITH 2" (50.8mm) BUS BAR



END VIEW WITH 4" (101.6mm) BUS BAR

TOP CONDUIT ENTRANCE

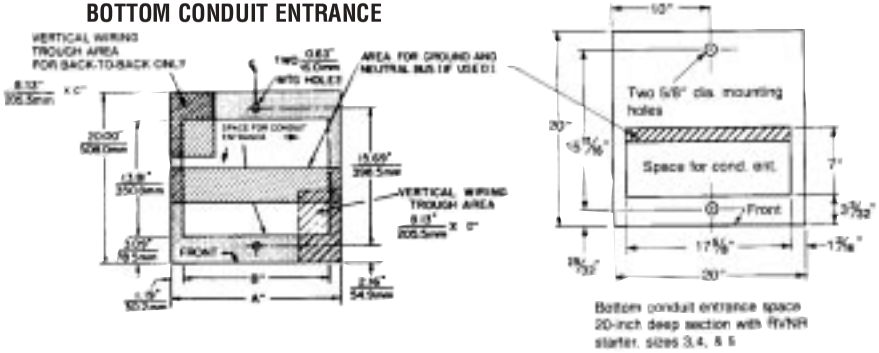


20" (508.0mm) DEEP

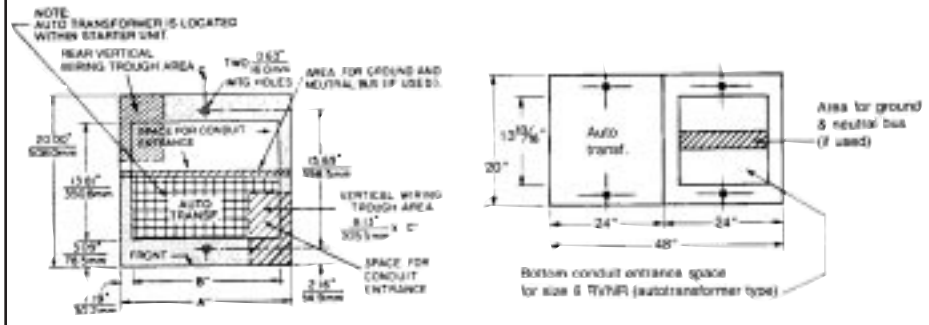
GENERAL DIMENSIONS

REF. DIM.	20" WIDE ENCLOSURE	24" WIDE ENCLOSURE	30" WIDE ENCLOSURE
A" =	20" / 508.0mm	24" / 609.6mm	30" / 762.0mm
B" =	17.63" / 447.8mm	21.63" / 549.4mm	27.63" / 701.8mm
C" =	4.63" / 117.6mm	8.63" / 219.4mm	NOT APPLICABLE

BOTTOM CONDUIT ENTRANCE

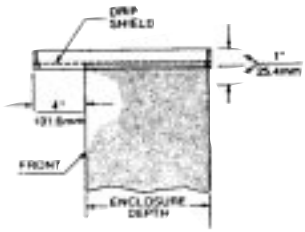


BOTTOM CONDUIT ENTRANCE DETAILS WHEN AUTO-TRANSFORMER IS FURNISHED

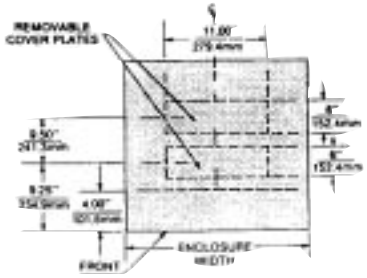


20" (508.0MM) DEEP
BACK-TO-BACK
(SIZE 3,4)

