SIEMENS

SELECTION & APPLICATION GUIDE

tiastar™

Motor Control Centers
usa.siemens.com/mcc





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For instruction manuals and instructional videos please see the Siemens Motor Control Center website usa.siemens.com/mcc

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tiastar MCC

Motor Control Centers (MCC) have come a long way since they were introduced in 1937 as a way to save floor space by placing several starters in a single cabinet. Ideally, the best-of the-best must also save installation time and money.

Siemens has an installed base of Motor Control Centers dating back to 1964. Our Siemens tiastar MCCs are designed as self-contained modular units which meets UL and NEMA standards. They come with rear-mounted, self-aligning copper stabs that firmly grasp onto the bus. Brackets guide the placement of units, further assuring positive engagement with the bus. From 22mm to 30mm pilot devices, from direct starters to world-class drives, the Siemens tiastar MCC has many features and options to meet your specific needs.



- UL 845 and CSA 22.22 No. 254-05 Labeling as applicable when specified
- Heavy-Duty Construction with up to 100kA Bus Bracing
- 600V 50/60 Hz
- NEMA Wiring
- Plug-In Units (up to Size 5 Starters)
- Door/Unit Mounted Pilot Device Panel
- High Density Compact Units available to reduce footprint

Technical specifications summary – tiastar MCC

Bus and electrical ratings	
Horizontal Bus Ratings	600A, 800A, 1200A, 1600A, 2000A, 2500A[1]
Horizontal Bus Material	Copper with tin or silver plating
Vertical Bus Ratings	300A, 600A, 800A
Available Interrupt Ratings	10k AIC, 14k AIC, 18k AIC, 22k AIC, 25k AIC, 35k AIC, 42k AIC, 50k AIC, 65k AIC, 85k AIC, 100k AIC
Vertical Bus Options	Isolated (standard) Insulated and isolated (optional) Auto Shutters (optional)
Bus Bracing	42K AIC, 65K AIC, 100K AIC
Max MCC Voltage Rating	600 V

Enclosure	
Enclosure Type	NEMA 1 (standard), NEMA 1A (gasketed), NEMA 2, NEMA 12, NEMA 3R (non walk-in)
Back-to-Back Option	Available

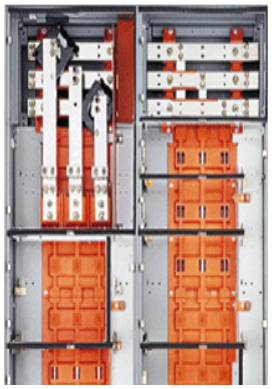
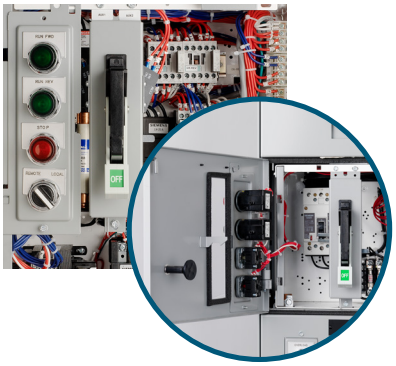
Dimensions	
Section Depth	15”, 20”, 21” (back-to-back), 31” (double deep), 41” (double deep)
Section Width	20”, 24”, 30”, 40”, 50”, 60”

1 NEMA 1 only and requires forced ventilation

Product features & benefits

Siemens tiastar Motor Control Centers (MCC) are composed of a number of vertical sections bolted together which allows for future addition of MCC vertical sections in case the customer requires expansion.

Feature		Benefits
Entire horizontal bus assembly is in top 12" of the vertical section		Easy accessibility for faster maintenance
Clear Lexan® horizontal wireway barrier		Easy visual inspection of horizontal bus
Plug-in units with integrated racking handles		Ease of installation and movement of plug-in units

Feature		Benefits
Isolated and insulated vertical bus assembly (Optional)		Prevents arcing faults from propagating
Dual location pilot device panel		Improved service access to save time
Industry's best unit operating handle		Clearly indicates equipment status (ON, TRIP, OFF)

tiastar Arc Resistant MCC



The Type 2A Arc Resistant MCC has been tested in accordance with IEEE C37.20.7 to provide an additional degree of protection to personnel performing normal operating duties in close proximity to the equipment. Type 2A classification means the MCC offers arc protection on the front, back and sides of the equipment



Technical specifications summary – tiastar MCC

Bus and electrical ratings

Maximum Horizontal Bus	1600 A
Maximum Vertical Bus	800 A
Maximum Short Circuit Withstand Rating	65 KA
Arc Flash Duration	50 ms (3 cycles)
Maximum Voltage Rating	600 VAC
Horizontal Bus Details	Copper Only
Incoming	MLO, MCB/MDS 1600 A max, splice to existing[1]

Enclosure

Enclosure Type	NEMA 1 and NEMA 1A (gasketed)
High Density Units Option	Available
VFD, RVSS Units	Available
Double Deep Option	Available

Dimensions

Modified Pull Box Height	12" Minimum (standard), 18" and 24" (optional)
Section Depth	20"
Section Width	20" or 30"
Total MCC Height	102" Minimum[2]
Room Requirements	112" Minimum Ceiling Height (Total MCC Height + 9") 38" Minimum Aisle

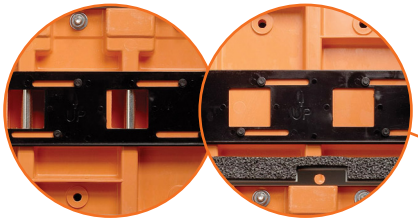
1 The Arc Resistant MCC should not be spliced to a Non-Arc Resistant MCC.
2 If the mounting channels are surface mounted then the minimum height is 103" (90" MCC height + 1" mounting channels + 12" modified pull box). Also, note that the total MCC height will increase if standard modified pull box is not selected.

Key innovations and benefits of Arc resistant design

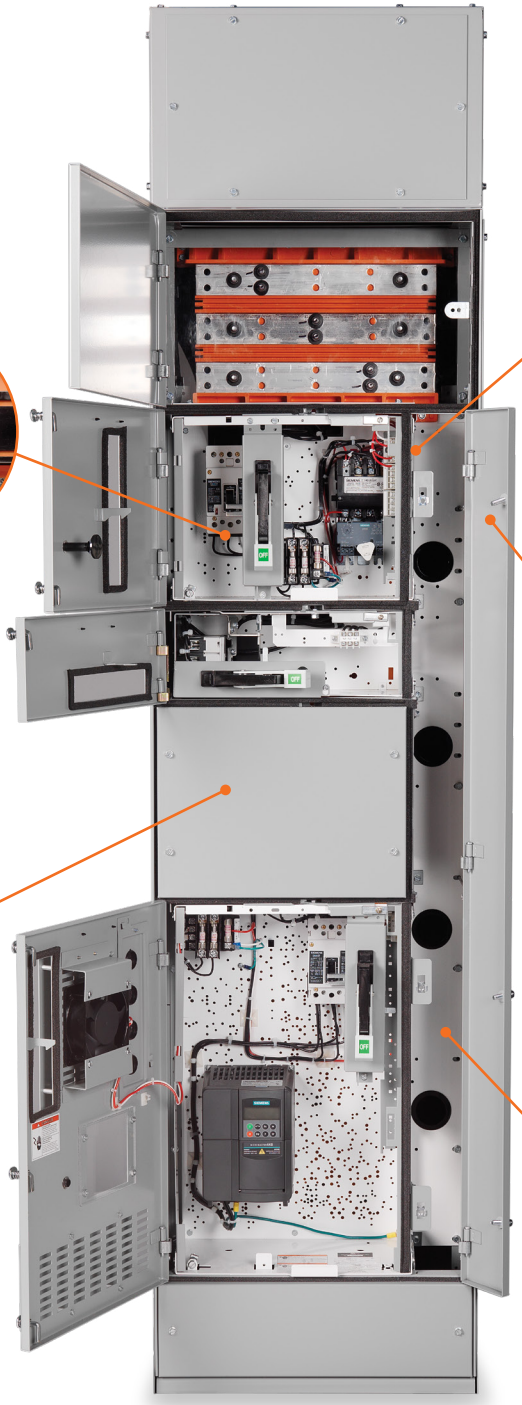
Reinforced doors
Reinforced cabinet ensure the equipment can withstand and contain pressure from internal arcing faults.



Automatic shutters
The barrier automatically opens and closes to allow insertion or removal of units. It isolates the vertical bus to prevent inadvertent contact lowering the risk to personnel.



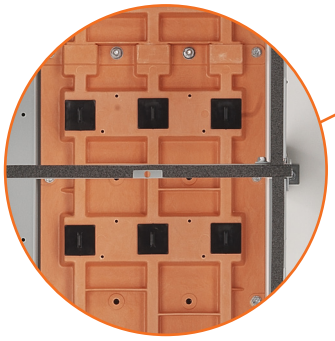
Open Closed



Bolted wireway
The wireway is bolted to ensure integrity of the MCC wireway is sustained during an arc flash incident.



Insulated bus bar
Isolates energized components, prevents accidental contact, and keeps arcing faults from propagating.



Internal venting system
The vertical wireway is perforated with holes that channel the gasses to the back and out the top of the MCC.



Figure 1: Arc Resistant MCC

Deflectors
The protection plate will allow MCCs to have vented doors, but will reduce the direct launching of arc flash by-products.



Modified pull-box with pressure flap
The arc flash by-products will be prevented from escaping due to the wire mesh, while the pressure flap will allow pressure release.

Figure 2: Closed door view - Arc Resistant MCC

Dynamic Arc Flash Sentry (DAS)

To complement the Arc Resistant MCC, the Dynamic Arc Flash Sentry (DAS) option is available. Dynamic Arc Flash Sentry (DAS) is a patented feature available in both Siemens MCCs and type 3WA Low Voltage Switchgear. The unique dual trip setting technology reduces the energy available in an arc flash event.

For more information, please see the Dynamic Arc Flash Reduction System and its Application in Motor Control Centers white paper at: ***www.usa.siemens.com/mcc***



tiastar Smart MCC



A tiastar Smart MCC is a networked motor control center that can communicate utilizing various network protocols. A Smart MCC has the capability of monitoring motor operation, energy consumption, power quality while also offering control. The Smart MCC communicates with the customers process control system or PLC via a data network.



Smart MCC components

Smart MCC is internally interconnected using PROFIBUS DP which incorporates intelligent devices such as SIMOCODE pro C and V motor management systems, SIRIUS 3RW55 series soft starters, SIMATIC PLCs, Siemens VFDs, and other smart components.

Major benefits

- Reduces Wiring Connections
- Reduces Cost
- Improves Operational Diagnostics
- Simplifies Installation and Troubleshooting

tiastar Smart MCC network architecture

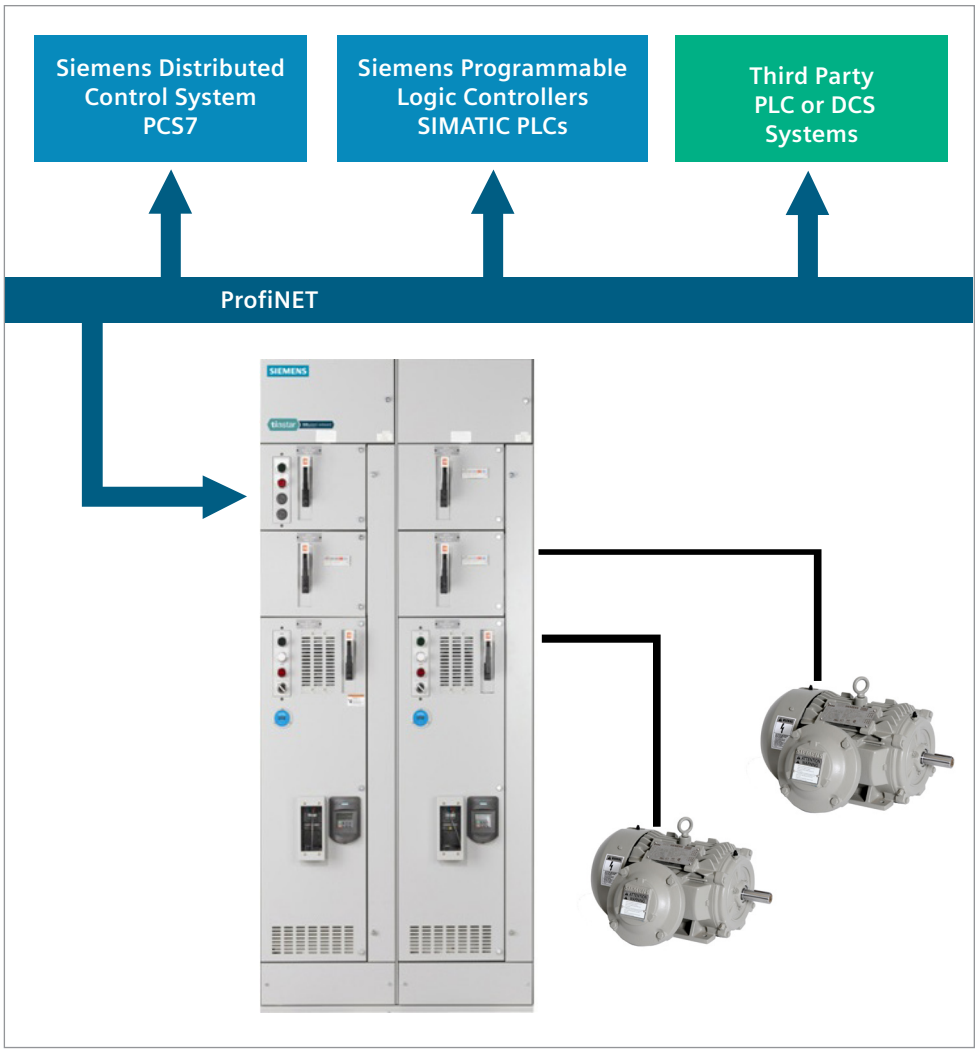


Figure 3 Example of a Smart MCC network with PROFINET

Options

A Smart MCC has the option to externally talk to other networks such as DeviceNet, Modbus RTU, Modbus TCP/IP, EtherNet/IP, and PROFINET.

VFD, RVSS Units	Available
High Density 6" Units Option	Not Available
Back-to-Back Option	Available
Double Deep Option	Available

Codes and standards

Siemens tiastar MCCs are manufactured to American National Standards Institute (ANSI) / Underwriters Laboratories (UL) 845 standard and contain the “UL Listed” label.

Siemens tiastar MCCs also complies with Canadian Standards Association (CSA) C22.2 No. 254-05 standards.

Siemens tiastar MCCs are American Bureau of Shipping (ABS) Type Approval Certificated.[1]

Seismic Certification

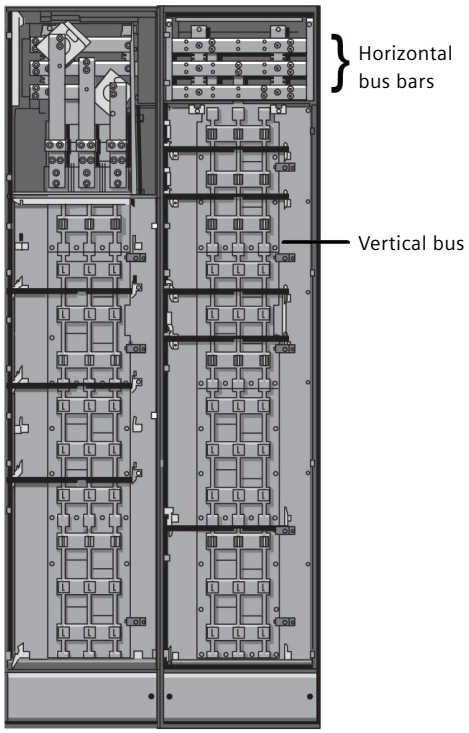
Siemens tiastar Motor Control Centers are certified to IBC 2015 Section 1705.13 and CBC 2016 Section 1705A.13.

1 Some restrictions may apply. Please contact factory for further details.

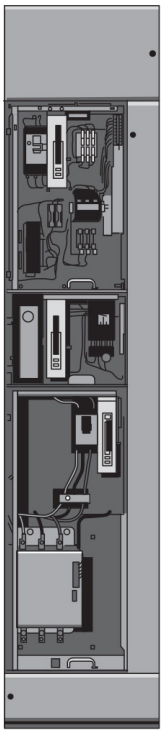
Estimated MCC shipping weight

Dimensions in Inches (mm)				
Width	Depth	Type	Weight per Section in lbs (kg) for NEMA 1, 2, or 12	Weight per Section in lbs (kg) for NEMA 3R
20″ (508)	15″ (381)	Front Only	550 (250)	650 (295)
20″ (508)	20″ (508)	Front Only	650 (295)	700 (318)
30″ (762)	15″ (381)	Front Only	700 (318)	800 (363)
30″ (762)	20″ (508)	Front Only	850 (386)	900 (409)
20″ (508)	21″ (533)	Back-to-Back	670 (304)	N/A
30″ (762)	21″ (533)	Back-to-Back	880 (400)	N/A

Note: MCC shipping split maximum is 80 inches (for example, four 20-inch wide vertical sections).



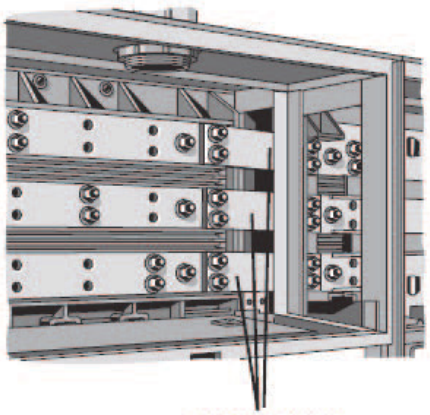
Shipping split #1



Shipping split #2

Figure 4: Example of shipping split

When a motor control center is made up of more than one vertical section, the sections are assembled together with a common top-frame and bottom-frame assembly. For shipping, this assembly can consist of a maximum of four 20-inch wide vertical sections (80″ maximum). Several assemblies can be bolted and bussed together at the installation site to form a complete lineup.



Splice plates

Figure 5: Splice plates

When there are more than four sections or the customer specifies a split between two vertical sections, a splice kit, must be installed to join the horizontal bus bars.

MCC heat dissipation

The purpose of this section is to allow the reader to approximate the heat output of an MCC. This information is based on power loss data collected for the major heat producing components.

The data presented here is based off the maximum rated current for each component. If the true loading current is known, then the estimate can be improved by multiplying the given power loss by the square of the true current divided by the square of the rated current:

$$P_{actual} = P_{max} \frac{i^2_{actual}}{i^2_{max}}$$

The power losses can be multiplied by 3.412 to convert them from Watts to BTU/hr.

1. Combination motor starters

		Maximum Power Loss (3-Pole) [W]				
Size	I_{max} [A]	Contactor	Breaker	Overload	CPT	Total
0	18	6	12	6	17	41
1	27	18	15	6	17	58
2	50	28	21	6	17	72
3	95	52	24	6	29	111
4	185	55	60	6	29	150
5	300	84	93	6	17	200
6	500	190	174	6	17	387

2. Circuit breakers

I_{max} [A]	Watts Loss (3-pole)
3	5
15	8
30	11
60	20
100	36
200	60
400	130
800	192
1200	259
1600	461
2000	720

3. Lighting transformers

KVA	Watts Loss
6	300
9	400
10	542
15	658
20	761
25	761
30	995
37.5	1135
45	1276

4. Reduced voltage soft starters

	Family	I_{max}	Power Loss (W)
3RW55	1X	30	10
	2X	82	25
	3X	129	51
	4X	262	171
	5X	520	252

5. Panel boards

		Maximum Power Loss (3-Pole) [W]				
				Branch Circuits		
Size	I_{max} [A]	Bus	Main Breaker	18	36	42
P1	400	380	129	87	77	80
P2	600	420	216	99	97	109
P3	800	470	192	116	96	113

6. Variable frequency drives

The power loss for a variable frequency drive is approximately 3.5% of the overall power:

$$Power\ Loss = (HP\ of\ Motor) \cdot \frac{0.746W}{HP} \cdot 3.5\%$$

7. Horizontal and vertical power bus

	Maximum Power Loss (3-Pole) [W]	
	Horizontal (20" Section)	Vertical (72" Section)
I_{max} [A]	Copper	Copper
300		57
600	54	115
800	64	240
1200	72	
1600	85	
2000	66	
2500	104	

Altitude ratings

Siemens tiastar Motor Control Centers are designed and built to operate up to 2000 meters above sea level (6,600 ft) without any modifications.