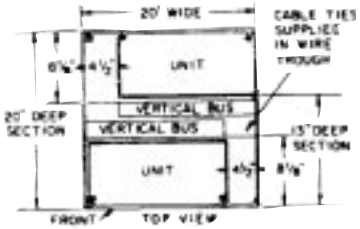
NEMA II DRIP SHIELD



END VIEW

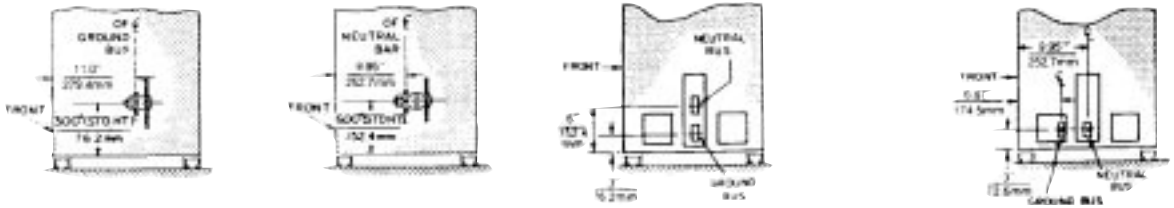


TOP VIEW



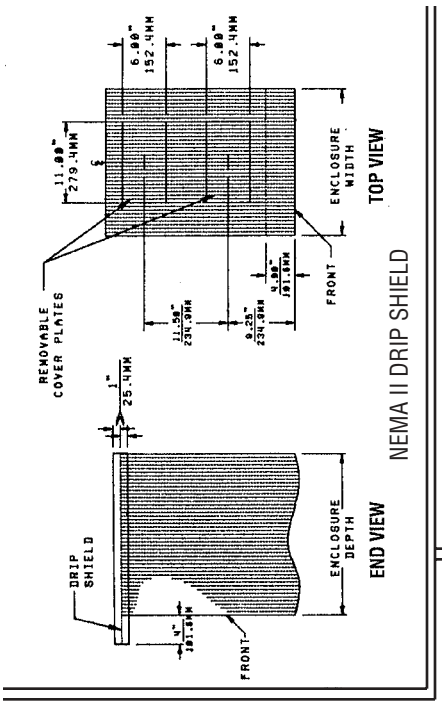
VERTICAL WIRING TROUGHS

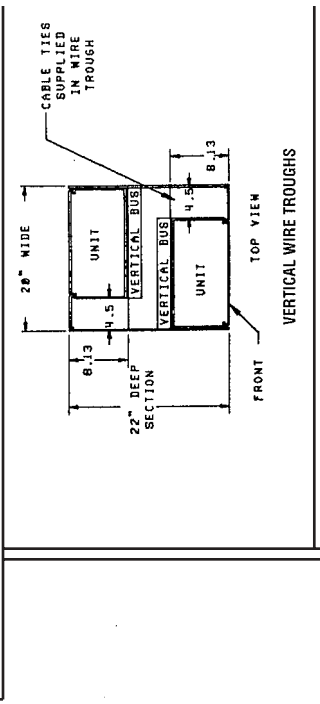
STANDARD GROUND AND NEUTRAL BUS DETAILS

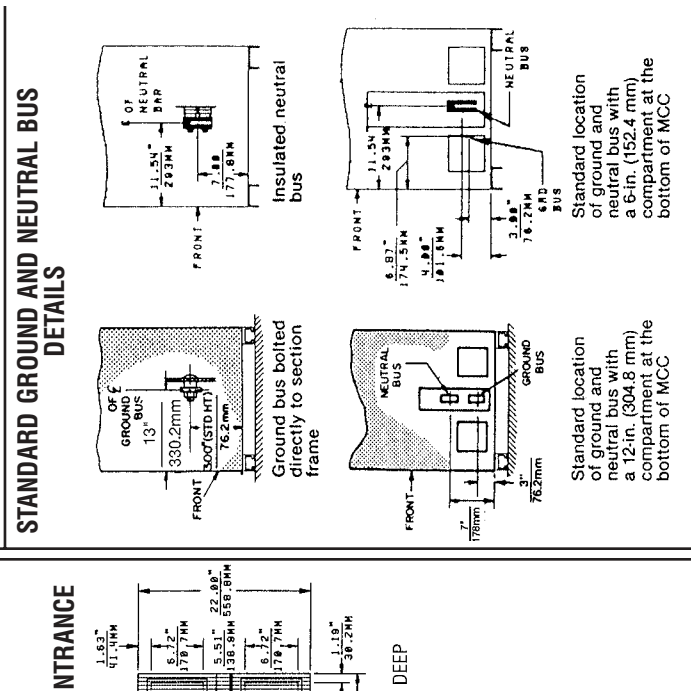


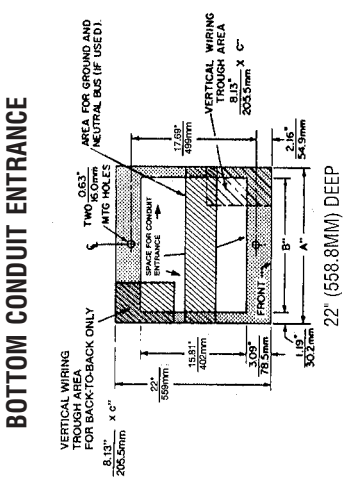
INDOOR ENCLOSURES

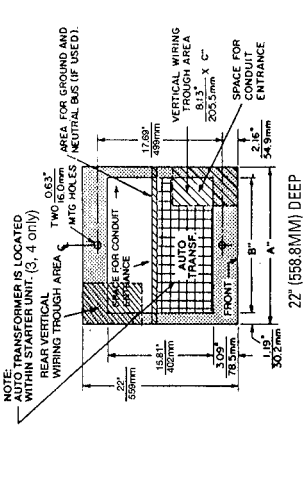
22" DEEP SECTION

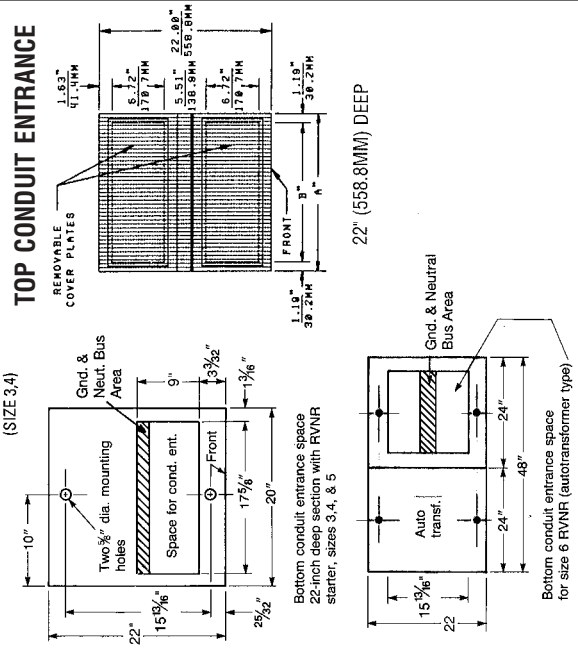


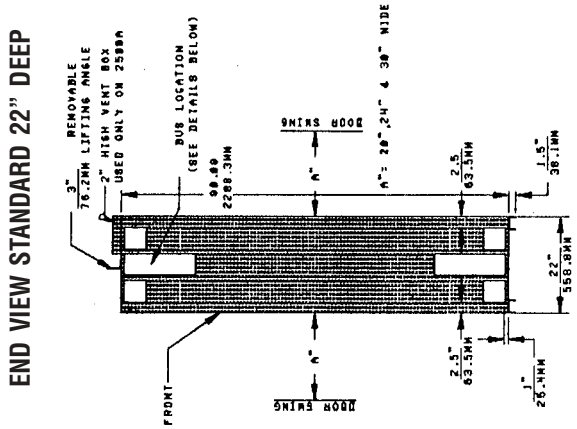


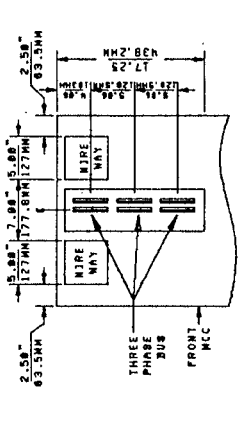










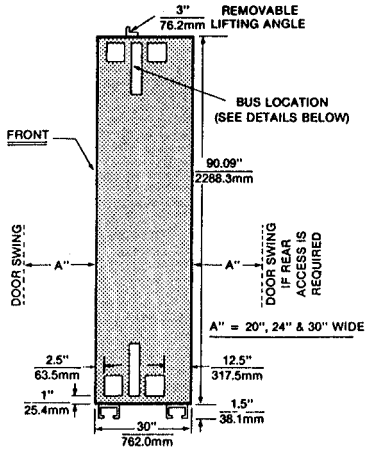


GENERAL DIMENSIONS

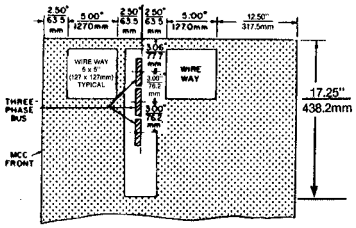
REF. DIM.	20" WIDE ENCLOSURE	24" WIDE ENCLOSURE	30" WIDE ENCLOSURE
A" =	20" / 508.0mm	24" / 609.6mm	30" / 762.0mm
B" =	17.63" / 447.8mm	21.63" / 549.4mm	27.63" / 701.8mm
C" =	4.63" / 117.6mm	8.63" / 219.4mm	NOT APPLICABLE

30" DEEP SECTION

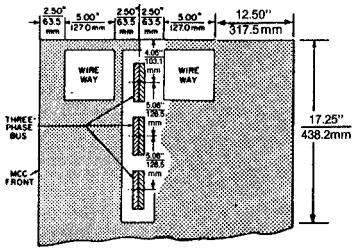
END VIEW STANDARD 30" DEEP



BUS DETAILS STANDARD 30" DEEP

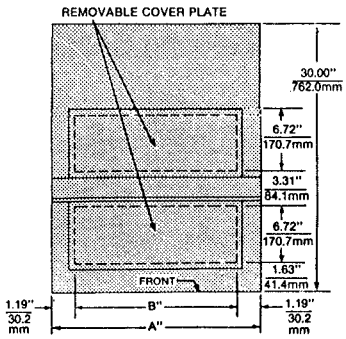


END VIEW WITH 2" (50.8mm) BUS BAR



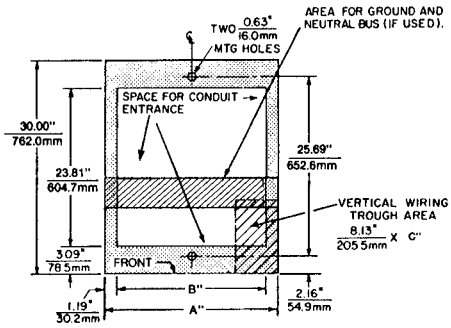
END VIEW WITH 4" (101.6mm) BUS BAR

TOP CONDUIT ENTRANCE DETAILS



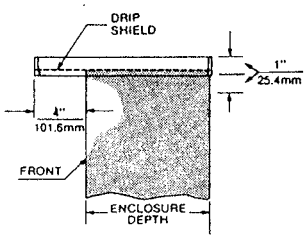
30" (762.0mm) DEEP

BOTTOM CONDUIT ENTRANCE

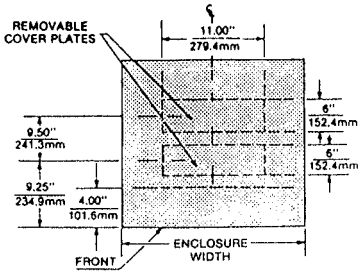


GENERAL DIMENSIONS

REF. DIM.	20" WIDE ENCLOSURE	24" WIDE ENCLOSURE	30" WIDE ENCLOSURE
A" =	20" 508.0mm	24" 609.6mm	30" 762.0mm
B" =	17.63" 447.8mm	21.63" 549.4mm	27.63" 701.8mm
C" =	4.63" 117.6mm	8.63" 219.4mm	NOT APPLICABLE



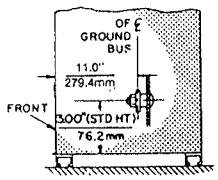
END VIEW



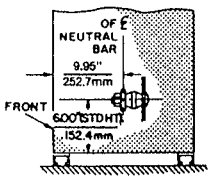
TOP VIEW

NEMA II DRIP SHIELD

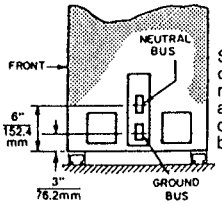
STANDARD GROUND AND NEUTRAL BUS DETAILS



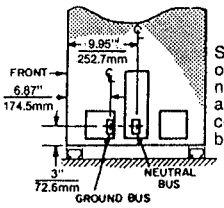
Ground bus bolted directly to section frame



Insulated neutral bus



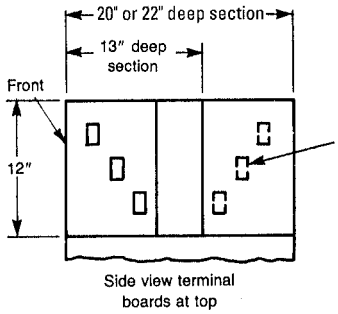
Standard location of ground and neutral bus with a 12-in. (304.8 mm) compartment at the bottom of MCC

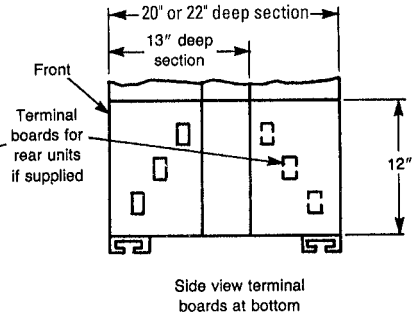


Standard location of ground and neutral bus with a 6-in. (152.4 mm) compartment at the bottom of MCC