Motor control centers are often installed in applications exceeding 1000 meters (3300 ft) above sea level. Due to the lower air density and heat transfer capacity at elevated altitudes, the physical properties such as dielectric strength, load capacity of the motor control centers, conductors and motors, as well as the tripping characteristics of thermal relays may require modification to reflect these changes due to altitude. Paschen's Law describes the breakdown voltage of parallel plates in a gas, as a function of pressure and gap distance. In other words, at lower pressure (higher altitudes) it takes less voltage to cross a given distance increasing the chance for electrical arcs. To compensate for this, it is recommended that the operational voltage be de-rated for altitudes exceeding 2,000 meters according to Paschen's law. In addition, the rated thermal current should also be reduced because of the decreased thermal efficiency of lower density (high altitude) air.

Siemens tiastar Motor Control Centers are designed and built to operate up to 2000 meters above sea level (6,600 ft) without any modifications. Siemens MCC components are designed and manufactured to provide excellent insulation and arc flash protection for bus components, in addition to having high thermal efficiency. Using creative design and engineering, Siemens MCCs can operate safely and reliably at altitudes up to 5,000 meters above sea level.

Altitude	0-2000M		2001 - 3000M		3001 - 4000M		4001 - 5000M	
Derating	**Voltage**	**Current**	**Voltage**	**Current**	**Voltage**	**Current**	**Voltage**	**Current**
Motor Control Center								
MCC Bus and Enclosure	100%	100%	100%	97%	90%	97%	79%	96%
Breakers								
Molded Case Breakers	100%	100%	86%	96%	75%	93%	67%	90%
3WA Power Breakers	100%	100%	100%	100%	90%	97%	79%	94%
Fuses								
	100%	100%	90%	95%	80%	90%	70%	85%
Starters								
Innova	100%	100%	100%	92%	90%	85%	79%	78%
Sirius	100%	100%	88%	88%	79%	78%	75%	70%
Soft Starters								
3RW52/55	100%	100%	100%	92%	90%	85%	79%	78%
Drives								
G120 (PM240-2)	100%	100%	90%	90%	80%	80%	70%	70%

NEMA enclosure types

Enclosure Types	Indoor or Outdoor	Description
NEMA 1	Indoor	This enclosure is primarily to prevent accidental contact by personnel with the enclosed equipment and for protection against falling dirt.
NEMA 1A (gasketed)	Indoor	This enclosure has the same use as NEMA 1 except the front of the enclosure is gasketed. The parts that are gasketed include: Unit separator angles, Right hand side of front of units, Bottom horizontal cross ties, Lip on top plate, Handle mechanism, and Bottom horizontal wireway cover plate. The whole front of structure is gasketed, except the hinged side of door.
NEMA 2	Indoor	This design is NEMA 1A front with a drip shield mounted on top of the enclosure. This enclosure is to protect equipment against falling noncorrosive liquids and dirt. It prevents the entrance of dripping liquid at a higher level than the lowest live part within the enclosure. The drip shield completely covers the top and extends 3" over the front and 1 1/2" over the sides of the basic structure. On front-only MCC's, the drip shield is flush to the rear. The drip shield is angled from front to rear and not flush with the top of the MCC. The drip shield mounts on the top of the structure.
NEMA 12	Indoor	This enclosure is intended for indoor use in areas where fibers, lint, dust, dirt, and light splashing are prevalent. The NEMA Type 12 enclosure will provide a greater degree of protection than a NEMA 1A enclosure. The following additional parts are gasketed: Hinged side of doors, Pilot device panel, Top plates, Wireway end-covers, and Rear plates. Because of the divider side sheet assemblies, there is no gap between sections, allowing for much greater dust resistance. In addition, interconnection holes in the side sheet assemblies are sealed. Bottom plates are included when NEMA 12 is specified.
NEMA 3R	Outdoor (Non walk-in)	This enclosure will prevent entrance of rain at a level higher than the lowest live part. The enclosure has provision for locking and drainage. This NEMA 3R enclosure entirely surrounds the motor control center for outdoor operation. Each non walk-in enclosure has a floor and a slanted roof. All doors are louvered and screened to promote air circulation and keep out pests. Motor control units can be racked in positive stop/test position with the outer enclosure doors closed. Rigid steel construction permits use from two sections up to any reasonable number of sections. Stainless steel hinge pins and door stops are standard. Pressure Sensitive Adhesive (PSA) Closed Cell Sponge Rubber door gasket forms a tight seal to keep the elements out. Space heaters, fluorescent lights, fans, filters, blowers, and convenience outlets are available as options. NEMA 3R enclosures are designed to accommodate bottom cable entry and exit only. The enclosures are not intended to provide protection against conditions such as dust, snow, or sleet (ice).

Attention: Variable Frequency Drives require special consideration, see units chapter VFD section for further details.

Paint and MCC finish

ANSI 61 Light Gray is the standard exterior color. Unit backplates and the rear of the vertical wireway are painted white for improved visibility.

Custom color MCCs are available.



Structure design and options

Sections

Heavy 14 gauge steel side sheet assemblies are used for supporting the structure without additional bracing. The front of each side frame has a 180° bend to provide additional rigidity and a smooth edge. Cross channels tie the side frames together. A common sheet is used to provide isolation between adjacent sections. A shipping split will have two outer side sheet assemblies and an inside divider side sheet assembly between sections.

Mounting Sills

Full-length mounting sills are standard for each shipping split. The sills are 3" wide by 1 1/8" high and constructed of 7 gauge steel. They have four holes per section for use with 1/2" (max.) anchor bolts. The sills add additional structural rigidity. The mounting sills are an integral part of the structure and should not be removed.

Structural Parts	
Divider Sheets	14 ga.
Side Sheets	14 ga.
Center Bottom Cross Ties	12 ga.
Rear-Channel (FO)	13 ga.
Channel Sills	7 ga.
Center-Top Channel	13 ga.
Vertical Bus Mounting Angles	14 ga.
Lifting Angles	7 ga.
Rear Covers	16 ga.
Top Plates	13 ga.
End Covers	16 ga.
Separator Angles	12 ga.
Shelf Brackets	10 ga.
Unit Parts	
Top and Bottom Unit Barriers	14 ga.
Back Pan	13 ga. 14 ga.
Side Barrier Plate	18 ga.
Angles	14 ga.
Doors	13 ga. 14 ga.

Note: Arc Resistant MCC metal thickness values will be different on some parts.



Lifting angle

A 7 gauge lifting angle is supplied with every shipping split regardless of length. The lifting angles are mounted atop the MCC structure.

Side sheets

Side sheet assemblies on 20″ deep units provide a 40.5 square inch wireway opening at the top and a 46 square inch wireway opening at the bottom to facilitate routing wires through the horizontal wireways between adjoining sections. 15″ deep units provide a 40.5 square inch wireway opening at the top and a 30 square inch wireway opening at the bottom.

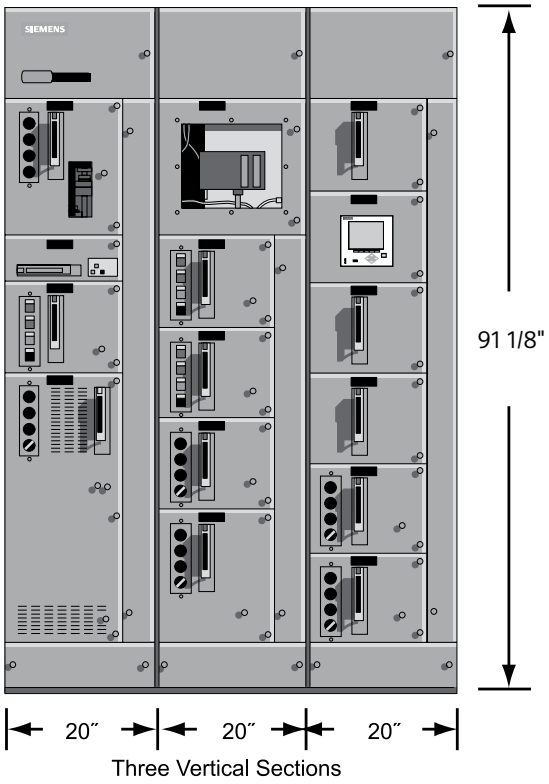


Figure 9: Vertical section dimensions

Back-to-back and double deep MCC options

Usually MCCs are front-mounted. However, for the customers who want to save space and cost, we offer our standard 21" deep back-to-back MCC design. We are the only manufacturer in the market that offers 21" deep back-to-back design with common horizontal and vertical buses.

For customers that would like to have back-to-back configuration but with separate horizontal and separate vertical busses for both the front and rear, double deep MCCs are available with depths of 31" and 41".

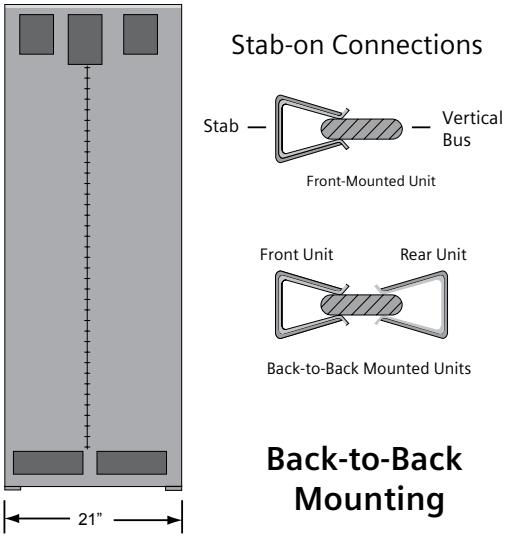


Figure 10: Back-to-back configuration

Pull box (top hat) options

Pull boxes are generally used to provide increased conduit mounting space and additional cable bending space for incoming main feeds instead of bus duct connections. This type of pull box assembly is referred to as a "top hat." Top hats are shipped 12", 18", or 24" high; 20" or 30" wide; 15" or 20" deep for customer field installation on top of MCCs.

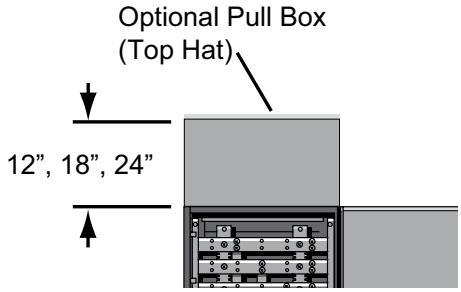


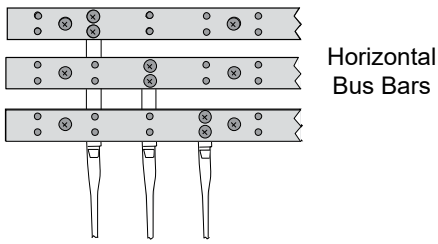
Figure 11: Pull box option

Special structures

30", 40", 50", and 60" wide sections are available for larger units such as large horsepower VFD, RVSS or special panels that may require it. 30" and wider structures may have horizontal bus, but are not supplied with vertical bus. 30" wide structures are available in 15" or 20" deep design and line up with standard 20" wide sections. 30" sections have full-width doors, while wider sections have two interposing doors. Dimensions for other special equipment such as transfer switches, NEMA 3R outdoor enclosures, or special service entrance enclosures will be provided on request.

Bus selection and options

For additional strength, the horizontal bus, vertical bus, bus support angles, and bus bracing insulators form one unified assembly.



Horizontal bus

The horizontal bus is a means of tapping power for distribution to the various units within a section. Siemens tiastar MCC's horizontal bus is always located on the top of the vertical section and never located behind unit space, allowing for easy maintenance and serviceability.

Horizontal bus specifications	
Horizontal Bus Current Ratings	600A, 800A, 1200A, 1600A, 2000A, 2500A[1] only
Horizontal Bus Material Options	Copper with tin or silver plating

Vertical bus

The standard vertical bus is tin-plated copper 3/8" thick with rounded edges. The edges on the vertical bus are rounded to assist in units stabbing onto the bus.

Vertical bus specifications	
Vertical Bus Current Ratings	300A, 600A, 800A
Vertical Bus Options	Isolated (standard for 42kA or 65kA bus bracing) Insulated and isolated (optional for 42kA or 65kA bus bracing; standard for 100kA bus bracing and back-to-back) Auto Shutters (standard for the Arc Resistant MCC; optional for all other configurations)
Stab Plating	Tin (standard) Silver (optional)
Bus Bracing	42K AIC, 65K AIC, 100K AIC

1 NEMA 1 only

Vertical bus (continued)

Vertical buses are available in two designs:

1) **Isolated** – Isolated vertical bus design is grounded sheet steel with stab openings and is the standard for front-only structures with 42kA or 65kA bus bracing. The vertical bus bars in this design are not physically insulated phase-to-phase.

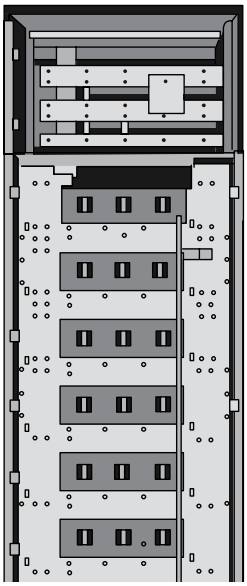


Figure 12: Isolated vertical bus

2) **Insulated and Isolated** – An optional insulated and isolated vertical bus design which prevents arcing faults from propagating is available for front only 42kA and 65kA bus bracing. The isolated and insulated vertical bus design is standard for 100kA bus bracing and all back-to-back structures.

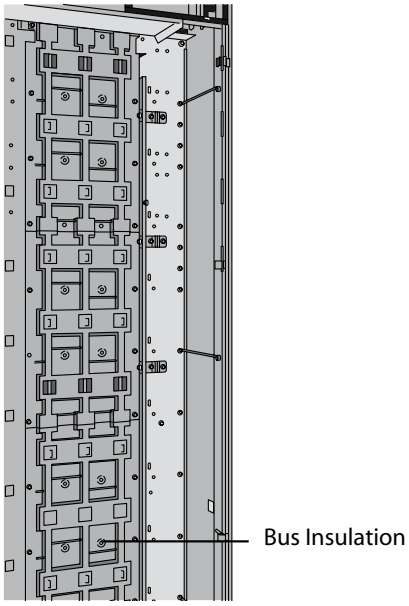


Figure 13: Insulated and isolated vertical bus

Auto Shutter (optional) mechanism automatically opens and closes to allow insertion or removal of units. It prevents inadvertent contact of the vertical bus; thus, lowering the risk to personnel. Auto shutters are available on vertical isolated/insulated busses, however they are a standard on arc resistant MCCs. It is important to point out that the shutter mounting holes are not in the standard bus assembly and cannot be duplicated in the field. Therefore, retrofitting automatic shutters to MCC's that do not have them is not possible.



Ground bus

A standard horizontal ground bus is typically mounted in the bottom 6" of the structure. An optional copper 1/4" x 1" vertical ground bus can be connected to the horizontal ground bus. When a combination motor control unit is inserted into the MCC, the optional vertical ground bus is engaged before the vertical power bus. The vertical ground bus provides a means of assuring the plug-in unit is solidly grounded before the power stabs are engaged and remains grounded until the power stabs are disengaged. When vertical ground bus is specified on back-to-back structures, vertical and horizontal ground bus must be supplied in the front and rear of each section.

The ground bus may be located in the top or bottom front of 15" or 20" deep MCCs or the top or bottom rear of back-to-back structures under most situations. A ground lug is supplied on one end of the ground bus as standard or can be optionally added to both ends. If not otherwise specified, the lug will be located in the incoming line section.

Ground bus		
Horizontal Bus Current Ratings	300A 600A 600A	Cu Cu Al
Vertical (A)[1]	300A	Cu

1 Available with motor ground terminations

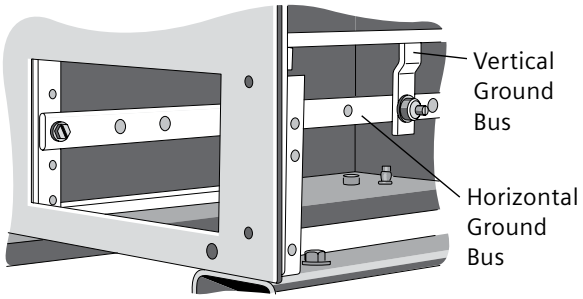


Figure 14: Vertical and horizontal ground bus

Neutral bus

A neutral connection is generally required for 3 phase 4 wire systems. A neutral pad is usually mounted in the incoming section only. Optionally, a neutral bus running the full length of the line-up can be provided. When full length neutral bus is specified, the neutral bus must be located in the bottom front of the MCC structure. Full length neutral bus requires that the ground bus be mounted in the top of the structure. In general, neutral bus capacity is sized at 1/2 main bus capacity. A two hole lug is supplied as standard when a service entrance label is not required. For service entry, a neutral lug and a bonding lug are supplied. All lugs used for ground or neutral are CU/AL type.

Neutral bus		
Neutral Bus (Bottom Mounted) (A)	300A 800A 1200A 1600A	Cu Cu Cu Cu

Wireways

Vertical Wireway
The vertical wireway is 72" H x 4" W and has a cross sectional area of 38.25 square inches. An optional 8" W vertical wireway is available with an area of 76.5 square inches.

A vertical wire-way door is supplied on each 20" and 24" wide section that does not contain a 72" tall unit. Vertical wireway doors are not supplied on any section that contains a 72" high unit or on 30" wide or wider structures or 20" wide units.

Each vertical wireway is supplied with three wire tie rods.

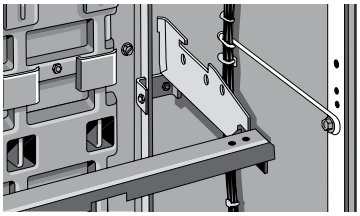


Figure 15: Wire tie rod

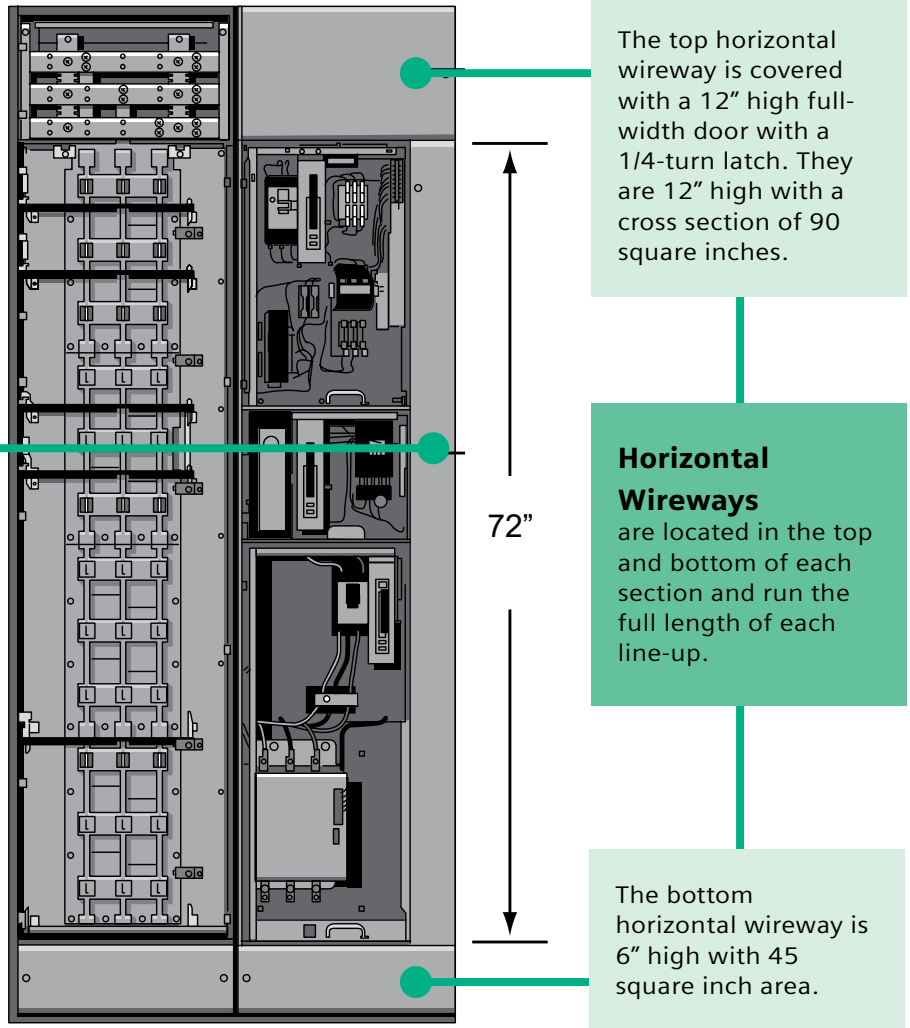


Figure 16: Vertical and horizontal wireways

Rear wireway
The rear of the structure can be used as a wireway if the available Grommeted Vertical Wireway with 2 1/2" grommeted holes are specified. Dimensions for rear wireways in front mounting 15" and 20" deep units are:

15" deep: 1 1/2" x 19 3/4"= 30 sq. in. cross sectional area.