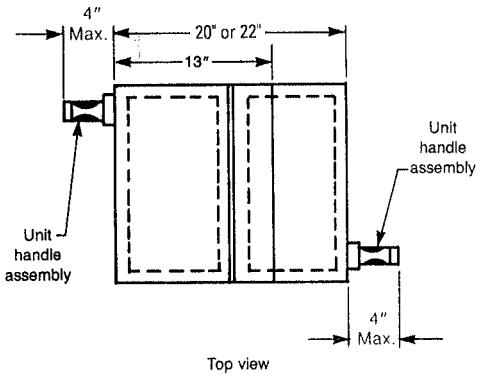
INDOOR ENCLOSURES

Type C Master Terminal Boards



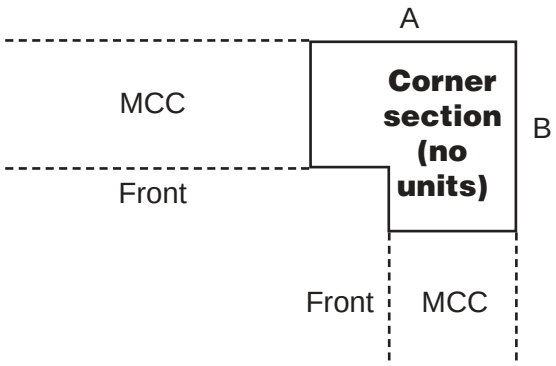


Disconnect Handle Projection



Used For L- and U- Shaped Motor Control Center Arrangements

Dimensions (In Inches)		
MCC Depth	A	B
13	17	20
20	24	24
22	26	24



OPTIONS

Space Heaters

Space heaters are used to prevent moisture condensation on the inside of the motor control center. One heater (62.5 watts at 120 volts AC) is installed in the bottom of each vertical section. UL requires space heaters be controlled by a thermostat. One thermostat can control up to 14 heaters and is located in the top horizontal wireway.

A terminal board for connecting an external 120-volt power source is standard. The terminal board is located in the top horizontal wireway adjacent to the thermostat(s). This is recommended since it permits the space heaters to be energized and effective even when the motor control center itself is deenergized. If export crating is involved, the space heater circuit can be wired to an external plug for energizing the heaters during shipment and
storage.

When specified, space heater power can be provided from within the motor control center. Include the required distribution transformer with primary and secondary protection in the motor control center.

An enclosed foreign voltage disconnect switch is available as an option.

Bottom Plates

Plates bolt on to the bottom of each motor control center section. They may be removed to facilitate installing conduit.

Starters Mounted Back-to-Back (Single Section)

This construction requires a minimum 20-inch deep enclosure. A common main horizontal bus is furnished with individual front and rear vertical buses to maintain same phase sequence, front and rear. This allows for mounting draw-out units in the rear of the section without changing phasing.

The back-to-back section is UL labelled per table below and can be mounted in a NEMA 3R non-walk-in outdoor enclosure.

Care must be exercised when arranging units as some of the larger starters, power transformers, etc., require the full enclosure depth.

Back-to-Back Availability

Main Bus Amps	42/50K AIC	65K AIC	100K AIC
600	UL	UL	N/A
800	UL	UL	N/A
1000	UL	UL	N/A
1200	UL	UL	N/A
1600	N/A	N/A	N/A
2000	UL	UL	N/A
2500	UL	UL	N/A

Back-To-Back Line Ups

13-inch through 22-inch motor control center equipments may be mounted back-to-back provided back access is not required. Refer to the factory, noting specific requirements. This arrangement may require a main bus transition assembly.

Extended Height Pull Box (Top Hat)

A pull box can be mounted on top of a vertical section when specified. The standard height is 12 inches; 6-, 18-, and 24-inch heights are also available. Top, front, and end covers are removable for access.

Rodent Barriers

Metal plates bolted to the bottom of each end section to close the opening between the front and rear floor sills. Not required if the floor sills will be removed or imbedded in concrete.

Structural Floor Sills

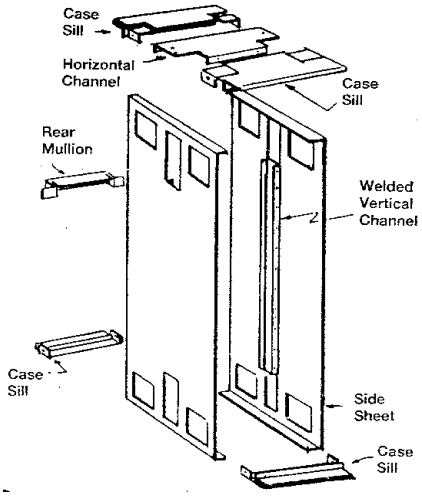
1½-inch X 3-inch structural channels are furnished in place of standard formed channels.

Extra Width Vertical Wireway

24-inch wide sections can be furnished with 8-inch wide vertical wireway and door.

Motor Control Center Construction

Indoor enclosure, exploded view



Major Structural Components
- Side Sheets, L-H & R-H
- Vertical Bus Mounting Channels — 0.090”
- Case Sills, Front/Rear, Top/Bottom — (13 Gauge)
- Top Horizontal Channel

Lifting Channel (Top) — 0.250”

Floor Sills, Front/Rear — 0.105”

Enclosing Covers/Panels
- Rear Doors, 45” (2 per section)
- Endplates, Top/Bottom Wireways
- Top Conduit Covers — 0.060”
- Bottomplates
- Vertical Wiretrough Door

Other Steel
- Unit Barrier Shelves .....0.060”
- Unit Cover Doors 6”, 12”, 18” .....0.060”
- Unit Cover Doors 24” & Larger .....0.090”
- Unit Saddles 6” & 12” .....0.060”
- Unit Saddles 24” & Larger .....0.075”