20" deep: 9" x 19 3/4" = 178 sq. in. cross sectional area.

Wiring classes and types

Siemens MCCs are available as either Class I or Class II assemblies utilizing either Type A, Type B, or Type C wiring as defined in UL 845-2005. Below are the class and type definitions:

Wiring class and type definition

Class I — Independent units

Class I motor control centers shall consist of mechanical groupings of combination motor control units, feeder tap units, other units, and electrical devices arranged in a convenient assembly. The manufacturer shall furnish drawings that include:

a. Overall dimensions of the motor control center, identification of units and their location in the motor control center, locations of incoming line terminals, mounting dimensions, available conduit entrance areas, and the location of the master terminal board if required (Type C wiring only).

b. Manufacturer's standard diagrams for individual units and master terminal boards (Type C wiring only) consist of one or more drawing(s) that:

- Identify electrical devices
- Indicate electrical connections
- Indicate terminal numbering designations

Note: When a combination schematic and / or wiring diagram for a unit is supplied showing optional devices, the manufacturer shall provide information to indicate which devices are actually furnished.

Class II — Interconnected units

Class II motor control centers shall be the same as Class I motor control centers with the addition of manufacturer furnished electrical interlocking and wiring between units as specified in overall control system diagrams supplied by the purchaser. In addition to the drawings furnished for Class I motor control centers, the manufacturer shall furnish drawings that indicate factory interconnections within the motor control center.

Class I-S and II-S — Motor control centers with custom drawing requirements

Class I-S and II-S motor control centers shall be the same as Class I and II except custom drawings shall be provided in lieu of standard drawings as specified by the user.

Examples of custom drawings are

- Special identifications for electrical devices
- Special terminal numbering designations
- Special sizes of drawings

The drawings supplied by the manufacturer shall convey the same information as drawings provided with Class I and II motor control centers, additionally modified as specified by the user.

Wiring types

Type A

User field wiring shall connect directly to device terminals internal to the unit and shall be provided only on Class I motor control centers.

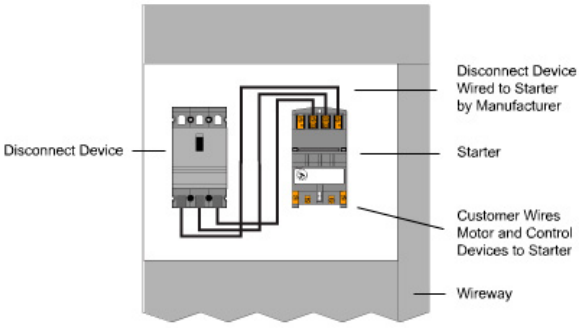


Figure 5: Class I, type A wiring

Type B

Type B user field load wiring for combination motor control units size 3 or smaller shall be designated as B-d or B-t, according to the following:

B-d connects directly to the unit terminals, which are located immediately adjacent and readily accessible to the vertical wireway.

B-t connects directly to a load terminal block in, or adjacent to, the unit.

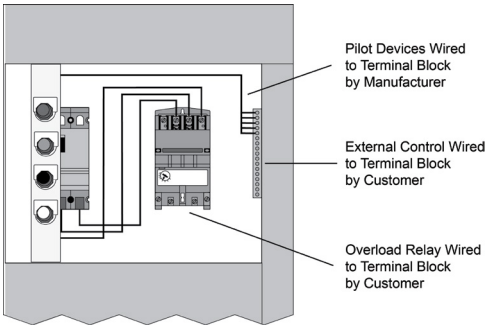


Figure 6: Class I, type B-d wiring

Type B user field load wiring for combination motor control units larger than size 3, and for feeder tap units, shall connect directly to unit device terminals.

Type B user field control wiring shall connect directly to unit terminal block(s) located in, or adjacent to, each combination motor control unit.

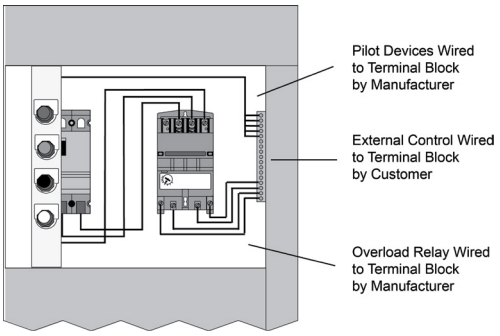


Figure 7: Class I, type B-t wiring

Type C

User field control wiring shall connect directly to master terminal blocks mounted at the top or bottom of those vertical sections that contain combination motor control units or control assemblies which shall be factory wired to their master terminal blocks. User field load wiring for combination motor control units, size 3 or smaller, shall connect directly to master terminal blocks mounted at the top or bottom of vertical sections. Motor control unit load wiring shall be factory wired to the master terminal blocks. User field load wiring for combination motor control units larger than size 3, and for feeder tap units, shall connect directly to unit device terminals.

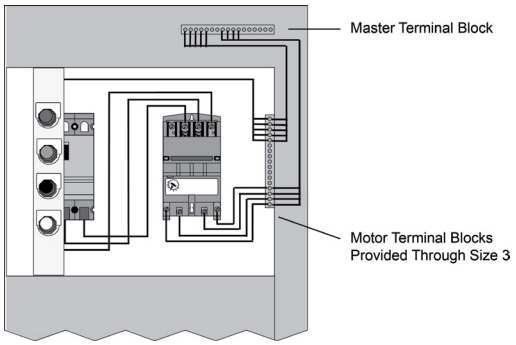


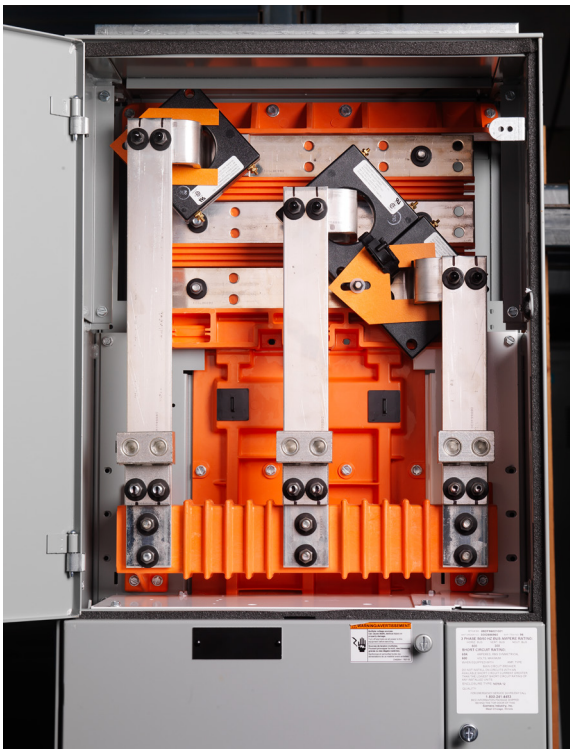
Figure 8: Class I, type C wiring

Mains and incoming devices

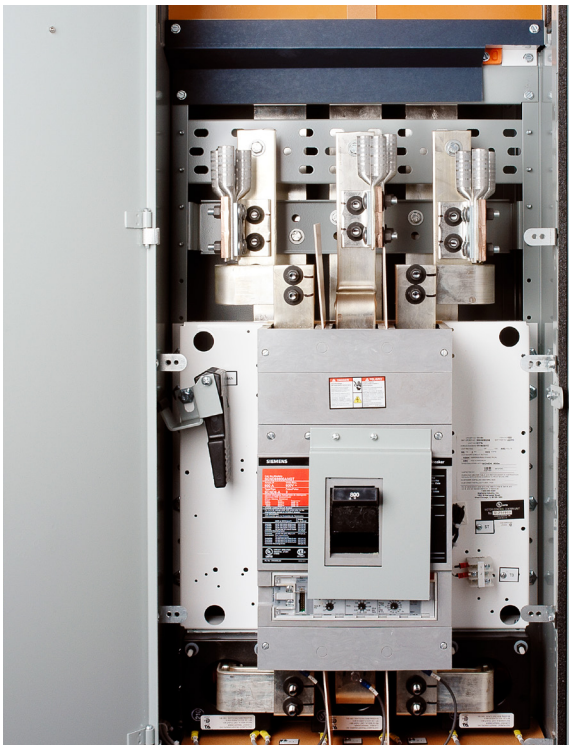
The incoming cables are terminated on lugs in an incoming compartment of the MCC. These lugs may be connected directly to the bus via Main Lug Only (MLO) or connected to a main disconnect device which may either be a Main Circuit Breaker (MCB) or Main Fusible Disconnect (MDS).

It is important to know whether the incoming cables will be coming from the bottom or top of the MCC, as the required wire bending space may affect the compartment size.

Note: All dimensions are shown in inches unless otherwise specified.



Main Lug Only (MLO) top feed



Main Circuit Breaker (MCB) top feed



Main Lug Only (MLO) bottom feed



Main Circuit Breaker (MCB) bottom feed

Figure 17: Main lugs on top or bottom compartment

Main Lug Only (MLO)

Horizontal lugs are available with 600A, 42,000A symmetrical bracing only (see Figure 18).

Special lugs such as NEMA 2-hole compression lugs can be accommodated. Consult Siemens for space requirements.

Amp/Bracing (A/K)	Location	Incoming cable size	Fig. ref. next page	Wire bending space dim. A	Total assembly height dim. B	Required unit space dim. C
600A/42K	Top	Qty = 2 #4 - 350kcmil CU	Figure 18	13	12	0
600A/42K-65K	Top	Qty = 2 #2 - 600kcmil CU	Figure 19	16	24	12
600A/85-100K	Top	Qty = 2 #2 - 600kcmil CU	Figure 20	20	30	18
600A/42K[1]	Bottom	Qty = 2 #4 - 350kcmil CU	Figure 21	13	18	12
600A/65K[1]	Bottom	Qty = 2 #4 - 350kcmil CU	Figure 21	13	24	18
800A/42K-65K	Top	Qty = 2 #2 - 600kcmil CU	Figure 19	16	24	12
800A/85K-100K	Top	Qty = 2 #2 - 600kcmil CU	Figure 20	20	30	18
800A/42K-65K[2]	Bottom	Qty = 2 #2 - 600kcmil CU	Figure 22	18	30	24
1200A/42K-100K	Top	Qty = 3 #2 - 600kcmil CU	Figure 20	20	30	18
1200A/42K-100K[2]	Bottom	Qty = 3 #2 - 600kcmil CU	Figure 22	18	30	24
1600A/42K-100K	Top	Qty = 4 #2 - 600kcmil CU	Figure 20	20	30	18
1600A/42K-65K[2]	Bottom	Qty = 4 #2 - 600kcmil CU	Figure 22	18	30	24
1600A/100K[2]	Bottom	Qty = 4 #2 - 600kcmil CU	Figure 24	46	72	72
2000A/42K-100K	Top	Qty = 6 #2 - 600kcmil CU	Figure 23	29	48	36
2000A/42K-100K	Bottom	Qty = 6 #2 - 600kcmil CU	Figure 24	46	72	72
2500A/42K-100K	Top	Qty = 6 #2 - 600kcmil CU	Figure 23	29	48	36
2500A/42K-100K	Bottom	Qty = 6 #2 - 600kcmil CU	Figure 24	46	72	72

1 Space behind structure not available.
2 Entire rear of structure not available.
Optional lugs available. Contact factory for size and rating.

Incoming line termination arrangements for Main Lug Only (MLO)

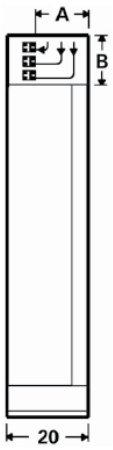


Figure 18

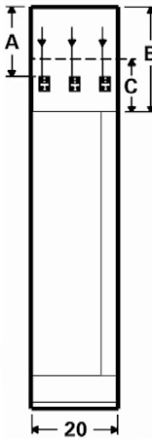


Figure 19

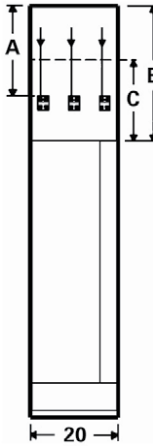


Figure 20

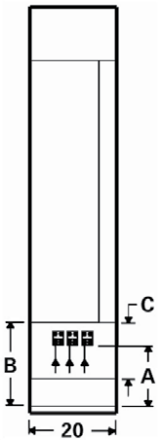


Figure 21

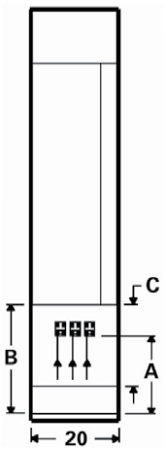


Figure 22

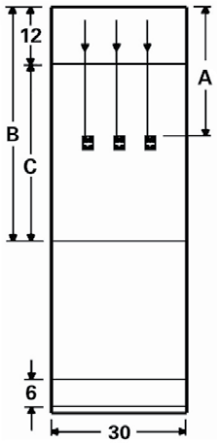


Figure 23

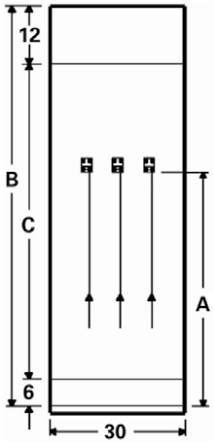
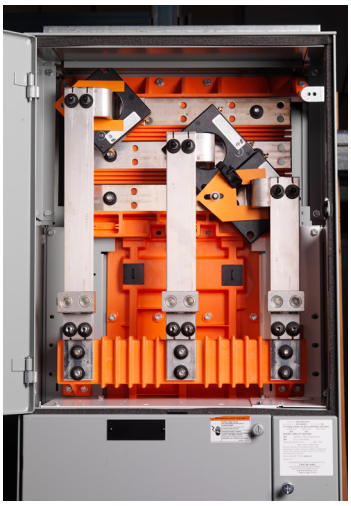


Figure 24



Example: MLO top feed

Main Circuit Breaker (MCB)

Molded Case Thermal Magnetic circuit breakers, Molded Case Solid State circuit breakers, and Insulated Case 3WA Power circuit breakers can be used as mains in the MCC. These circuit breakers are 80% rated, however 100% rated options are also available (see below).

Circuit Breaker Frame	Location	Incoming cable size	Fig. ref. next page	Wire bending space dim. A	Total assembly height dim. B	Required unit space dim. C
400A[7 8]	Top	Qty = 1 #6 - 350kcmil CU	Figure 26	15	30	18
400A[7 8]	Bottom	Qty = 2 3/0 - 500kcmil CU	Figure 30	15	42	36
600A[7 8]	Top	Qty = 2 3/0 - 500kcmil CU	Figure 26	15	30	18
600A[7 8]	Bottom	Qty = 2 3/0 - 500kcmil CU	Figure 30	15	42	36
800A[1 8]	Top	Qty = 3 #1 - 500kcmil CU	Figure 27	22	48	36
800A [2 6 8]	Bottom	Qty = 3 #1 - 500kcmil CU	Figure 31	22	54	48
1200A[1 8]	Top	Qty = 4 250 - 500kcmil CU	Figure 27	22	48	36
1200A[2 3 6 8]	Bottom	Qty = 4 250 - 500kcmil CU	Figure 31	22	54	48
1600A[3 8]	Top	Qty = 4 300 - 600kcmil CU	Figure 34	30	90	72
1600A[3 8]	Bottom	Qty = 4 300 - 600kcmil CU	Figure 35	30	90	72
2000A[3]	Top	Qty = 6 300 - 600kcmil CU	Figure 32	32	90	72
2000A[3]	Bottom	Qty = 6 300 - 600kcmil CU	Figure 33	26	90	72
1600A[4]	Top	Qty = 4 300 - 600kcmil CU	Figure 32	28	90	72
1600A[4]	Bottom	Qty = 4 300 - 600kcmil CU	Figure 33	25	90	72
2500A[4]	Top	Qty = 6 300 - 600kcmil CU	Figure 32	28	90	72
2500A[4]	Bottom	Qty = 6 300 - 600kcmil CU	Figure 33	25	90	72

1 Space in rear of structure not available
2 Entire rear of structure not available
3 Molded case circuit breakers
4 3WA power circuit breakers
5 15-25A lug size 12-10 AL, 14-10 CU; 30-100A, 10-1/0 CU/AL
6 800A - 1200A not available in back-to-back bottom mounting
7 Stab opening at bottom of unit not available in rear
8 100% rated circuit breaker option available to 1200A only; unit size may increase

Optional lugs available. Contact factory for size and rating.
Note: All circuit breakers are calibrated for 40° C.