ENCLOSURES

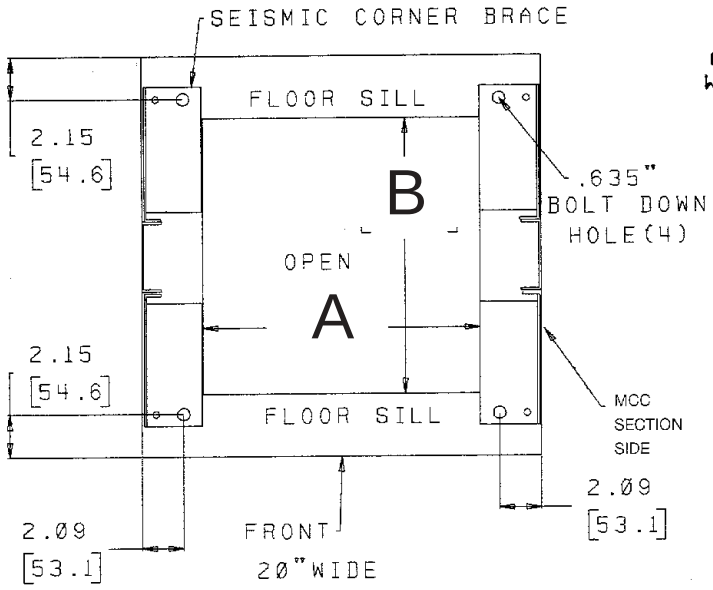
Seismic Bracing

Floor plan of each vertical section showing conduit entrance limitations for motor control center vertical sections with seismic bracing.

See standard indoor enclosures for other construction details.

Note that bolt down locations for sections with seismic bracing change from center of structure (left to right), to four corners with .635 clearance holes for ½-inch bolts.

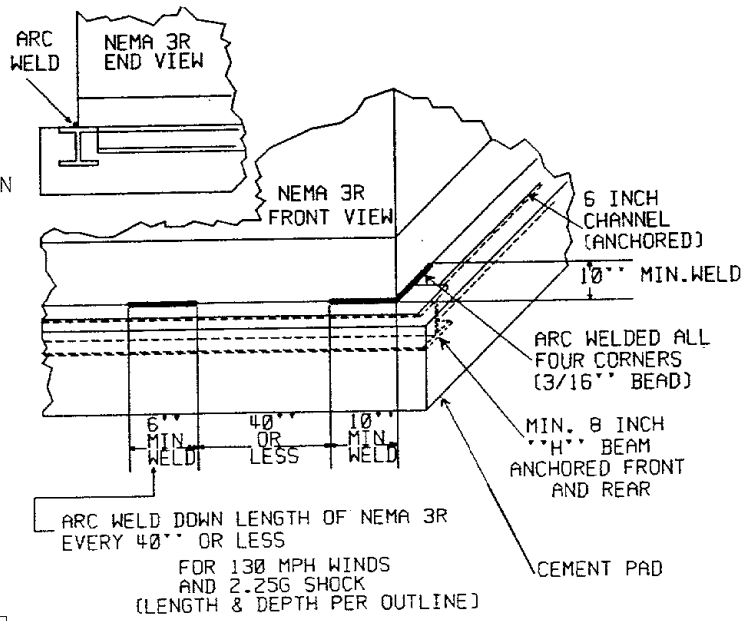
Section Floor Plan for Seismic Bracing for NEMA 1 or NEMA 3R Construction



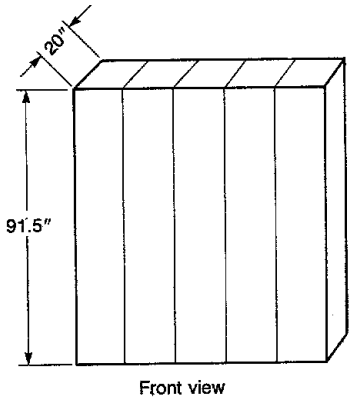
Case Width	"A"
20" (508mm) W	13.88" (352.5 mm)
24" (609.6 mm) W	17.88" (454.2 mm)
30" (762 mm) W	23.88" (606.6 mm)

"B" (Depth)	
20" DP	22" DP
13.75"	15.75"
(349.2)	(398.5)

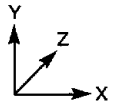
Mounting Requirements for Seismic NEMA 3R with Optional Heavy Base



Center of Gravity



Front view



For a uniformly loaded 90" high x 20" deep lineup, center of gravity is:

X = center of lineup
Y = 46½" above bottom of floor sill
Z = 8" in from front (front-mounted devices 20" deep)
OR: 10" in from front (back-to-back construction)
5" in from front (13" deep)
8½" in from front (22" deep)
11" in from front (25" NEMA 3R)

Typical variations due to uneven loads:
X = ± 5"
Y = ± 1"
Z = ± .5"

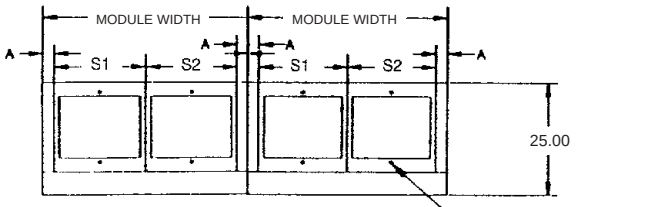
OUTDOOR ENCLOSURES

NEMA 3R NON-WALK-IN ENCLOSURE (STANDARD)

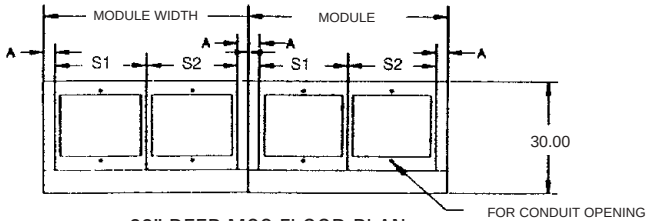
The standard NEMA 3R enclosure consists of a specially constructed MCC section with a mating framework which supports the roof and extended front. The basic design is similar to switchboard construction. The smaller footprint will permit a broader usage than the optional NEMA 3R construction. Meets Seismic Zone 4 (optional). ④

Module Width (Total)	A	MCC Split Length (S1 & S2) ②
25	2.5	20”
30	3.0	24”
35	2.5	30”
45	2.5	40”
50	3.0	44”
55	2.5	50”
55	3.5	48”
60	3.0	54”
65	2.5	60”