Incoming line termination arrangements for Main Circuit Breaker (MCB)

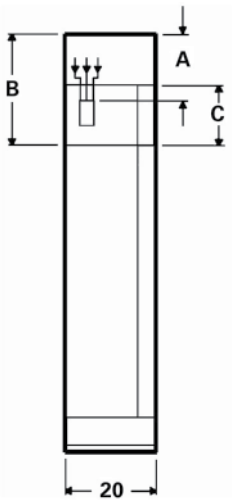


Figure 25

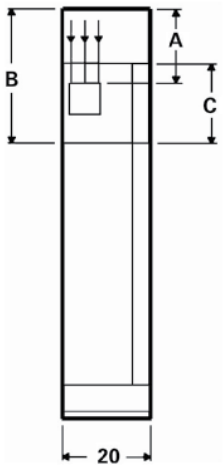


Figure 26

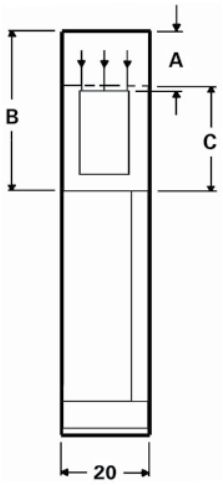


Figure 27

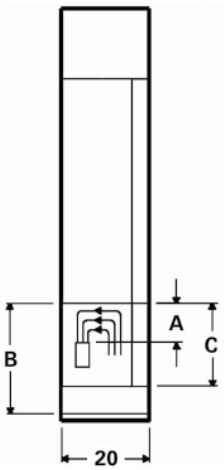


Figure 28

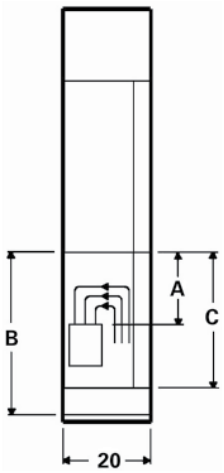


Figure 29

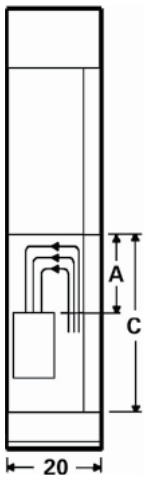


Figure 30

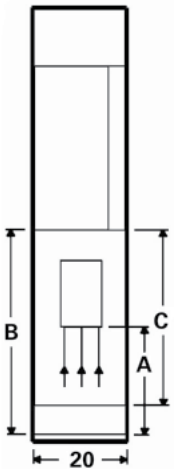


Figure 31

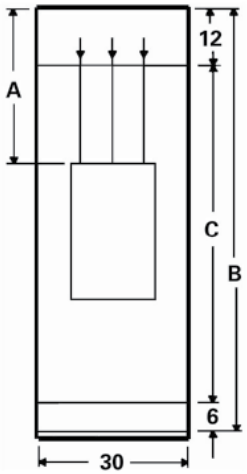


Figure 32

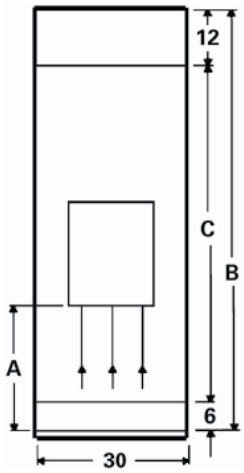


Figure 33

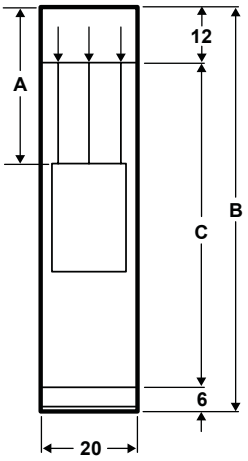


Figure 34

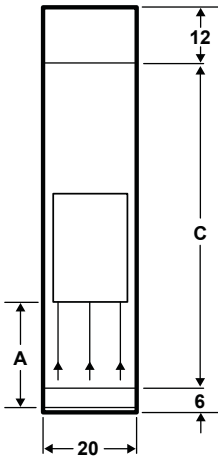


Figure 35



Example: MCB top feed

Main Disconnect Switch (MDS)

Main fusible switches consist of the following:

- 400 to 600A, Class R fuse holder
- 800 to 1200A, Class L fuse holder

Fusible disconnect switch/clips	Location	Incoming cable size	Fig. ref. next page	Wire bending space dim. A	Total assembly height dim. B	Required unit space dim. C
400A/400A	Top	Qty = 2 3/0 - 500kcmil CU	Figure 40	14	48	36
400A/400A	Bottom	Qty = 2 3/0 - 500kcmil CU	Figure 43	14	60	54
600A/600A	Top	Qty = 2 3/0 - 500kcmil CU	Figure 40	14	48	36
600A/600A	Bottom	Qty = 2 3/0 - 500kcmil CU	Figure 43	14	60	54
800A/800A[1]	Top	Qty = 3 250-500kcmil CU	Figure 46	22	90	72
800A/800A[1]	Bottom	Qty = 3 250-500kcmil CU	Figure 45	22	90	72
1200A/1200A[1]	Top	Qty = 4 250-500kcmil CU	Figure 46	22	90	72
1200A/1200A[1]	Bottom	Qty = 4 250-500kcmil CU	Figure 45	22	90	72

1 Space in rear of structure not available.
Optional lugs available. Contact factory for size and rating.

Incoming line termination arrangements for Main Disconnect Switches (MDS)

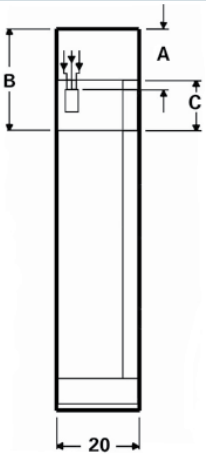


Figure 36

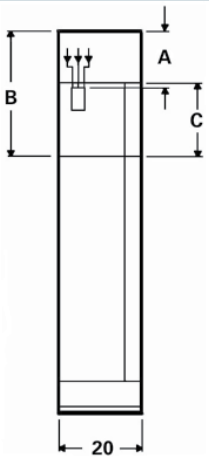


Figure 37

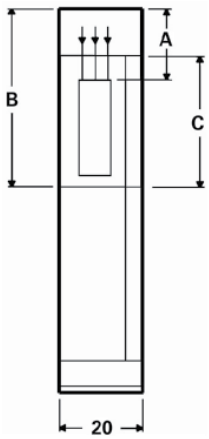


Figure 38

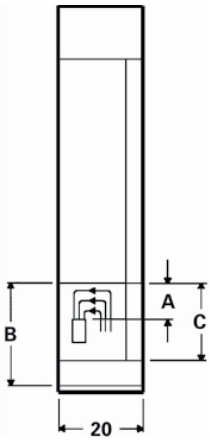


Figure 39

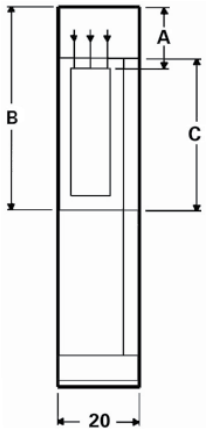


Figure 40

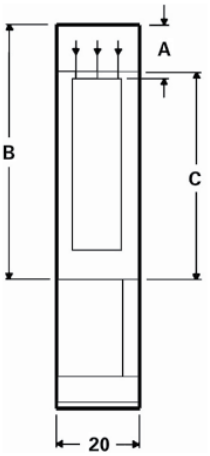


Figure 41

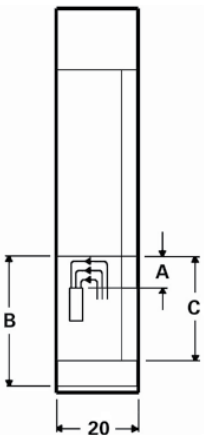


Figure 42

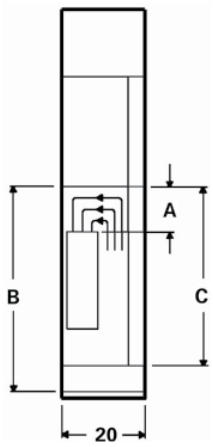


Figure 43

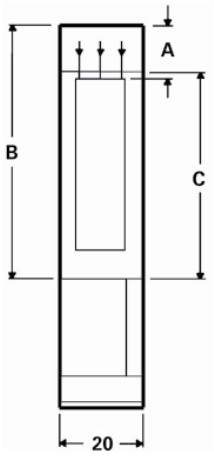


Figure 44

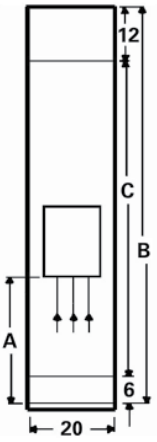


Figure 45

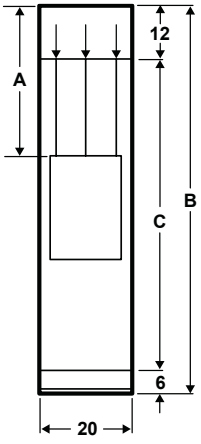


Figure 46

Feeders



Example of Feeder Circuit Breaker (FCB)



Example of Dual Feeder Disconnect Switch (DFDS)

Feeder Circuit Breakers space requirements

Frame size (Amps)	Max trip (Amps)	Unit height (inches)
		1 CB
125	125	12
250	250	18
400	400	24[1,3]
600	600	24[1,3]
800	800	36[1] (Top)
800	800	48[1] (Bottom)
1200	1200	36[1] (Top)
1200	1200	48[1] (Bottom)

Feeder Circuit Breakers high density

Max trip (Amps)	Unit height (inches)
	1 CB
15-250	6

Feeder Disconnect Switch space requirements

Switch rating (Amps)	Fuse clip size (Amps)	Unit height (inches)	
		1 SW	2 SW
30	30	12[2]	12[2]
60	60	12[2]	12[2]
100	100	18	—
200	200	30	—
400	400	42[1,3]	—
600	600	42[1,3]	—

Feeder Disconnect Switch ratings

Disconnect size	Disconnect[2] type	Fuse type	Rating
30	MCS	R,J	100KA
60	MCS	R,J	100KA
100	MCS	R,J	100KA
200	MCS	R,J	100KA
400	JXDS	R,J	100KA
600	LXDS	R,J	100KA
800	MXDS	L	100KA
1200	MXDS	L	100KA

1 Fixed mounted unit.
2 Requires load terminal blocks.
3 Stab opening at top of unit not available in rear.

Feeder Circuit Breakers

Siemens offers feeder circuit breakers from our 3VA and 3WA breaker lines based on breaker ampacity and customer requirements.

The all new 3VA molded case circuit breakers are ideal for motor control center applications. Offering over 500 accessories in a modular framework; 3VA breakers provide maximum flexibility to meet your needs.

Highlights:

- Certified in accordance with UL 489
- Feeder breaker of choice at 600A and below
- Compact design
- Large selection of internal accessories
- Available in thermal magnetic (3VA5) and electronic trip (3VA6)
- Integrated communications available





Feeder Circuit Breaker ratings

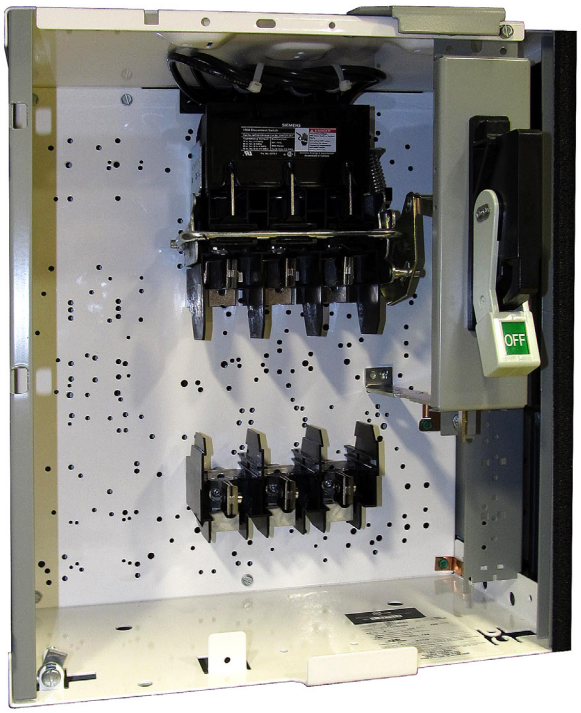
Type	Frame	240V	480V	600V
3VA51(H)	125A	150	65	25
3VA61(H)	150A	100	65	22
3VA61(C)	150A	200	100	35
3VA61(L)	150A	200	150	50
3VA61(E)	150A	-	200	100
3VA52(H)	250A	100	65	25
3VA52(C)	250A	200	100	35
3VA62(H)	250A	100	65	22
3VA62(C)	250A	200	100	35
3VA62(L)	250A	200	150	50
3VA62(E)	250A	-	200	100
3VA53(H)	400A	100	65	25
3VA53(C)	400A	200	100	35
3VA63(H)	400A	100	65	22
3VA63(C)	400A	200	100	35
3VA63(L)	400A	200	150	50
3VA63(E)	400A	-	200	100
3VA54(H)	600A	100	65	25
3VA54(C)	600A	200	100	35
3VA64(H)	600A	100	65	22
3VA64(C)	600A	200	100	35
3VA64(L)	600A	200	150	50
3VA64(E)	600A	-	200	100
MD6	800A	65	50	25
HMD6	800A	100	65	50
CMD6	800A	100	100	65
SMD6	800A	65	50	25
SHMD6	800A	100	65	50
SCMD6	800A	100	100	65
WLS208	800A	65	65	65
WLL208	800A	100	100	85
ND6	1200A	65	50	25
HND6	1200A	100	65	50
CND6	1200A	100	100	65
SND6	1200A	65	50	25
SHND6	1200A	100	65	50
SCND6	1200A	100	100	65
WLS212	1200A	65	65	65
WLL212	1200A	100	100	85
PD6	1600A	65	50	25
HPD6	1600A	100	65	50
CPD6	1600A	100	100	65
WLS216	1600A	65	65	65
WLL216	1600A	100	100	85
RD6	2000A	65	50	25
HRD6	2000A	100	65	50
WLS220	2000A	65	65	65
WLL220	2000A	100	100	85

Breakers listed are rated to the UL489 standard.

Note: All circuit breakers are calibrated for 40° C.

Standard disconnects

Standard fusible units use the following disconnects:
Siemens Visible Blade 30 - 200A
Siemens Molded Case Switch 400, 600A



Example of 100A disconnect switch



Example of 400A molded case switch

Bus splice & bus duct

Ground bus

Bus links are available for connection to existing tiastar/system 89 MCC. The following information is needed for each order:

a. Style No. of existing MCC

b. Left or right connection to new MCC order

c. Ampacity of existing bus (example: 600A, 800A, etc.)

d. Size of existing ground and neutral bus

Note: For some MCCs (Model 90 and Model 95), a transition arrangement may be necessary.

Bus duct connections are supplied on request. They may require a pull box or a special structure depending on the application. Complete bus stub dimensions, bus run drawings, and specification must be supplied.

Splice kits

Note: For complete splice kit installation details, refer to instructions supplied with splice kits.

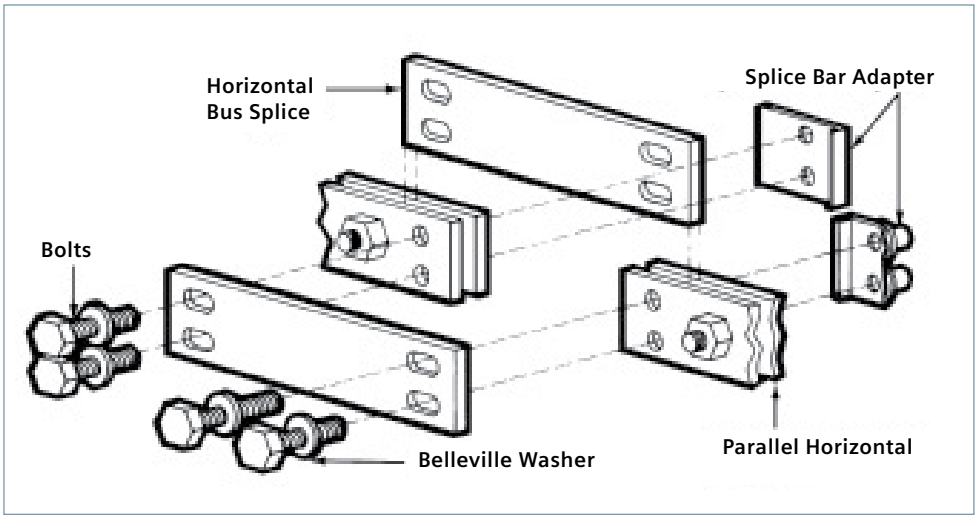


Figure 47: Exploded view of splice kit

Splice kits

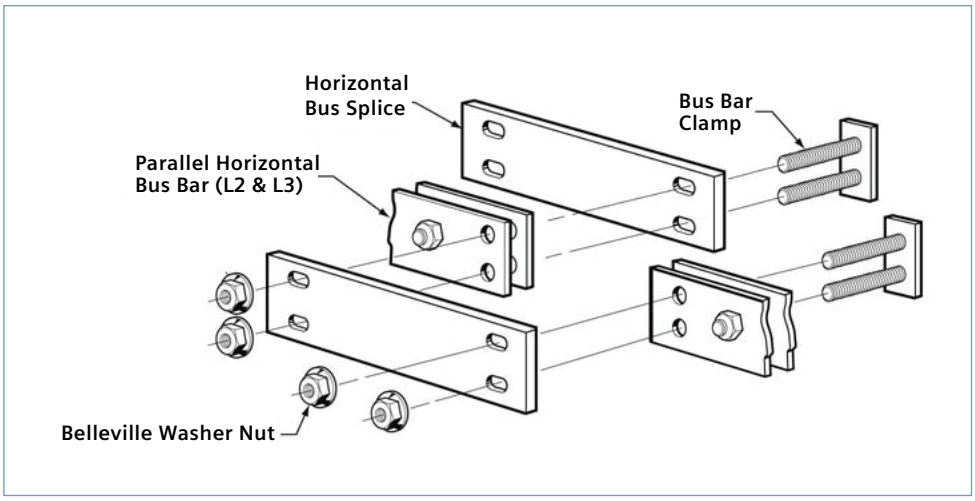


Figure 48: 1200, 1600A L2 and L3 connection

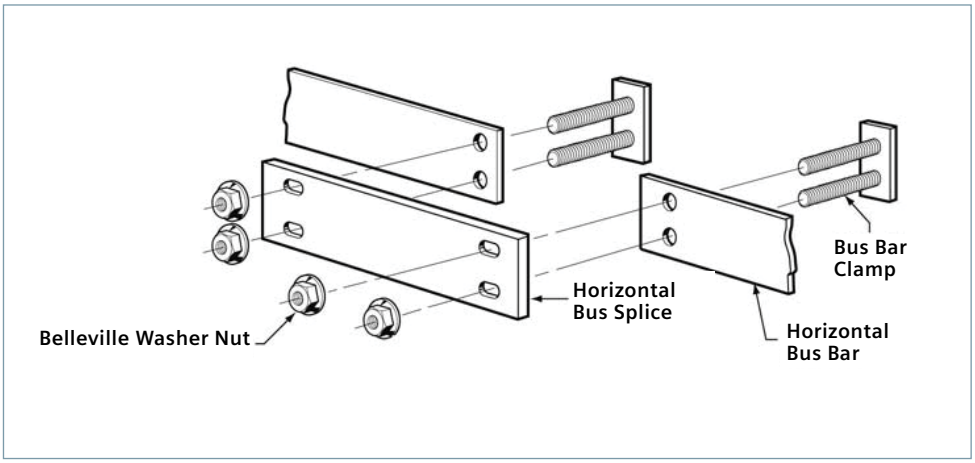


Figure 49: 1200A, 1600A neutral bus connection

TPS4 Surge Protective Devices (SPD)

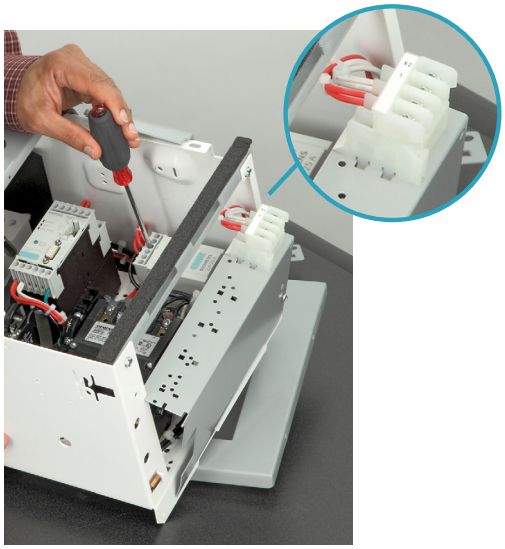
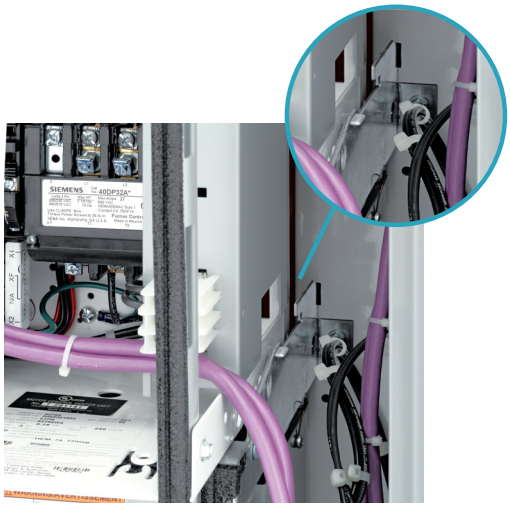
Siemens Integral TPS4s are UL 1449 3rd Edition, factory installed SPDs within our MCCs, utilizing optimal electrical system connections to minimize impedance losses. This results in some of the industry's best "installed" Voltage Protection Ratings. This SPD has the following features:

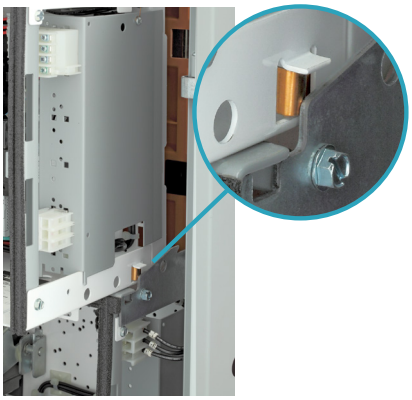
- UL 1449 4th Edition and UL 1283
- UL 1449-4 Type 2 SPD, UL 1283 Listed, CSA 22.2 No. 269.2, Optional UL 1449 4th Edition Recognized Type 1, CSA 22.2
- 20 kA In (most models)
- 100 - 300 kA surge current capacity per phase
- EMI/RFI filtering or Sine Wave tracking
- 10 year product warranty
- Standard Monitoring - LEDs, Audible Alarm, Dry Contacts, Surge Counter, and Ground References Monitoring (GRM) Diagnostics.
- 200 kA SCCR (most models)
- UL96A Lightning Protection Master Label Compliant



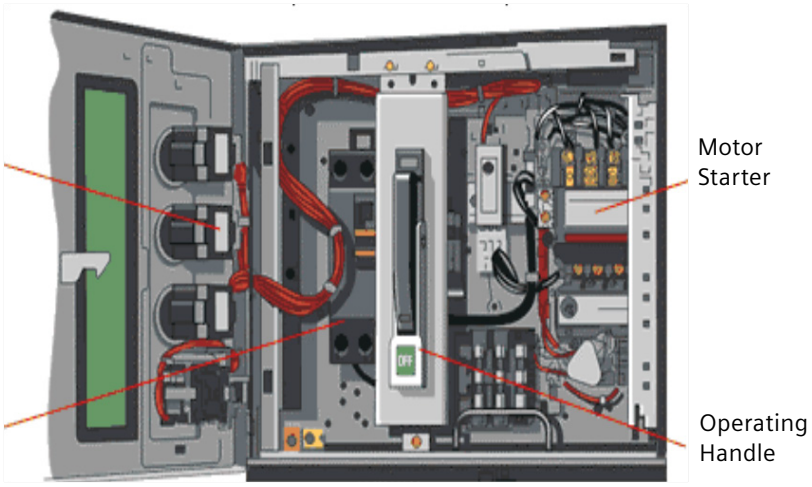
Plug-in feature units

All plug-in unit of the same size are interchangeable and can be relocated elsewhere in the motor control center. Unit compartment heights may be modified in the field to accept different size units.