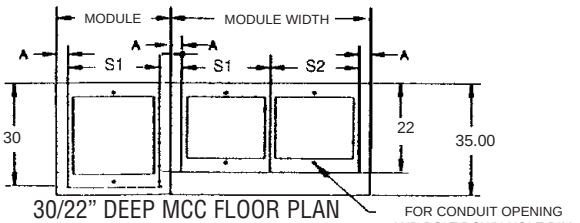
NOTES:
① Doors shown are double doors, or MW less than 45” door will be single door.
② NEMA 3R module may contain 1, 2 or 3 MCC sections, 3 section shipping split limited to (3) 20” wide MCC sections only.
③ All dimensions in inches.
④ For Seismic mounting see Sh # B-10



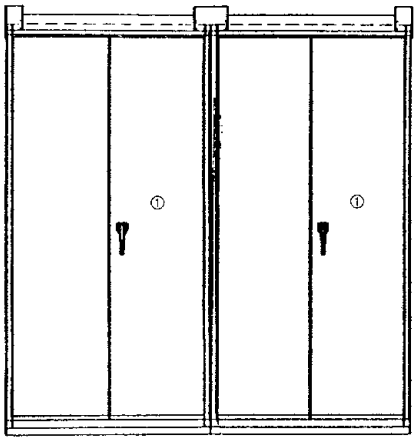
20” DEEP MCC FLOOR PLAN

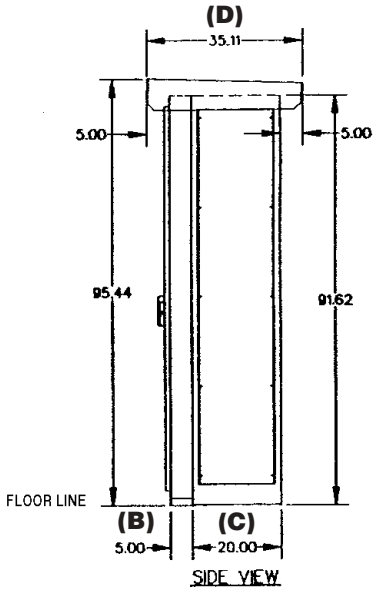


22” DEEP MCC FLOOR PLAN



30/22” DEEP MCC FLOOR PLAN





MCC Depth (C)	Front Extension (B)	Top Cover (D)
20”	5	35
22”	8	40
30” Plus 22”	5	45
	13	

OUTDOOR ENCLOSURES

NEMA 3R WEATHERPROOF ENCLOSURE (OPTIONAL)

General Electric's outdoor construction consists of an indoor (20-inch deep only) motor control center line-up in an outdoor enclosure. Standard NEMA 3R enclosures generally house two or more vertical sections and are bolt-together type construction with provision for future expansion. Standard construction will withstand wind velocities up to 75 mph. Roof loading should be limited to 30 lbs./ft^2. Exterior finish is an air-dry alkyd enamel ANSI 61 (light gray) over a phosphate corrosion-resistant primer. Outdoor enclosures are approximately 104 inches overall height. Floor plates beneath the interior motor control center line-up are not provided. If required, order motor control center bottom plates with the motor control center sections. Space heaters with thermostatic control are recommended in the motor control center line-up. Refer to specific job drawings for mounting and anchoring details.

NEMA 3R outdoor enclosures are available in four enclosure types:

- NEMA 3R non-walk-in
- NEMA 3R non-walk-in (back-to-back)
- NEMA 3R walk-in
- NEMA 3R common-aisle, walk-through

Each NEMA 3R module may vary in width from 20 inches to 48 inches, and modules of varying width may be bolted together to form a single shipping section. With the standard base a maximum of two modules can be shipped bolted together. Specify a heavy base under the following conditions:

- If more than two NEMA 3R modules form a single shipping section.
- Rear access to the motor control center is specified.
- Wall insulation is specified.
- Extended height is specified.
- Wind withstandability above 75 mph (130 mph max.)
- Seismic withstandability is specified (Zone 4, 2.25g max.).
- NEMA 3R walk-through construction is required.