Feature		Benefits
Terminal blocks are mounted on a swing-out side barrier.		Ease in wiring and inspection
A positive stop in the “TEST” position.		Indicates that a plug-in unit is fully withdrawn from the vertical bus and prevents the unit from falling out of the structure during unit removal.

Feature		Benefits
Copper ground clip on plug-in unit.		Engages and grounds units at all times.
All doors swing open a minimum of 110°.		Easy unit access and removal.
Safety lock capabilities.		Allows lockout /tagout procedures to be implemented at the unit level.

Combination starters



A combination starter is the grouping of a circuit protecting device with a contactor and motor overload to operate and protect the customers motor load. Plug in units or MCC buckets are modular compartments that plug on to the vertical bus of the motor control center. Power flows from the horizontal bus to the vertical bus. Then through the stab assembly into the MCC bucket and off to the customers motor load.



NEMA size	Description
1 - 4	SIRIUS NEMA Rated Contactors (Standard)
5, 6	SIRIUS NEMA Rated Contactors (Standard)
4, 5, 6	SIRIUS Vacuum Contactors (Optional)

Stabs

The power stabs engage the vertical power distribution bus when the units are installed in the structure. Plug-in tin plated copper (standard) unit stab assemblies include self-aligning stab clips with spring steel backup springs. Wires from the stab clips to the line-side of the circuit breaker or disconnect switch are contained in the stab housing and are isolated phase-to-phase until the wires enter the MCC.

Full Voltage Non-Reversing (FVNR) Unit and Full Voltage Reversing (FVR) with fusible switch or circuit breaker



Example of Full Voltage Non-Reversing (FVNR)



Example of Full Voltage Reversing (FVR)

Full Voltage Non-Reversing (FVNR) Unit and Full Voltage Reversing (FVR) with circuit breaker or fusible switch

	Maximum Horsepower Rating					Circuit Breaker Type				
								Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Standard Breaker Type	MCP Frame Size (Amps)	FVNR	FVR	kA Interrupting Rating at 480V[2]
1	7.5	7.5	10	10	10	MCP	125	12 (305)	18 (457)	42 (standard) / 100 (optional)
2	10	15	25	25	25			12 (305)	24 (610)	
3	25	30	50	50	50			18 (457)	30 (762)	
4	40	50	75	100	100		125/250	24 (610)	36 (914)	
5	75	100	150	200	200		250/400	36 (914)	48 (1219)	
6[3]	150	200	300	400	400		400/600/800	48 (1219)	72 (1829) 30W (762W)	
7[3]	—	—	—	600	600	ND6[4]	1200	72 (1829) 20W x 20D (508W x 508D)	N/A	42 / 65

	Maximum Horsepower Rating					Fusible Type (for maximum HP at 480V), Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Fusible Switch/ Fuse Clip (Amps)	FVNR	FVR	kA nterrupting Rating at 80V[2]
1	7.5	7.5	10	10	10	30/30	12 (305	18 (457)	100
2	10	15	25	25	25	60/60	12 (305)	24 (610)	
3	25	30	50	50	50	100/100	24 (610)	36 (914)	
4	40	50	75	100	100	200/200	42 (1067)	48 (1219)	
5	75	100	150	200	200	JD6 MCS/400	60 (1524)	60 (1524)	
6[3]	150	200	300	400	400	MD6 MCS/800	72 (1829)	72 (1829) 30W (762W)	
7[3]	—	—	—	600	600	ND6 MCS/1200	40W x 20D (1016W x 508D)	N/A	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in)
4 Thermal magnetic breaker (not MCP)

Full Voltage Contactor (FVC) unit with circuit breaker or fusible switch

	Maximum KW Resistance Heating Loads					Circuit Breaker Type			Fusible Type (for maximum KW at 480V)		
NEMA size	208V	230V	400V	480V	600V	Circuit Breaker Frame Size (Amps)	Dimensions in inches (mm) Unit Height[1]	kA Interrupting Rating at 480V[2]	Fusible Switch/ Fuse Clip (Amps)	Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth	kA Interrupting Rating at 480V[2]
1	10.8	11.9	18.7	23.8	31	125	12 (305)	100	30/30	12 (305	100
2	16.2	17.9	31.2	35.8	46.7	125	12 (305)		60/60	12 (305)	
3	32	35	62	71	93	125	18 (457)		100/100	24 (610)	
4	48	54	94	107	140	125/250	24 (610)		200/200	42 (1067)	
5	108	119	206	238	311	250/400	36 (914)		JXD6 MCS/400	60 (1524)	
6[3]	198	218	346	437	570	600	48 (1219)		LXD6 MCS/600	72 (1829)	
						800	72 (1829)		MXD6 MCS/800	72 (1829) 30W (762W)	
7[3]	259	286	476	572	747	1200	72 (1829)	65	NXD6 MCS/1200	72 (1829) 50W x 20D (1270W x 508D)	

	Maximum KW Resistance Heating Loads					Fusible Type (for maximum HP at 480V), Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Fusible Switch/ Fuse Clip (Amps)	FVNR	FVR	kA Interrupting Rating at 480V[2]
1	10.8	11.9	18.7	23.8	31	30/30	12 (305	18 (457)	100
2	16.2	17.9	31.2	35.8	46.7	60/60	12 (305)	24 (610)	
3	32	35	62	71	93	100/100	24 (610)	36 (914)	
4	48	54	94	107	140	200/200	42 (1067)	48 (1219)	
5	108	119	206	238	311	JD6 MCS/400	60 (1524)	60 (1524)	
6[3]	198	218	346	437	570	MD6 MCS/800	72 (1829)	72 (1829) 30W (762W)	
7[3]	259	286	476	572	747	ND6 MCS/1200	40W x 20D (1016W x 508D)	N/A	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in)
4 Thermal magnetic breaker (not MCP)

Two Speed One Winding (2S1W) and Two Speed Two Winding (2S2W) with circuit breaker or fusible switch

Constant or variable torque

	Maximum Horsepower Rating					Circuit Breaker Type				
								Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Standard Breaker Type	MCP Frame Size (Amps)	2S1W	2S2W	kA Interrupting Rating at 480V[2]
1	7.5	7.5	10	10	10	MCP	125	24 (610)	24 (610)	42 (standard) / 100 (optional)
2	10	15	25	25	25			24 (610)	24 (610)	
3	25	30	50	50	50			48 (1219)	36 (914)	
4	40	50	75	100	100		125/250	60 (1524)	48 (1219)	
5[3]	75	100	150	200	200		250/400	72 (1829) 30W (762W)	72 (1829) 30W (762W)	
6[3]	150	200	300	400	400		600/800	Consult Siemens	72 (1829) 30W (762W)	

	Maximum Horsepower Rating					Fusible Type (for maximum HP at 480V), Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Fusible Switch/Fuse Clip (Amps)	2S1W	2S2W	kA Interrupting Rating at 480V[2]
1	7.5	7.5	10	10	10	30/30	24 (610)	24 (610)	100
2	10	15	25	25	25	60/60	24 (610)	24 (610)	
3	25	30	50	50	50	100/100	36 (914)	30 (762)	
4	40	50	75	100	100	200/200	48 (1219)	36 (914)	
5[3]	75	100	150	200	200	JD6 MCS/400	72 (1829) 30W (762W)	72 (1829) 30W (762W)	
6[3]	150	200	300	400	400	MD6 MCS/800	Consult Siemens	72 (1829) 40W (1016W)	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in).

Two Speed One Winding (2S1W) and Two Speed Two Winding (2S2W) with circuit breaker or fusible switch (continued)

Constant horsepower

	Maximum Horsepower Rating					Circuit Breaker Type				
								Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Standard Breaker Type	MCP Frame Size (Amps)	2S1W	2S2W	kA Interrupting Rating at 480V[2]
1	5	5	7.5	7.5	7.5	MCP	125	24 (610)	24 (610)	42 (standard) / 100 (optional)
2	7.5	10	20	20	20			24 (610)	24 (610)	
3	20	25	40	40	40			36 (914)	30 (762)	
4	30	40	50	75	75		125/250	48 (1219)	36 (914)	
5[3]	60	75	100	150	150		250/400	72 (1829) 30W (762W)	72 (1829) 30W (762W)	
6[3]	100	150	200	300	300		400/600	Consult Siemens	72 (1829) 30W (762W)	

	Maximum Horsepower Rating					Fusible Type (for maximum HP at 480V), Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Fusible Switch/ Fuse Clip (Amps)	2S1W	2S2W	kA Interrupting Rating at 480V[2]
1	5	5	7.5	7.5	7.5	30/30	24 (610)	24 (610)	100
2	7.5	10	20	20	20	60/60	24 (610)	24 (610)	
3	20	25	40	40	40	100/100	48 (1219)	36 (914)	
4	30	40	50	75	75	200/200	60 (1524)	48 (1219)	
5[3]	60	75	100	150	150	JD6 MCS/400	72 (1829) 30W (762W)	72 (1829) 30W (762W)	
6[3]	100	150	200	300	300	MD6 MCS/800	Consult Siemens	72 (1829) 40W (1016W)	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in).

Reduced Voltage Autotransformer (RVAT) non-reversing with circuit breaker or fusible switch—closed transition

NEMA size	Maximum Horsepower Rating					Circuit Breaker Type		
	208V	230V	400V	480V	600V	Standard Breaker Type	Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth	kA Interrupting Rating at 480V[2]
2	10	15	25	25	25	MCP	42 (1067	42 (standard) / 100 (optional)
3	25	30	50	50	50		42 (1067)	
4	40	50	75	100	100		48 (1219)	
5[3]	75	100	150	200	200		72 (1829) 30W (762W)	
6[3]	150	200	300	400	400		72 (1829) 30W (762W)	
7[3]	—	—	—	600	600	ND6[4]	Consult Siemens	42/65

NEMA size	Maximum Horsepower Rating					Fusible Type (for maximum HP at 480V), Type		
	208V	230V	400V	480V	600V	Fusible Switch/ Fuse Clip (Amps)	Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth	kA Interrupting Rating at 480V[2]
2	10	15	25	25	25	60/60	42 (1067)	100
3	25	30	50	50	50	100/100	48 (1219)	
4	40	50	75	100	100	200/200	60 (1524)	
5[3]	75	100	150	200	200	JD6 MCS/400	72 (1829) 30W (762W)	
6[3]	150	200	300	400	400	MD6 MCS/800	72 (1829) 30W (762W)	
7[3]	—	—	—	600	600	ND6 MCS/1200	Consult Siemens	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in)
4 Thermal magnetic breaker (not MCP)

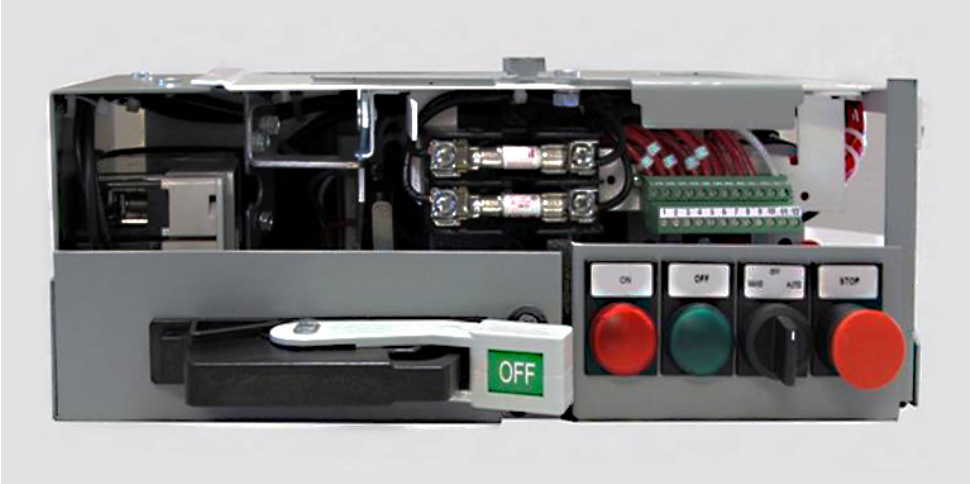
Reducing Voltage Wye Delta Closed (YDC) transition and Reducing Voltage Wye Delta Open (YDO) transition

	Maximum Horsepower Rating					Circuit Breaker Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Standard Breaker Type	YDO	YDC	kA Interrupting Rating at 480V[2]
2	20	25	25	40	40	MCP	30 (762)	42 (1067)	42 standard)/ 100 (optional
3	25	30	50	75	75		36 (914)	48 (1219)	
4	60	60	75	150	150		36 (914)	48 (1219)	
5[3]	150	150	150	300	300		72 (1829) 30W (762W)	72 (1829) 30W (762W)	

	Maximum Horsepower Rating					Fusible Type (for maximum HP at 480V), Type			
							Dimensions in inches (mm) Unit Height[1] W = Width, D = Depth		
NEMA size	208V	230V	400V	480V	600V	Fusible Switch/ Fuse Clip (Amps)	YDO	YDC	kA Interrupting Rating at 480V[2]
2	20	25	25	40	40	100/100	36 (914)	48 (1219)	100
3	25	30	50	75	75	200/200	48 (1219)	60 (1524)	
4	60	60	75	150	150	JD6 MCS/400	72 (1829)	72 (1829)	
5[3]	150	150	150	300	300	LD6 MCS/600	72 (1829) 30W (762W)	72 (1829) 30W (762W)	

1 The addition of oversized CPTs, relays, timers, etc. may increase unit height.
2 For other available voltage ratings, consult Siemens
3 Fixed mounted units (not plug-in).

Compact High Density (HD) combination starters



Our Compact Modular High Density Units reduce unit size by 6" (Up to 50%) for starters sizes 1-4 reducing footprint and saving floor space while meeting UL and NEMA standards.

Full Voltage Non-Reversing (FVNR) Unit with Circuit Breaker

	Maximum Horsepower Rating			Circuit Breaker Type			
NEMA size	208V	230V	480V	Standard Breaker Type	MCP Fame Size (Amps)	Unit Height Dimensions in inches (mm)	kA Interrupting Rating at 480V[1]
1	7.5	7.5	10	MCP	125	6 (152)	100
2	10	15	25				
3	25	30	50			12 (305)	
4	40	50	100		125/250	18 (457)	

Full Voltage Contactor (FVC) Unit with Circuit Breaker

	Maximum KW Rating				
NEMA size	208V	230V	480V	Unit Height Dimensions in inches (mm)	kA Interrupting Rating at 480V[1]
1	9.7	10.7	22	6 (152)	100
2	16.2	17.9	37		
3	32	35.8	74	12 (305)	
4	48	54	112	18 (457)	

1 For other available voltage ratings contact Siemens

Reduced Voltage Soft-Starter (RVSS) units



Siemens soft-start controllers incorporate the latest in solid-state technology to provide precise control in the starting of AC induction motors. Solid state reduced voltage starting allows motor voltage to be gradually applied, reducing potentially damaging high inrush currents and starting torques. These controls are easy to set up, operate, troubleshoot and repair. They are fully adjustable for many applications and with voltage ramp capability, can handle varying loads. Soft-start controllers can lower operating costs by reducing downtime due to equipment maintenance and repair; and minimize product and drive system damage caused by hard physical starts or stops. Siemens Soft-Start controllers with the energy saving feature conserve energy during lightly loaded conditions by reducing the motor voltage and current

Overview

The advantages of the SIRIUS soft starters at a glance:

- Soft starting and soft stop
- Stepless starting
- Reduction of current peaks
- Avoidance of mains voltage fluctuations during starting
- Reduced load on the power supply network
- Reduction of the mechanical load in the operating mechanism
- Considerable space savings and reduced wiring compared with mechanical reduced voltage starters
- Maintenance-free switching
- Fits perfectly in the SIRIUS modular System

SIRIUS 3RW55

In addition to soft starting and soft stopping, the solid-state SIRIUS 3RW55 soft starters provide numerous functions for higher-level requirements. They cover a rating range up to 600Hp at 460 V in the inline circuit. The SIRIUS 3RW55 soft starters are characterized by a compact design for space-saving and clearly arranged control cabinet layouts. For optimized motor starting and stopping, the innovative SIRIUS 3RW55 soft starters are an attractive alternative with considerable savings potential compared to applications with a frequency converter.

Whether it is for inline circuits or inside delta circuits – the SIRIUS 3RW55 soft starter offers savings especially in terms of size and equipment costs. Combinations of various starting, operating and ramp-down possibilities ensure an optimum adaptation to the application specific requirements. Operating and commissioning can be performed by means of the user-friendly keypad and a menu prompted, multi-line graphic display with background lighting. The optimized motor ramp-up and ramp down can be effected by means of just a few settings with a previously selected language. Four-key operation and plain-text displays for each menu point guarantee full clarity at every moment of the parameterization and operation.



Application areas:

- Pumps
- Mills
- Ventilators
- Saws
- Compressors
- Crushers
- Water transport
- Mixers
- Conveying systems and lifts
- Centrifuges
- Hydraulics
- Industrial cooling and refrigerating systems

Reduced Voltage Soft Starter (RVSS) Units

Rating HP (Class 10E)	RVSS Type	Rated Amperes(1)	Mounting Height	Structure
7.5	3RW5513	11	36	Plug-in
10	3RW5514	16	36	Plug-in
15	3RW5515	22	36	Plug-in
20	3RW5516	28	36	Plug-in
25	3RW5524	42	36	Plug-in
30	3RW5524	42	36	Plug-in
40	3RW5525	56	36	Plug-in
50	3RW5526	68	36	Plug-in
60	3RW5527	83	36	Plug-in
75	3RW5534	101	36	Plug-in
100	3RW5535	128	36	Plug-in
125	3RW5536	153	36	Plug-in
150	3RW5543	186	48x20	Fixed
200	3RW5545	279	48x20	Fixed
250	3RW5546	328	72x20	Fixed
350	3RW5547	416	72x20	Fixed
400	3RW5548	504	72x20	Fixed

Rating HP (Class 20E)	RVSS Type	Rated Amperes(1)	Mounting Height	Structure
7.5	3RW5513	11	36	Plug-in
10	3RW5514	16	36	Plug-in
15	3RW5515	22	36	Plug-in
20	3RW5516	27.2	36	Plug-in
25	3RW5524	42	36	Plug-in
30	3RW5524	42	36	Plug-in
40	3RW5525	56	36	Plug-in
50	3RW5526	68	36	Plug-in
60	3RW5527	83	36	Plug-in
75	3RW5534	97	36	Plug-in
100	3RW5536	129	36	Plug-in
125	3RW5543	146	48x20	Fixed
150	3RW5546	230	72x20	Fixed
200	3RW5548	262	72x20	Fixed
250	3RW5552	450	72x30	Fixed
350	3RW5552	450	72x30	Fixed
400	3RW5554	520	72x30	Fixed

Variable Frequency Drive (VFD) units

SINAMICS G120C



SINAMICS G120C has been especially designed for an economic, space-saving and easy-to-operate frequency converter providing a multitude of functions. This device combines compactness with superior power density and is characterized by fast installation and commissioning.

Smallest size

- Compact design (integrated braking chopper)
- Fast mechanical installation (i.e. pluggable terminals)

Easy to use

- Simple, optimized commissioning with the STARTER tool
- Effective, adequate parameter set (simple storing and cloning functions using IOP, BOP-2 or SD card)
- Usable with IOP or BOP-2 operator panels

Leading edge technology

- Energy-efficient, encoder-less vector control - automatic flow reduction with V/F ECO
- Safety Integrated (Safe Torque Off)
- Communication PROFIBUS DP, PROFINET, CAN and USS/ Modbus RTU

Application

For industrial and commercial applications (secondary drive in production machines or generally for water/waste water, automotive). Application examples include mixers, extruders, simple pumps, fans, compressors, vibrator motors, simple wire drawing machines.

SINAMICS G120C (continued)

Design

SINAMICS G120C is a compact inverter where the Control Unit (CU) and Power Module (PM) function units are combined in one device. SINAMICS G120C can be integrated into the widest range of applications, either using the integrated digital and analog inputs or via the integrated fieldbus interface (available in the USS/ Modbus RTU, PROFINET, PROFIBUS DP, CANopen versions). Especially the product versions with integrated PROFIBUS DP or Profinet interface make full integration into the Siemens TIA family possible, therefore allowing the advantages of the seamless TIA product family to be fully utilized. SINAMICS G120C devices are preset in the factory so that they can be immediately connected to PROFIBUS DP or Profinet fieldbuses and used without parameterization.

G120C technical data

	Output Ratings				Dimensions - in. (mm)[1]		
Frame size	LO-OL A	LO-OL hp	HI-OL A	HI-OL hp	Mounting Height	Structure W x D	IR
A	1.4	0.5	1.1	0.5	18 (457)	20 x 15 (508 x 381)	65ka
A	1.9	0.75	1.4	0.5			
A	2.6	1	1.9	0.75			
A	3.5	2	2.6	1			
A	4.8	2	3.5	2			
A	6.2	3	4.8	2			
A	7.5	3	6.2	3			
B	10.6	5	7.5	3	24 (610)		
B	14.0	10	10.6	5			
C	21.3	15	14.0	10	30 (762)		
C	26.4	15	21.3	15			
C	31.5	20	26.4	15			

1 Circuit Breaker, Reactor (Line or Load) and Drive Included.

Overload capacity

- High overload (HO):
  200% base load current I_H for 3 s plus
  150% base load current I_H for 57 s within a 300 s cycle time
- Light overload (LO):
  150% base load current I_H for 3 s plus
  110% base load current I_H for 57 s within a 300 s cycle time

SINAMICS G120C (continued)

Factory options

Technical Data	
Voltage and power ranges	380-480 V, 0.5 to 20 HP (LO) 380-480 V, 0.5 to 15 HP (HO)
Operating temperature	0 °C to +40 °C
Process control	Internal PID controller (auto-tuning)
Type of control	Vector control, FCC (Flux Current Control), multipoint characteristic (parameterizable V/f characteristic), V/f characteristic
Communications	PROFIBUS, DP, PROFINET, CANopen and USS/Modbus RTU

For additional G120C information, please see the SINAMICS and Motors for Single-Axis Drives Catalog, Order No. E86060-K5531-A101-A1-7600.

Contractor options
Bypass Contactor (None/Automatic/Manual/Selectable)
Input Isolation Contactor
Output Isolation Contactor

VFD options
Operator Panel (BOP-2, IOP, none)
Door Mounted Operator Panel
PC Inverter Connection Kit 2

Reactor, filter, and other options
Input/Output Reactor
Passive harmonic filter
RFI filter
Output filter (DV/DT, sine wave)
Pulse Resistor Braking[1]
Semiconductor Fuses

1 Recommend that resistor banks should be installed outside of the MCC. Consult factory for further details.

SINAMICS G120



SINAMICS G120 is a modular drive inverter system that comprises various function units. These are essentially: Control Unit (CU) and Power Module (PM). The CU controls and monitors the PM and the connected motor in several operating modes that can be selected. It supports communication with a local or central controller and monitoring devices.

- **With many innovative functions**
  Safety Integrated for safety-relevant machines and systems, capable of regenerative feedback into the line supply for energy saving
- **Fast commissioning**
  STARTER tool and data backup using the BOP-2, IOP or MMC/SD card
- **Efficient and consistent solutions**
  Via Totally Integrated Automation (TIA), consistency from SINAMICS through to the automation level

Application

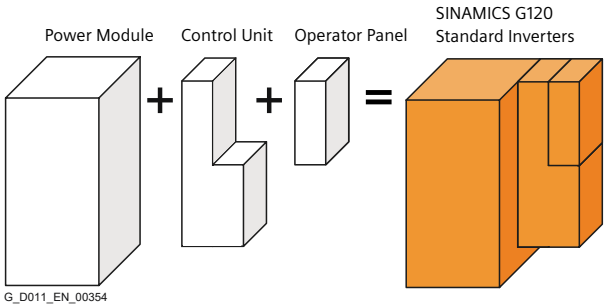
Machines and plants in industrial and commercial applications (machinery construction, automotive, textiles, chemical industry, printing, steel).

Application examples include: Pumps and fans, Compressors, Centrifuges, Conveyor systems.

Design

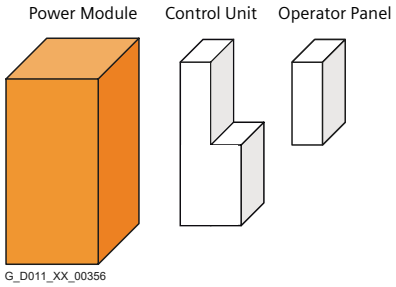
Application-oriented design of SINAMICS G120

SINAMICS G120 standard inverters are modular inverters for standard drives. Selection of the SINAMICS G120 is reduced to two or three steps thanks to the modular system used.



SINAMICS G120 (continued)

Selecting the power module



PM240-2 – Power Modules

PM240-2 – Power Modules are suitable for many applications. The PM240-2 has an integrated braking chopper in frame sizes FSA up to FSF and has the possibility of connecting a braking resistor. For frame size FSGX, an optional pluggable braking module can be ordered.



PM250 Power Modules

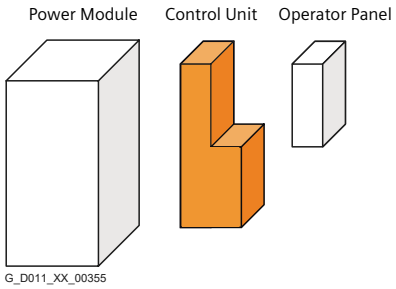
PM250 power modules are suitable for the same applications as the PM240-2, but they are specialized to address conveyor-related applications - where the braking energy is directly fed back into the line supply using the unique technology of Efficient Infeed Technology. This feature provides the ability to feed energy back into the supply system in the generator mode (electronic braking) so that the energy in not wasted in a braking resistor.



SINAMICS G120 (continued)

Selecting the Control Unit

The optimum Control Unit is selected, based on the number of I/Os and any additional functions required such as Safety Integrated or HVAC. The communication options are already integrated and do not have to be additionally ordered or plugged in. Three product series are available corresponding to the particular application.



MCC Control Unit Options

CU230P-2 HVAC	CU240B-2	CU240E-2	CU250S-2
CU230P-2 DP	CU240B-2 DP	CU240E-2 DP	CU250S-2 DP
CU230P-2 CAN		CU240E-2 F	CU250S-2 PN
CU230P-2 PN		CU240E-2 DP-F	CU250S-2 CAN
		CU240E-2 PN	
		CU240E-2 PN-F	
			
• Extended I/O configuration • Vector and servo control • Encoder feedback • Basic and Extended Safety Functions • USS, Modbus, PROFIBUS, PROFINET • Ethernet IP	• Basic I/O configuration • USS, Modbus, PROFIBUS, PROFINET	• Standard I/O configuration • STO as standard • Optional Basic Safety Functions • USS, Modbus, PROFIBUS, PROFINET	• Extended I/O configuration • Vector and servo control • Encoder feedback • Basic and Extended Safety Functions • USS, Modbus, PROFIBUS, PROFINET

SINAMICS G120 (continued)

Selecting the Control Unit (continued)

CU230 Control Units

The CU230 Control Units have been specifically designed for pump, fan and compressor applications.

CU240 Control Units

The CU240 Control Units are suitable for a wide range of applications in a general machine construction, such as conveyor belts, mixers and extruders.

CU250 Control Units

The CU250 Control Unit is particularly suited for drives with high requirements in speed and torque accuracy.

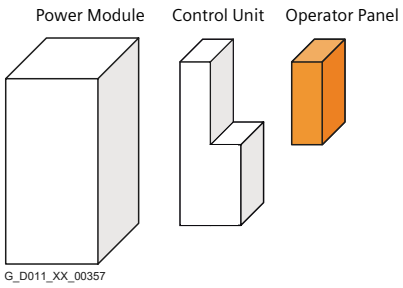
Selecting Optional System Components

Intelligent Operator Panel IOP

Graphic display with bar-type diagrams, e.g. for status values such as pressure or flow rate.

Basic Operator Panel BOP-2

Menu navigation and 2-line display permit fast and user-friendly commissioning of the inverter. Simple basic commissioning by simultaneously displaying parameter value, as well as the option of filtering parameters.





SINAMICS G120 (continued)

Technical data

		Output Ratings				Dimensions - in. (mm)[1]		
	Frame Size	LO-OL A	LO-OL hp	HI-OL A	HI-OL hp	Mounting Height	Structure W x D	IR
PM240-2	A	1.2	0.5	1.3	0.5	18 (457)	20 x 15 (508 x 381)	65ka
	A	1.6	0.5	1.7	0.75			
	A	2.0	0.75	2.2	1			
	A	2.9	1	3.1	1.5			
	A	3.8	2	4.1	2			
	B	5.5	3	5.9	3	24 (610)		
	B	7.2	3	7.7	5			
	B	9.5	5	10.2	5			
	C	16.7	10	13.2	7.5	36 (914)		
	C	23.3	15	19	10			
	C	29.8	20	26	15			
	D	35.3	25	32	20	48 (1219)	20 x 15[2] (508 x 381)	
	D	41.9	30	38	25			
	D	55.8	40	45	30			
	E	69.8	50	60	40	60 (1624)		
	E	83.7	60	75	50			
	F	102.3	75	90	60	72 (1829)	20 x 20[2] (508 x 508)	
	F	134.9	100	110	75			
	F	165.5	125	145	100			
	F	190.7	150	178	125			
	F	240.0	150	200	150			
PM250	D	35.3	25	32	20	48 (1219)	20 x 15[2] (508 x 381)	
	D	41.9	30	38	25			
	D	55.8	40	45	30			
	E	69.8	50	60	40	60 (1624)		
	E	83.7	60	75	50			
	F	102.3	75	90	60	72 (1829)	20 x 20[2] (508 x 508)	
	F	134.9	100	110	75			
	F	165.5	125	145	100			

1 Circuit Breaker, Reactor (Line or Load) and Drive Included.
2 Fixed Mounted

Overload capability:

- **High overload (HO):** Up to 100 HP PM240-2 and all PM250 (HO): 2 × base-load current I_H (i.e. 200% overload) for 3 s plus 1.5 × base-load current I_H (i.e. 150% overload) for 57 s within a cycle time of 300 s From 125 HP PM240: 1.6 × base-load current I_H (i.e. 160% overload) for 3 s **plus** 1.36 × base-load current I_H (i. e. 136% overload) for 57 s within a cycle time of 300 s
- **Light overload (LO):** Up to 100 HP PM240-2 and all PM250 (LO): 1.5 × base-load current IL (i. e. 150% overload) for 3 s **plus** 1.1 × base-load current IL (i.e. 110% overload) for 57 s within a cycle time of 300 s From 125 HP PM240: 1.5 × base-load current IL (i.e. 150% overload) for 1 s **plus** 1.1 × base-load current IL (i.e. 110% overload) for 59 s within a cycle time of 300 s

SINAMICS G120 (continued)

Technical data

Voltage and power ranges	380–480 V, 0.5 to 350 HP (LO) 380–480 V, 0.5 to 300 HP (HO)
Operating temperature	0 °C to +40 °C
Process control	Internal PID controller (autotuning)
Types of control	Vector control, FCC (Flux Current Control), multipoint characteristic (parameterizable V/f characteristic), V/f characteristic

Factory Options

Contactor Options	
Bypass Contactor (None/Automatic/Manual/Selectable)	
Input Isolation Contactor	
Output Isolation Contactor	

VFD Options	
Operator Panel (BOP-2, IOP, none)	
Door Mounted Operator Panel	
PC Inverter Connection Kit 2	

Reactor, Filter, and Other Options	
Input/Output Reactor	Pulse Resistor Braking[2]
Passive harmonic filter[1]	Semiconductor Fuses
RFI filter	18-pulse (for FSE and FSF)
Output filter (DV/DT, Sinewave)	

1 Not recommended for applications that use generated power, such as water/waste-water market.
2 Recommend that resistor banks should be installed outside of the MCC. Consult factory for further details.

For additional G120 information, please see the SINAMICS and Motors for Single-Axis Drives Catalog, Order No. E86060-K5531-A101-A1-7600.

Pollution Degree Ratings according to UL61800-5-1

MCCs containing VFDs should be installed in a Pollution Degree 2 environment in accordance with UL61800-5-1. If an MCC with VFD is to be placed in a Pollution Degree 3 or higher environment, a NEMA12 rated MCC should be installed.

Pollution Degree	Description
1	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
2	Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation is to be expected, when the VFD is out of operation.
3	Conductive pollution or dry non-conductive pollution occurs, which becomes conductive due to condensation, which is to be expected.
4	The pollution generates persistent conductivity caused, for example by conductive dust or rain or snow.

Unit options

Overloads

Overload options

Overload Protection	Description
ESP200 Solid State Overload Relay	Trip Class 5, 10, 20, or 30 can easily be set by two DIP switches Eliminates the need for heaters phase loss, phase unbalance, and ground fault protection
SIMOCODE	Solid State Overload Protection Class 5 - 40 Multifunctional, electronic full motor protection Detailed operating, service, and diagnostics data via PROFIBUS, Profinet, Ethernet IP, and Modbus RTU



ESP200 Solid State Overload Relay

Building and improving on past successes, self-powered ESP200 overload relays are a revolution for both industrial and construction applications. These overload relays provide accuracy unmatched in the market. With repeat accuracy of greater than 99%, trips can be set to the most specific conditions, resulting in both longer motor life and cost savings. The ESP200 over-load relay is very simple to configure. Just set the FLA dial to match the FLA of the motor nameplate and set the DIP switches per the faceplate engraving.

SIMOCODE



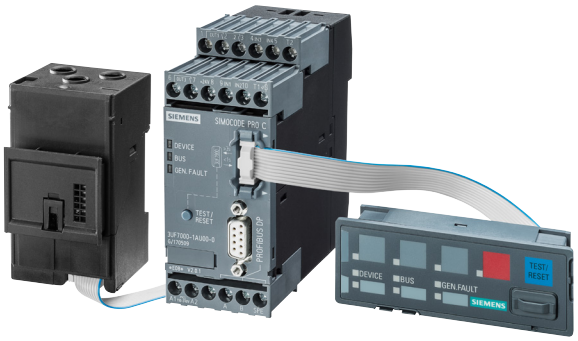
Smart MCC utilizes SIMOCODE overloads to give the customer a true motor management system. SIMOCODE pro is the flexible and modular motor control system for low-voltage motors. It can easily and directly be connected to automation systems via PROFIBUS and covers all functional requirements between the motor starter and the automation system – including the fail-safe disconnection of motors. Further, SIMOCODE pro combines in just one compact system all required protection, monitoring, safety and control functions. The motor management system thus helps you to increase the process control quality and reduce costs at the same time – from planning through installation right to operation or service of a plant or system. In the MCCs, SIMOCODE pro C and SIMCODE pro V are available.

Benefits from SIMOCODE pro:

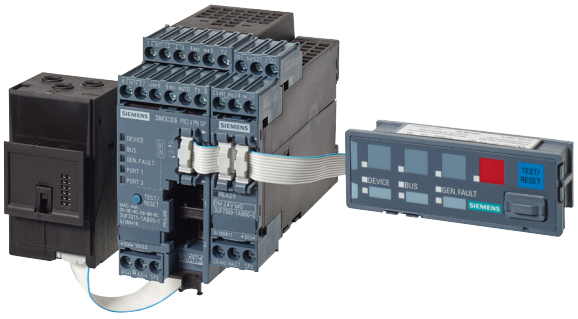
- Simple configuration
- Protects your flexibility with the aid of optional expansion modules
- Gain transparency throughout your system with extensive data provision

SIMOCODE pro motor management is structured in functionally graded series:

- SIMOCODE pro C, as a compact system for direct-on-line starters and reversing starters or the actuation of a circuit breaker with PROFIBUS-interface
- SIMOCODE pro V, as a variable system with all control functions and with the possibility of expanding the inputs, outputs and other functions of the system using expansion modules.



SIMOCODE pro C



SIMOCODE pro V

SIMOCODE (continued)

SIMOCODE expansion

Expansion Possibilities	SIMCODE pro C (Basic Unit 1)	SIMCODE pro V PB (Basic Unit 2)[1]
Operator panels	X	X
Operator panel with display	—	X
Current measuring modules	X	X
Current/voltage measuring module	—	X
Decoupling module	—	X
Expansion modules (number):		
Digital modules	—	2
Fall Safe digital module[2]	—	1
Analog module	—	1
Ground fault module	—	1
Temperature module	—	1

X= available, — = not available

1 When an operator panel with display and/or decoupling module is used, restrictions on the number of connection modules connectable per basic unit must be observed.