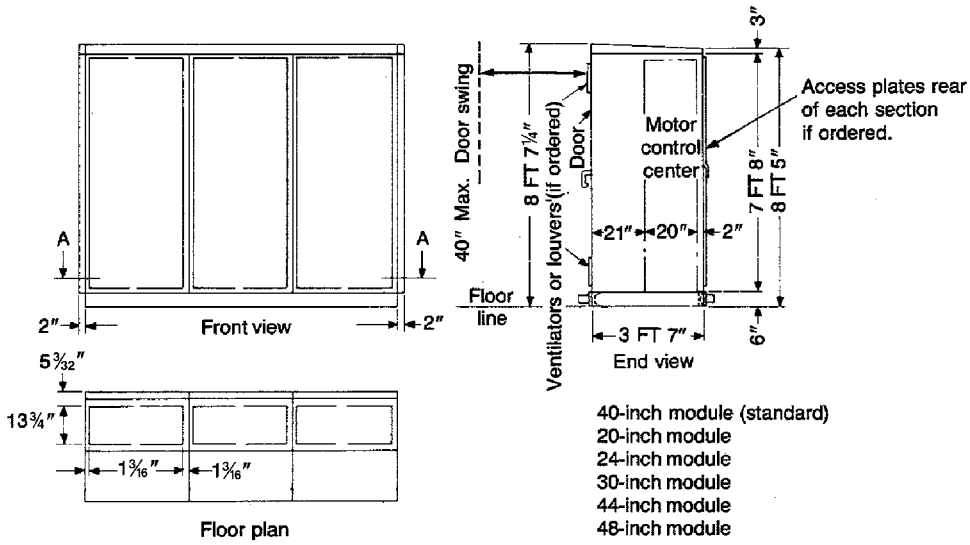
OUTDOOR ENCLOSURE FEATURES

	STANDARD	OPTIONAL			
Feature	3R Non-Walk-In	3R Non-Walk-In	3R Non-Walk-In Back-To-Back	3R Walk-In	3R Walk Through
Rear Access	Standard	Optional	–	Optional	Optional
Louvered Door Ventilation	–	Standard	Standard	Standard	–
Filters For Door Ventilation	–	Optional	Optional	Optional	–
Top or End Ventilation	Standard	–	–	Optional	Optional
Filters for Top or End Ventilation	–	–	–	Optional	Optional
Insulation–Top & Sides	–	Optional	Optional	Optional	Optional
Insulation–Top Only	–	Optional	Optional	Optional	Optional
Fluorescent Lighting, Switches and Convenience Outlets	Optional	Optional	–	Optional	Optional
130 mph Wind Withstandability	Optional	Optional	Optional	Optional	Optional
Seismic Withstandability (2.25G Max)	Optional	Optional	Optional	Optional	Optional
Extended Height (10")	–	Optional	Optional	Optional	Optional
Door Stops	Standard	Standard	Standard	Standard	–
Panic Door Hardware	–	–	–	–	Standard
Removable Floor Plates in Front of MCC	–	Standard	Standard	Standard	Standard
Key Lockable Doors (cylinder lock)	Padlock Prov.	Standard	Standard	Standard	Standard
Heating and Cooling	–	Optional	Optional	Optional	Optional
Heavy Base		Optional	Optional	Optional	Standard

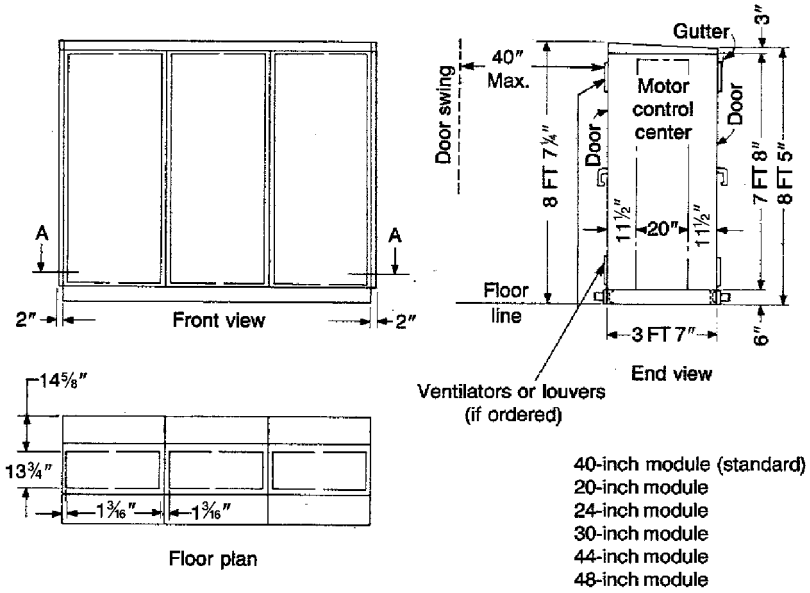
B

OUTDOOR ENCLOSURE DIMENSIONS

Optional NEMA 3R Outdoor Non-Walk-In



Optional NEMA 3R Outdoor Non-Walk-In (Back-to-Back)

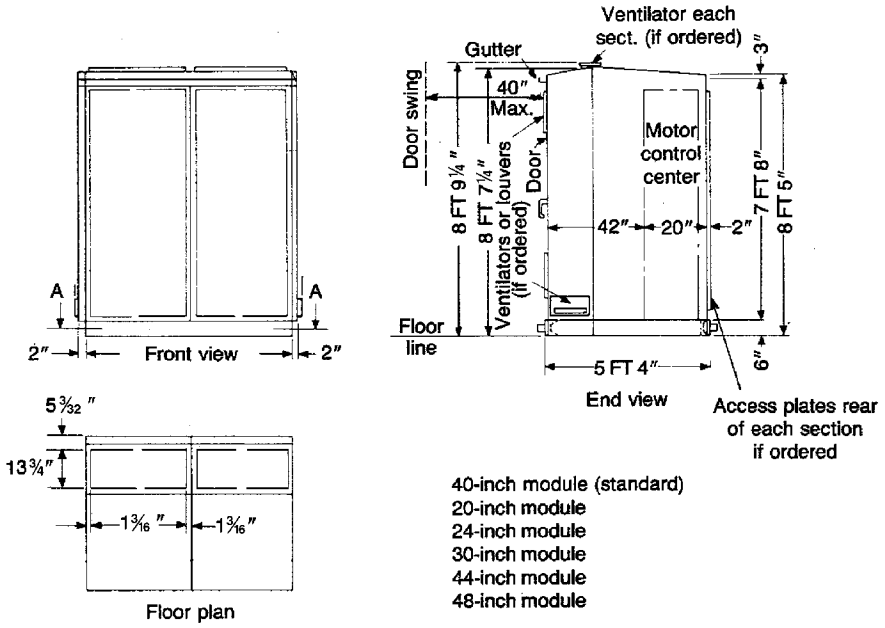


GENERAL NOTES:

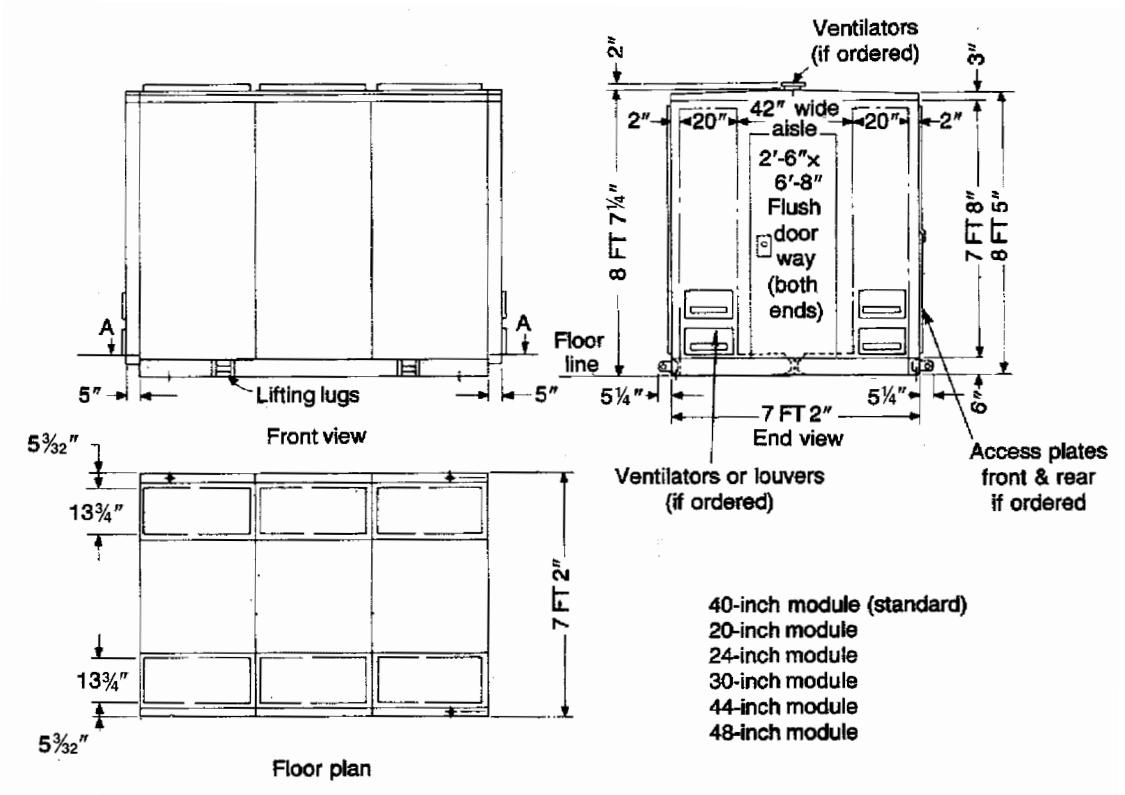
- NEMA 3R bolt-down hole size and location is subject to change depending on equipment requirements. See specific job drawings.
- Average shipping weight of all outdoor enclosures is based on 50 lbs. per square foot of floor space plus the weight of the interior motor control center line-ups.
- Some local codes require 30-inch minimum door width.

OUTDOOR ENCLOSURE DIMENSIONS

Optional NEMA 3R Outdoor Walk-In



Optional NEMA 3R Outdoor Common-Aisle Walk Through



BUS SELECTION

All continuous–current rating selections or recommendations are based on the motor control center being located in a maximum 40° C (104°F) ambient. Refer to General (Section A) for other environmental considerations.

MAIN HORIZONTAL BUS

The size of motor control center main bus and cables feeding the main bus is based on the current-carrying capacity required for motors plus other connected loads.

The capacity required for motors can be taken as 125 percent of the full-load rating of the largest motor plus 100 percent of the full-load rating of all other motors to be operated at the same time. Modified requirements resulting from duty-cycle or demand factor can be taken into account.

The current-carrying capacity required for other connected loads should be computed on the basis of 100 percent of the sum of individual loads except where a demand factor can properly be applied to reduce this total. Consideration should be given to future requirements.

VERTICAL BUS EXTENSIONS

The maximum vertical bus loading is calculated as follows: 80 percent of the feeder trip or fuse clip rating, plus 100 percent of the starter full load amps, plus 25 percent of the largest motor full load amps. This total cannot exceed the vertical bus rating. Tin plated copper verticval bus is standard, with silver plating as an option.

NEUTRAL BUS

Neutral bus is normally rated 50 percent or 100 percent of the main bus ampacity depending on system requirements.

GROUND BUS

UL requires a ground bus in multisection motor control centers. 300 ampere Cu or 375 ampere Al ground bus will meet minimum size requirements for main busses rated through 2000 amperes. A clearance hole for 3/8-inch hardware is provided in each section.

OPTIONS

The following UL listed options are available:

- Cap plugs for unused vertical bus stab openings.
- Shutter mechanism for vertical bus stab openings.
- Fully-insulated main horizontal bus.
- Silver plated horizontal and vertical bus.
- Plated ground bus (tin/silver).

BUS SYSTEMS/SELECTION

MCC Bus	Continuous Current Rating Amperes	Material		Short-Circuit Rating in RMS Symmetrical Amperes–(kA)			UL	Notes
		Cu	Alum⑧	42	65⑨	100②		
Main Horizontal	600	X	X		X	X	X	2” Bus
	800	X	X		X		X	2” Bus
	1000		X		X	X	X	④2” Bus
	1200	X	X	X	X	X	X	①4” Bus
	1600⑤⑦	X		X	X	X	X	①4” Bus
	2000⑥	X		X	X	X	X	①4” Bus
	2500⑥	X		X	X	X	X	①4” Bus
Vertical	300	X		X	X		X	
	450	X		X	X		X	
	600	X		X	X	X	X	③
Neutral	300	X					X	
	375		X				X	
	600	X	X				X	
	800	X	X				X	
	1000	X					X	
	1200	X	X				X	
	1250	X					X	
Horizontal Ground	300	X					X	1/4” x 1”
	375		X				X	1/4” x 2”
	600	X					X	1/4” X 2”
	600		X				X	3/8” X 2”
Vertical Grounds	150	X					X	1/8” x 1”

① 4-inch bus requires top 18-inch motor control center bus compartment.
② Not available in back-to-back construction (requires 4" main bus with 600 A vertical bus)
③ Required for all bolt-in assemblies.
④ Can be UL rated at 1200 amperes in a 20” deep section.
⑤ Back to back 20” deep not available.
⑥ 2000 and 2500 amp main bus require 22” deep section.
⑦ 1600 amp main bus requires a 20” deep section.
⑧ Copper bus is standard in Spectra MCC construction.
⑨ Standard bracing in Spectra MCC construction, 42K for back-to-back construction.