2 The fall-safe digital module can be used instead of one of the two digital modules.

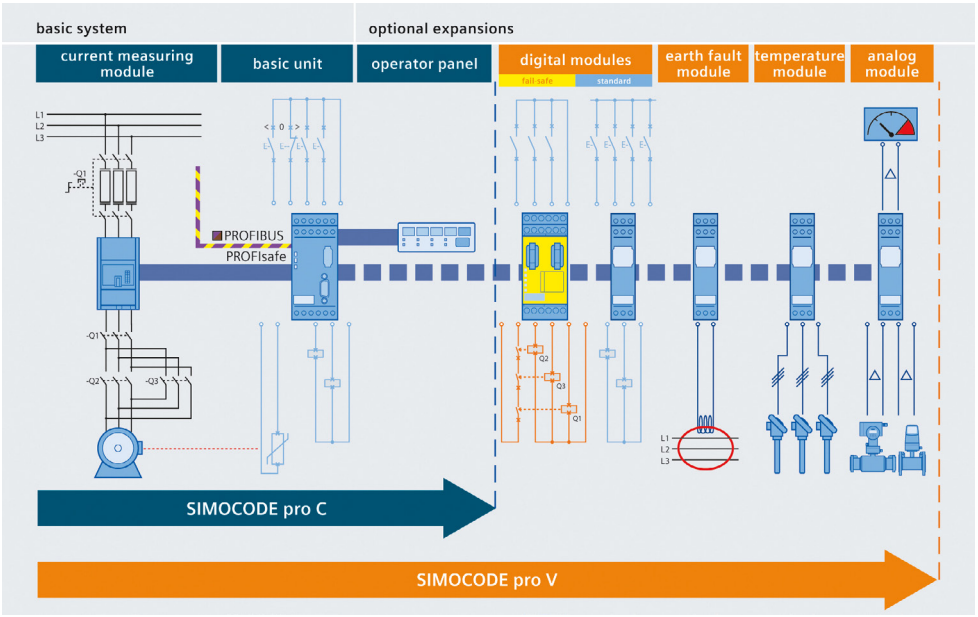
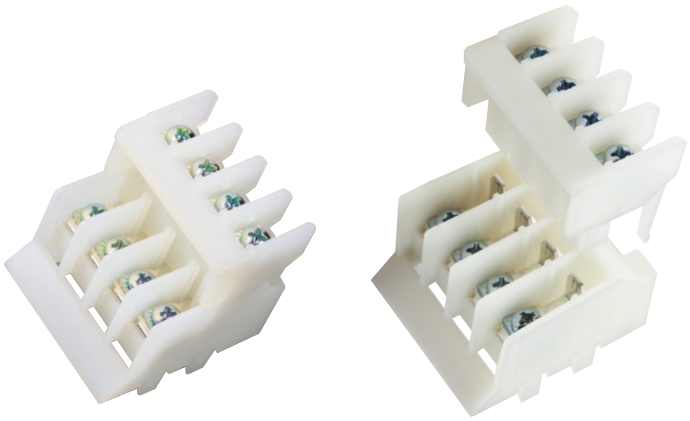


Figure 51: SIMOCODE system

SIMOCODE factory programming

When this selection is requested, functional unit programming per the unit wiring schematic will be provided after the customer supplies the proper information. For a list of standard programming blocks, please see the SIMOCODE Pro Control Reference Manual, E87010-A0241-T004-A5-MCC. Commissioning / Integration / Process type programming is not part of this feature.

Terminal blocks



Control terminal blocks

Rail mounted pull-apart control terminals are standard for both type B and C units. All terminal blocks are located at the right front of the unit for access from the vertical wireway.

Unit control terminal blocks are:

- White in color
- Box Type with Tang (wire clamped between tang and collar)
- Supplied with White Marking Strip

Terminals supplied in groups of 4 for Pull-Apart terminal blocks or groups of 3 for Stationary terminal blocks as required for application. Standard terminal block mounting allows for a maximum of 21 Stationary or 20 Pull-Apart terminal points for control.

Type	Wire Range	Amp Rating	Voltage
Pull-Apart	16 - 12 ga.	25A	600V
Stationary	22 - 8 ga.	40A	600V

Pull-apart terminal blocks

Pull-Apart terminal blocks pull apart and interlock mechanically, providing a terminal block assembly in which individual groups are free to move to permit electrical separation while remaining coupled mechanically to the series.

Clamping the wire between a tang and a collar provides the following advantages:

- No twisted off strands.
- A constant locking torque keeps screws in position.
- Hardened stainless steel clamping collar eliminates stripped thread problems.
- Terminal blocks are also available with screw type terminals for ring tongue lugs.

Stationary terminal blocks

Stationary terminal blocks are available. They have the same features as Pull-Apart, except they remain fixed and do not separate.

Terminal blocks (continued)

Load Terminal Wire Ranges

Starter Size	Wire Range Starter Load Terminal	Maximum[1] AWG	Type Bd, Bt, & C Wiring		
			Power Terminal Block Wire Range	Stationary	Optional Pull-Apart
0-1	#14 to #8	#8	#22 to #8	X	X
2	#12 to #2	#6	#18 to #2	X	X
3	#8 to #2/0	#1	#14 to #2/0	X	—
4	#6 to 250kcmil	2/0	—	—	—
5	(1) #4 to 600kcmil (2) #1/0 to (2) 250kcmil	— 350kcmil	— —	— —	— —
6	#2 to (2) 600kcmil (1) 600kcmil	(2) 350 kcmil —	— —	— —	— —

1 To maintain proper bending space for load cables direct to the starter do not exceed max. wire gauge listed.

Type C wiring terminal blocks

Type C wiring uses stationary type terminal blocks. Their standard location is in the top 12” horizontal wireway.

C terminals may also be located in the bottom 6” horizontal wireway. Three rows of terminals for control and load may be mounted at the top. Space is available for 42 terminals per row for control and load. For each unit size 2, reduce 3 terminals per unit, due to larger load blocks. For each unit size 3, reduce 6 per unit. The bottom wireway is limited to one row of terminals only. C terminals cannot be located in the same area as incoming lines. C terminals for a section with incoming lines, whether connected to main lugs or main disconnect, will be located in an adjacent section. C terminals will be restricted to two rows in a section with a print pocket. Ground or neutral bus should not be located in the same area as C terminals because of restricted conduit room and the number of C terminals that can be mounted.

Master terminal block location

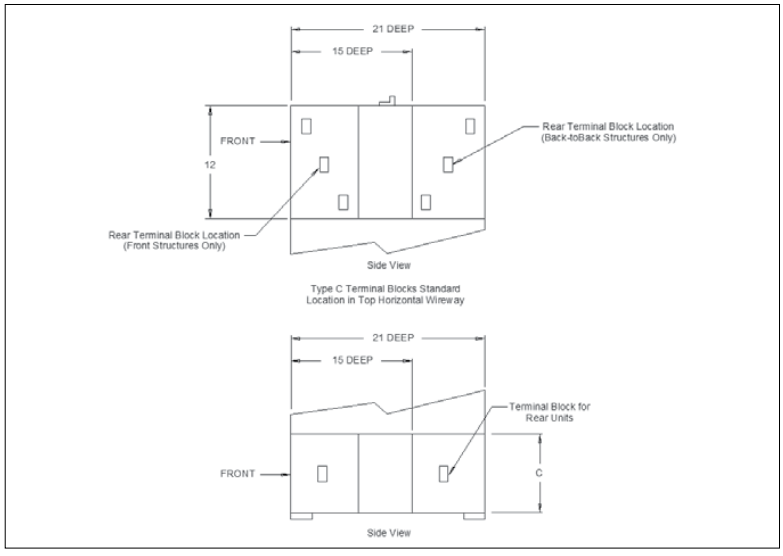


Figure 52: Master terminal block location dimensions

Terminal blocks (continued)

Load terminal blocks

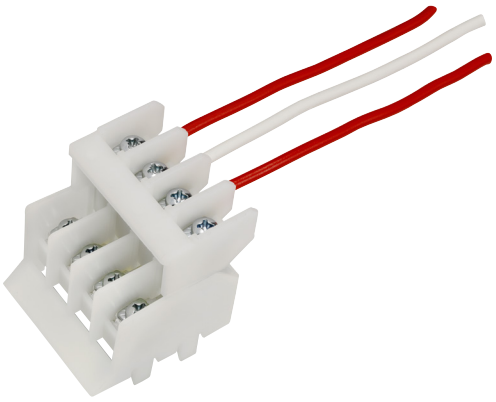
If NEMA Type B-t wiring option is specified, load terminal blocks are supplied on units through Size 3 starters. Pull-apart load terminal blocks can be provided through Size 2. Size 3 starters will be supplied with stationary (non pull-apart) load terminal blocks. Load terminals are white in color.

Wiring specifications

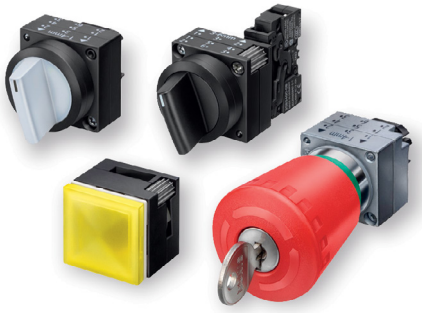
Control on Units	16 ga. copper	
	105 °C	
	600 V	
Interconnection control wiring between Units	14 ga. copper	
	105 °C	
	600 V	
Power wiring– Sized to suit maximum HP rating of unit	14 ga. to 2 ga. copper	105 °C
		600 V
	1 ga. to 500 kcmil copper	105 °C
		600 V

Standard color coding of wires

AC Control (all voltages)	Red
DC Control (all voltages)	Blue
AC Power (all voltages)	Black
Line Side CPT	Black
Equipment Ground	Green
Current Carrying Neutral	White
Interconnecting Control Wires Between Units	Red



Pilot devices





22mm Standard	30mm Optional
SIRIUS 3S	Class 52
Plastic	Oil Tight
Resistor Type	Transformer Type or LED
NEMA Type 4	NEMA Type 3, 4, 12 and 13

3S Pilot Light

Robustness – Uncompromisingly industry-compatible

- Rugged and durable even in a tough environment
- Very high resistance to water, dust and temperatures.
- High resistance against media like oils, aggressive vapors, and brines
- Suitable for the food and beverage industry

Class 52 Oiltight pilot devices

Siemens 30mm NEMA pilot devices are designed to provide long, trouble-free service in the most demanding applications. Durable plastic Metal Operators with plastic buttons resist oils while internally, contact blocks have double break bifurcated silver contacts which improve overall performance.

- NEMA Types 1, 3, 3R, 4, 4X, 12 & 13
- NEMA A600 (Contacts)
- IP10, IP14, IP52, IP54, & IP66 rated
- Automotive Standards
- UL Listed #E22655
- CSA Certified #LR6535

Pilot devices (continued)

Pilot Device Options

Option	Description	FVNR	FVC	FVR	2S1W / 2S2W
Push Buttons	Start - Stop	X	X		
	Forward - Reverse - Stop			X	
	Fast - Slow - Stop				X
	High - Low - Stop				X
Selector Switch	Hand - Off - Auto	X	X	X	X
	Off - On	X	X		
	Start - Stop	X	X		
	Forward - Off - Reverse			X	
	Slow - Off - Fast				X
	High - Off - Low				X
Pilot Device Housing	Blank	X	X	X	X
	4 Holes	X	X	X	X

Pilot Lights Options

Description	FVNR	FVC	FVR	2S1W / 2S2W
Running	X	X		
Off	X	X	X	
Running - Off	X	X		
On - Off	X	X		
Forward - Reverse			X	
Forward - Reverse - Off			X	
High - Low				X
High - Low - Off				X

Additional features

Standard control transformer sizes in VA[2]

Starter Size	FVNR / FVR	RVAT	Wye Delta	2S1W	2S2W
0	50	—	—	50	50
1	50	150	150	50	50
2	50	150	150	150	50
3	150	150	150	150	150
4	150	50[1]	50[1]	50[1]	150
5[1]	50	50	50	50	50
6[1]	50	50	50	50	50

1 Starter supplied with interposing relay(s).
2 The CPT sizes will allow for the use of a pilot light.

Excess capacity CPT VA rating FVNR starter standard size VA rating

Starter Size	FVNR Standard VA Rating	Excess Capacity Above Starter Required	VA Rating Required for 100 VA Extra	Inrush Requirement VA	Inrush Capacity of Standard Transformer
0	50	25	150	218	218
1	50	25	150	218	218
2	50	24	150	218	218
3	150	124	250	310	1130
4	150	99	250	510	1130
5[1]	50	25	150	27	218
6[1]	50	25	150	27	218

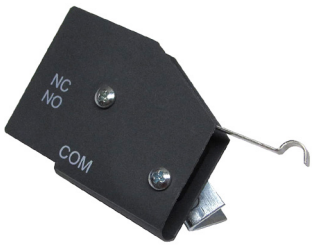
1 Starter supplied with interposing relay(s).

Fuse selection - control power transformer

	Secondary Fuse Size			Primary Fuse Size		
Transformer VA	24V	120V	240V	240V	480V	600V
50	3.2	0.6	0.3	1	0.5	0.3
150	10	2	1	3	1.5	1
250	12	3.2	1.6	5	2.5	2

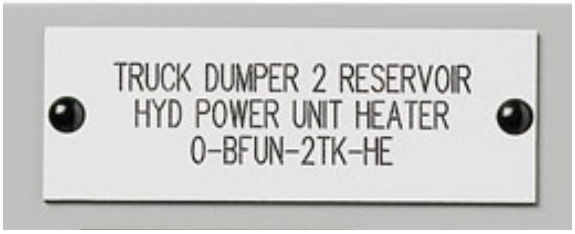
Handle auxiliary switch

A handle auxiliary switch is available on the disconnect operating handle for breakers and fusible switches. The standard switch has Form C contact, which is normally used to disconnect separate source voltage in the unit.



Additional features (continued)

Standard Options	
Amp meter + CT	Elapse time meter
CT	Surge suppression
Voltage monitor	Under voltage CB
Vac. contactor	Shunt Trip
Transducer	Ground stab
Fuse Puller	Special paint
Bypass	Timer
ASI®	4P relay
Ground fault	Extra unit space



Nameplate

Nameplates for individual units are 1.25" tall by 3.56" wide and can have three (standard) or four engraving lines. Unit nameplates are fastened to the unit door with plastic rivets. Stainless screw mounted unit nameplates are available as an option. The standard color for unit nameplates is a black surface with a white text. Other unit nameplate colors, such as a white surface with a black text or dark gray surface with white text or light gray with black text or red with white text or yellow with black text or blue with white text, are available as options.

Standard text size is 3/16", but 1/4", 3/8", and 1/2" are available as options. When dual units (starters or feeders) are supplied, two separate unit nameplates are supplied on each unit. An optional 2" tall by 6" wide or 2" tall by 8" wide master nameplate is available. Standard engraving on the master nameplate is three lines 1/2" tall characters. Optional 3/8" tall characters and various nameplate color options are available for the master nameplate.

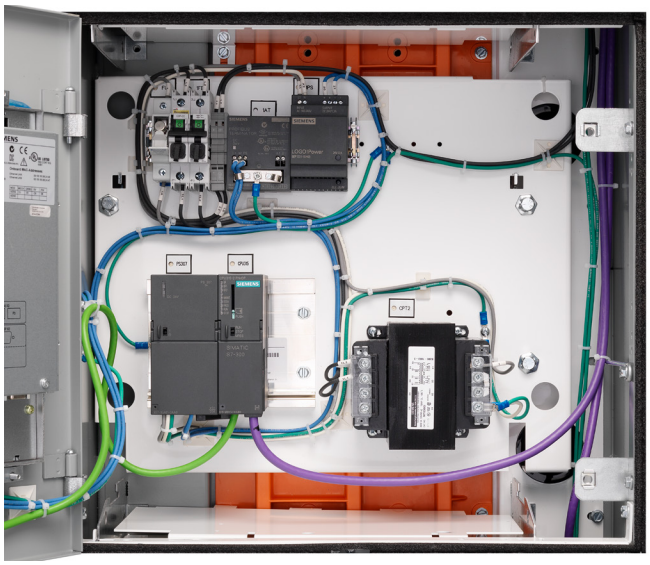
Unit nameplate engraving character limit

Letter Height	Line 1	Line 2	Line 3	Line 4
3/16" Std.	25	18	25	—
3/16"	25	18	18	25
1/4"	18	16	18	NA
3/8"	16	16	NA	NA
1/2"	13	NA	NA	NA

For ordering blank nameplate kits, please see the MCC Aftermarket Renewal Parts Catalog.

Programmable Logic Controller (PLCs) units and Human-Machine Interface (HMI) options

A full line of Siemens PLCs can be mounted in the tiastar motor control center. Siemens has the flexibility and expertise to provide a wide variety of configurations to meet user specified requirements for programmable logic control applications. HMI can also be installed in the tiastar line.



Metering units



Advanced power monitoring devices are available for Siemens MCCs including SENTRON PAC3120, SENTRON PAC3220, SENTRON PAC4200, Siemens 9410, and Siemens 9810. Siemens line of power meters provides market leading technology for power quality measurement. These products continually change to meet growing needs for power quality and energy monitoring.

The PAC3120 and PAC3220 are powerful compact power monitoring devices that are suitable for use in industrial, government and commercial applications, where basic metering and energy monitoring is required. The meter may be used as a stand alone device monitoring over 25 (PAC3120) and over 50 (PAC3220) parameters or as part of an industrial control, building automation or global power monitoring system. Metering and monitoring applications range from simple analog volt and amp meter replacements to stand-alone sub-billing or cost allocation installation (PAC3220 offers this with multiple tariffs).

PAC3120

The PAC3120 has many features not usually found in this price class of meters. A large graphical display supports multiple languages and easy to use menus that can be used to set up the meter as well as a PC based program, SENTRON powerconfig, that can be used to pre-configure one or multiple units. The meter also has built in Modbus RTU communications via a RS485 interface. The meter comes standard with four digital inputs and outputs. Two output are suitable for pulse output for export/import real and reactive energy. The other two output are controllable from an outside source by way of a Modbus register.

Metering and monitoring applications range from simple analog volt and amp meter replacements to stand-alone sub-billing or cost allocation installations.

PAC3220

The PAC3220 is a powerful compact power monitoring device that is suitable for use in industrial, government and commercial applications where basic metering and energy monitoring is required. The meter may be used as a standalone device monitoring over 100 parameters or as part of an industrial control, building automation or global power monitoring system.

Metering and monitoring applications range from simple analog volt and amp meter replacements to stand-alone sub billing or cost allocation installations with multiple tariffs. The PAC3220 can also be used to support LEED certification and provide the needed energy metering data for federal/local government energy reduction programs. The PAC3220 provides open communications using Modbus RTU/TCP, PROFINET and PROFIBUS-DP protocols for easy integration into any local or remote monitoring system Simple configuration of the meter can be done from the front display or by using a PC with SENTRON powerconfig setup free software available for download from Siemens website.

Metering units (continued)

PAC4200

The SENTRON PAC4200 is a feature packed power monitoring device that is suitable for use in industrial, government and commercial applications where basic to advanced metering, logging, and I/O is required. The meter may be used as a stand alone device monitoring over 200 parameters or as part of an industrial control, building automation or global enterprise wide monitoring system.

Advanced power quality monitoring and logging applications range from single low voltage breaker / building metering to sub-station main feeder monitoring, sub-billing or cost allocation installations with multiple tariffs. The SENTRON PAC4200 can also be used to support LEED certification and provide the needed energy metering data for federal/local government EPACT 2005 energy reduction programs.

The SENTRON PAC4200 provides open communication using the standard built-in Ethernet Modbus TCP, Optional Modbus RTU or ProfiNET-DP protocols for easy integration into any local or remote monitoring system. The gateway functionality of this device reduces installation cost by replacing other gateway devices and simplifying wiring. Simple configuration of the meter can be done from the front display or by using a PC with SENTRON powerconfig setup software, supplied with the meter.

Panelboards and transformers units

A Motor Control Center is principally intended to house multiple combination starters for the control of electrical motors. It is often convenient to include a limited number of power distribution units such as lighting panels and transformer units.

Lighting panelboards applied in MCCs

Amp Rating	Number of Circuits	Height in Inches (mm)		
		1Φ 3W 240/120	3Φ 4W 208Y/120	3Φ 4W 277/480
Main Lug Only/Main Circuit Breaker				
125/250	18	30 (762)	30 (762)	30 (762)
	30	36 (914)	36 (914)	36 (914)
	42	42 (1067)	42 (1067)	42 (1067)



Distribution transformers

KVA Rating	Phase	Unit Height in Inches (mm)
1	1	12 (305)[1]
1.5		
2		
3		
5		
7.5		18 (457)[2]
10		
15		
25		24 (610)[2 3]
30		
37.5		36 (914)[2 3]
45		
9	3[3]	18 (457)
15		
25		
30		
37.5		24 (610)
45		

1 Plate mounted.
2 Transformer mounted on brackets 6 in. (152 mm) off sills.
3 Requires 20 in. (508 mm) deep structure.

High resistance ground unit option

High Resistance Grounding (HRG) systems have gained in popularity in process application due to their ability to safely continue operation during a single line-ground fault and limit escalation of such a fault into a multi-phase event. Siemens HRG MCC unit limits the ground fault current which reduces the damage and stress to equipment and power system components.



Why you should use HRG

Protect equipment	Limit ground fault current to less than 10A, reducing damage and stress to equipment and power system components.
Reduce downtime	Process equipment can continue to operate in the event of a line to ground fault, increasing profitability.
Fast fault location	Pulsing circuit and optional ammeter allow for easier fault location, saving time and frustrations.

The HRG MCC unit consists of a Front Control Plate, the Internal Control Plate and an enclosed resistor.

All options are 2-10A, 60 Hz, 100kAIC, and include a Control Power Transformer.

Voltage (V)	Description
240 Delta	open resistors
	open resistors, SIS wire
240/139 Wye	open resistors
	open resistors, SIS wire
480 Delta	open resistors
	open resistors, SIS wire
480/277 Wye	open resistors
	open resistors, SIS wire
600 Delta	open resistors
	open resistors, SIS wire
600/347 Wye	open resistors
	open resistors, SIS wire



Feeder Circuit Breaker (FCB) vertical catalog sections

Common tiastar structures are available as catalog numbers. Orders can be placed via Industry Mall or COMPAS. Structures are 480V, 65kA, 3 phase, 3 wire, NEMA 1A. Structure dimensions are 90" high and 20" wide[1]. Horizontal bus is tin plated and rated for 65 °C. Structures include MCC installation manual.

FCB vertical section numbering system

8	P	G	1	1	1			–	1				

Class

8	P	G	1	1	tiastar MCC Section

Section Characteristics

1	90" tall by 20" deep

Section type

3	Section with a 48" FCB unit
4	Section with a 72" FCB unit

Bus Ratings

B	600A Horizontal, 300A Vertical
C	600A Horizontal, 600A Vertical[2]
D	800A Horizontal, 300A Vertical
E	800A Horizontal, 600A Vertical[2]
F	1200A Horizontal, 300A Vertical
G	1200A Horizontal, 600A Vertical[2]

Circuit Breaker Frame

F	125A, 48" unit, 20" wide
J	250A, 48" unit, 20" wide
Q	125A, 72" unit, 20" wide
R	250A, 72" unit, 20" wide
S	400A, 72" unit, 30" wide
T	600A, 72" unit, 30" wide

Circuit Breaker Trip Amps

0	3	30	1	7	175
0	5	40	1	8	200
0	7	50	2	0	225
0	8	60	2	1	250
1	0	70	2	2	300
1	1	80	2	3	350
1	2	90	2	4	400
1	3	100	2	5	450
1	5	125	2	6	500
1	6	150	2	7	600



Fixed with vertical bus



Fixed without vertical bus

1 Unless otherwise specified
2 600A Vertical Bus options include shutter provisions

Note: All circuit breakers are calibrated for 40° C.

FCB vertical catalog section numbers

48” fixed mounted feeder circuit breaker with vertical bus and two 12” plug-in unit spaces

600A Horiz Bus, 300A Vert Bus, 125A Frame	
30A Trip	8PG1113-1BF03
40A Trip	8PG1113-1BF05
50A Trip	8PG1113-1BF07
60A Trip	8PG1113-1BF08
70A Trip	8PG1113-1BF10
80A Trip	8PG1113-1BF11
90A Trip	8PG1113-1BF12
100A Trip	8PG1113-1BF13
125A Trip	8PG1113-1BF15

600A Horiz Bus, 300A Vert Bus, 250A Frame	
150A Trip	8PG1113-1BJ16
175A Trip	8PG1113-1BJ17
200A Trip	8PG1113-1BJ18
225A Trip	8PG1113-1BJ20
250A Trip	8PG1113-1BJ21

600A Horiz Bus, 600A Vert Bus, 125A Frame	
30A Trip, shutter provisions	8PG1113-1CF03
40A Trip, shutter provisions	8PG1113-1CF05
50A Trip, shutter provisions	8PG1113-1CF07
60A Trip, shutter provisions	8PG1113-1CF08
70A Trip, shutter provisions	8PG1113-1CF10
80A Trip, shutter provisions	8PG1113-1CF11
90A Trip, shutter provisions	8PG1113-1CF12
100A Trip, shutter provisions	8PG1113-1CF13
125A Trip, shutter provisions	8PG1113-1CF15

600A Horiz Bus, 600A Vert Bus, 250A Frame	
150A Trip, shutter provisions	8PG1113-1CJ16
175A Trip, shutter provisions	8PG1113-1CJ17
200A Trip, shutter provisions	8PG1113-1CJ18
225A Trip, shutter provisions	8PG1113-1CJ20
250A Trip, shutter provisions	8PG1113-1CJ21

800A Horiz Bus, 300A Vert Bus, 125A Frame	
30A Trip	8PG1113-1DF03
40A Trip	8PG1113-1DF05
50A Trip	8PG1113-1DF07
60A Trip	8PG1113-1DF08
70A Trip	8PG1113-1DF10
80A Trip	8PG1113-1DF11
90A Trip	8PG1113-1DF12
100A Trip	8PG1113-1DF13
125A Trip	8PG1113-1DF15

800A Horiz Bus, 300A Vert Bus, 250A Frame	
150A Trip	8PG1113-1DJ16
175A Trip	8PG1113-1DJ17
200A Trip	8PG1113-1DJ18
225A Trip	8PG1113-1DJ20
250A Trip	8PG1113-1DJ21

800A Horiz Bus, 600A Vert Bus, 125A Frame	
30A Trip, shutter provisions	8PG1113-1EF03
40A Trip, shutter provisions	8PG1113-1EF05
50A Trip, shutter provisions	8PG1113-1EF07
60A Trip, shutter provisions	8PG1113-1EF08
70A Trip, shutter provisions	8PG1113-1EF10
80A Trip, shutter provisions	8PG1113-1EF11
90A Trip, shutter provisions	8PG1113-1EF12
100A Trip, shutter provisions	8PG1113-1EF13
125A Trip, shutter provisions	8PG1113-1EF15

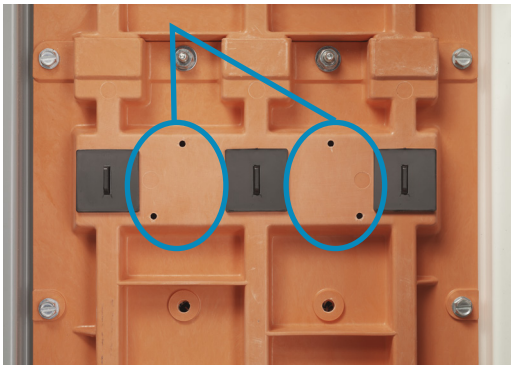
800A Horiz Bus, 600A Vert Bus, 250A Frame	
150A Trip, shutter provisions	8PG1113-1EJ16
175A Trip, shutter provisions	8PG1113-1EJ17
200A Trip, shutter provisions	8PG1113-1EJ18
225A Trip, shutter provisions	8PG1113-1EJ20
250A Trip, shutter provisions	8PG1113-1EJ21

1200A Horiz Bus, 300A Vert Bus, 125A Frame	
30A Trip	8PG1113-1FF03
40A Trip	8PG1113-1FF05
50A Trip	8PG1113-1FF07
60A Trip	8PG1113-1FF08
70A Trip	8PG1113-1FF10
80A Trip	8PG1113-1FF11
90A Trip	8PG1113-1FF12
100A Trip	8PG1113-1FF13
125A Trip	8PG1113-1FF15

1200A Horiz Bus, 300A Vert Bus, 250A Frame	
150A Trip	8PG1113-1FJ16
175A Trip	8PG1113-1FJ17
200A Trip	8PG1113-1FJ18
225A Trip	8PG1113-1FJ20
250A Trip	8PG1113-1FJ21

Note: Shutter Provisions means that optional automatic shutters (8PG1191-2MA00) can be added to the vertical section by the customer.

Auto shutter provisions



FCB vertical catalog section numbers

48" fixed mounted feeder circuit breaker with vertical bus and two 12" plug-in unit spaces (cont.)

1200A Horiz Bus, 600A Vert Bus, 125A Frame	
30A Trip, shutter provisions	8PG1113-1GF03
40A Trip, shutter provisions	8PG1113-1GF05
50A Trip, shutter provisions	8PG1113-1GF07
60A Trip, shutter provisions	8PG1113-1GF08
70A Trip, shutter provisions	8PG1113-1GF10
80A Trip, shutter provisions	8PG1113-1GF11
90A Trip, shutter provisions	8PG1113-1GF12
100A Trip, shutter provisions	8PG1113-1GF13
125A Trip, shutter provisions	8PG1113-1GF15

1200A Horiz Bus, 600A Vert Bus, 250A Frame	
150A Trip, shutter provisions	8PG1113-1GJ16
175A Trip, shutter provisions	8PG1113-1GJ17
200A Trip, shutter provisions	8PG1113-1GJ18
225A Trip, shutter provisions	8PG1113-1GJ20
250A Trip, shutter provisions	8PG1113-1GJ21

72" fixed mounted feeder circuit breaker, without vertical bus

600 Horiz Bus, 125A Frame	
30A Trip, 20" wide	8PG1114-1BQ03
40A Trip, 20" wide	8PG1114-1BQ05
50A Trip, 20" wide	8PG1114-1BQ07
60A Trip, 20" wide	8PG1114-1BQ08
70A Trip, 20" wide	8PG1114-1BQ10
80A Trip, 20" wide	8PG1114-1BQ11
90A Trip, 20" wide	8PG1114-1BQ12
100A Trip, 20" wide	8PG1114-1BQ13
125A Trip, 20" wide	8PG1114-1BQ15

600 Horiz Bus, 250A Frame	
150A Trip, 20" wide	8PG1114-1BR16
175A Trip, 20" wide	8PG1114-1BR17
200A Trip, 20" wide	8PG1114-1BR18
225A Trip, 20" wide	8PG1114-1BR20
250A Trip, 20" wide	8PG1114-1BR21

600 Horiz Bus, 400A Frame	
300A Trip, 30" wide	8PG1114-1BS22
350A Trip, 30" wide	8PG1114-1BS23
400A Trip, 30" wide	8PG1114-1BS24

600 Horiz Bus, 600A Frame	
450A Trip, 30" wide	8PG1114-1BT25
500A Trip, 30" wide	8PG1114-1BT26
600A Trip, 30" wide	8PG1114-1BT27

800 Horiz Bus, 125A Frame	
30A Trip, 20" wide	8PG1114-1DQ03
40A Trip, 20" wide	8PG1114-1DQ05
50A Trip, 20" wide	8PG1114-1DQ07
60A Trip, 20" wide	8PG1114-1DQ08
70A Trip, 20" wide	8PG1114-1DQ10
80A Trip, 20" wide	8PG1114-1DQ11
90A Trip, 20" wide	8PG1114-1DQ12
100A Trip, 20" wide	8PG1114-1DQ13
125A Trip, 20" wide	8PG1114-1DQ15

800 Horiz Bus, 250A Frame	
150A Trip, 20" wide	8PG1114-1DR16
175A Trip, 20" wide	8PG1114-1DR17
200A Trip, 20" wide	8PG1114-1DR18
225A Trip, 20" wide	8PG1114-1DR20
250A Trip, 20" wide	8PG1114-1DR21

800 Horiz Bus, 400A Frame	
300A Trip, 30" wide	8PG1114-1DS22
350A Trip, 30" wide	8PG1114-1DS23
400A Trip, 30" wide	8PG1114-1DS24

800 Horiz Bus, 600A Frame	
450A Trip, 30" wide	8PG1114-1DT25
500A Trip, 30" wide	8PG1114-1DT26
600A Trip, 30" wide	8PG1114-1DT27

1200 Horiz Bus, 125A Frame	
30A Trip, 20" wide	8PG1114-1FQ03
40A Trip, 20" wide	8PG1114-1FQ05
50A Trip, 20" wide	8PG1114-1FQ07
60A Trip, 20" wide	8PG1114-1FQ08
70A Trip, 20" wide	8PG1114-1FQ10
80A Trip, 20" wide	8PG1114-1FQ11
90A Trip, 20" wide	8PG1114-1FQ12
100A Trip, 20" wide	8PG1114-1FQ13
125A Trip, 20" wide	8PG1114-1FQ15

1200 Horiz Bus, 250A Frame	
150A Trip, 20" wide	8PG1114-1FR16
175A Trip, 20" wide	8PG1114-1FR17
200A Trip, 20" wide	8PG1114-1FR18
225A Trip, 20" wide	8PG1114-1FR20
250A Trip, 20" wide	8PG1114-1FR21

1200 Horiz Bus, 400A Frame	
300A Trip, 30" wide	8PG1114-1FS22
350A Trip, 30" wide	8PG1114-1FS23
400A Trip, 30" wide	8PG1114-1FS24

1200 Horiz Bus, 600A Frame	
450A Trip, 30" wide	8PG1114-1FT25
500A Trip, 30" wide	8PG1114-1FT26
600A Trip, 30" wide	8PG1114-1FT27

Blank, panel, Main Lug Only (MLO), and Main Circuit Breaker (MCB) vertical catalog sections

Common tiastar structures are available as catalog numbers. Orders can be placed via Industry Mall or COMPAS. Structures are 480V, 65kA, 3 phase, 3 wire, NEMA 1A. Structure dimensions are 90" high and 20" wide[1]. Horizontal bus is tin plated and rated for 65 °C. Structures include MCC installation manual.

Blank panel vertical section numbering system

8	P	G	1	1	1	1	–	1				

Class

8	P	G	1	1

tiastar MCC Section

Section Characteristics

1 90 in. tall by 20in. deep

Section type

1 Section with or without an incoming cable compartment

Configuration				Horizontal Bus (A)	Vertical Bus (A)	Features
A	A	0	0	600	300	six 12" blank spaces
A	A	0	1	600	600	six 12" blank spaces[2]
A	A	1	0	800	300	six 12" blank spaces
A	A	1	1	800	600	six 12" blank spaces[2]
A	A	2	0	1200	300	six 12" blank spaces
A	A	2	1	1200	600	six 12" blank spaces[2]
B	A	0	0	600	—	72" high, 20 in. wide blank mounting panel
B	A	1	0	800	—	72" high, 20 in. wide blank mounting panel
B	A	2	0	1200	—	72" high, 20 in. wide blank mounting panel
B	B	0	0	600	—	72" high, 30 in. wide blank mounting panel
B	B	1	0	800	—	72" high, 30 in. wide blank mounting panel
B	B	2	0	1200	—	72" high, 30 in. wide blank mounting panel
C	A	0	1	600	600	600A MLO Top Entry[2]
C	A	1	1	800	600	800A MLO Top Entry[2]
C	A	2	1	1200	600	1200A MLO Top Entry[2]
C	B	0	1	600	600	600A MLO Bottom Entry[2]
C	B	1	1	800	600	800A MLO Bottom Entry[2]
C	B	2	1	1200	600	1200A MLO Bottom Entry[2]
D	A	0	1	600	600	600A MCB Top Entry[2]
D	A	1	1	800	600	800A MCB Top Entry[2]
D	A	2	1	1200	600	1200A MCB Top Entry[2]
D	B	0	1	600	600	600A MCB Bottom Entry[2]
D	B	1	1	800	600	800A MCB Bottom Entry[2]
D	B	2	1	1200	600	1200A MCB Bottom Entry[2]



Blank vertical catalog section

1 Unless otherwise specified
2 600A Vertical Bus options include shutter provisions

Note: All circuit breakers are calibrated for 40° C.

Blank, panel, MLO, and MCB vertical sections

Product Description	Catalog Number
Blank Vertical Sections with six 12" plug-in unit spaces (see Figure 53)	
600A Horiz Bus, 300A Vert Bus	8PG1111-1AA00
600A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1AA01
800A Horiz Bus, 300A Vert Bus	8PG1111-1AA10
800A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1AA11
1200A Horiz Bus, 300A Vert Bus	8PG1111-1AA20
1200A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1AA21
Mounting Panel Vertical Section (see Figure 54)	
20" wide, 600A Horiz Bus	8PG1111-1BA00
20" wide, 800A Horiz Bus	8PG1111-1BA10
20" wide, 1200A Horiz Bus	8PG1111-1BA20
30" wide, 600A Horiz Bus	8PG1111-1BB00
30" wide, 800A Horiz Bus	8PG1111-1BB10
30" wide, 1200A Horiz Bus	8PG1111-1BB20
Main Lug Only (MLO) Vertical Sections (see Figure 55)	
Top MLO	
600A Lugs, 600A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CA01
800A Lugs, 800A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CA11
1200A Lugs, 1200A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CA21
Bottom MLO	
600A Lugs, 600A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CB01
800A Lugs, 800A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CB11
1200A Lugs, 1200A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1CB21
Main Circuit Breaker (MCB) Vertical Sections (see Figure 56)	
Top MCB	
600A Frame, 600A Trip, 600A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DA01
800A Frame, 800A Trip, 800A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DA11
1200A Frame, 1200A Trip, 1200A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DA21
Bottom MCB	
600A Frame, 600A Trip, 600A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DB01
800A Frame, 800A Trip, 800A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DB11
1200A Frame, 1200A Trip, 1200A Horiz Bus, 600A Vert Bus, shutter provisions	8PG1111-1DB21

MCC standard structures



Figure 53: Blank section



Figure 54: Mounting panel



Figure 55: Main Lug Only (MLO)



Figure 56: Main Circuit Breaker (MCB)

Feeder Circuit Breaker (FCB) catalog units

Common tiastar FCB units are available as catalog numbers. Orders can be placed via Industry Mall or COMPAS. Units are 480V, 60Hz, 65kA, NEMA 12. Units include: door, wiring diagram, and unit installation manual.

FCB Catalog Numbering System

8	P	G	1	1		2	–	1				

Class

8PG11	tiastar MCC

Unit Size

1	Standard
2	High Density

Compartment type

2	Plug-in units

Overload Type

1	None

Product type

B	FCB
C	FCB units designed for G120 VFD mounting

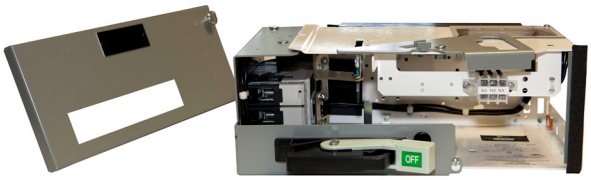
Ratings and Unit Size at 480V

A	65K 125A 6"
B	65K 125A 12"
C	65K 125A 18"
D	65K 125A 24"
E	65K 125A 36"
F	65K 125A 48"
G	65K 250A 18"
H	65K 250A 24"
I	65K 250A 36"
J	65K 250A 48"
K	65K 250A 60"

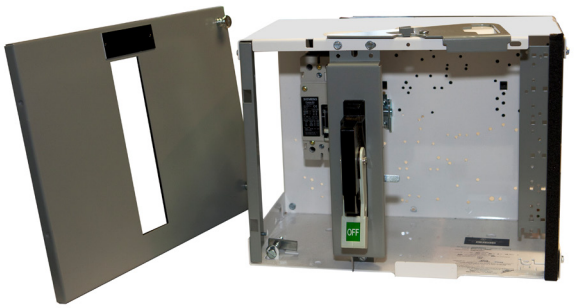
Circuit Breaker Trip Amps

0	0	15
0	1	20
0	2	25
0	3	30
0	4	35
0	5	40
0	6	45
0	7	50
0	8	60
1	0	70
1	1	80
1	2	90
1	3	100
1	4	110
1	5	125
1	6	150
1	7	175
1	8	200
2	0	225
2	1	250

Note: All circuit breakers are calibrated for 40° C.



tiastar 6" FCB catalog unit



tiastar 12" FCB catalog unit

FCB catalog numbers

Product Description	Catalog Number
480V 65K 125A 6” High Density	
15A	8PG1122-1BA00
20A	8PG1122-1BA01
25A	8PG1122-1BA02
30A	8PG1122-1BA03
35A	8PG1122-1BA04
40A	8PG1122-1BA05
45A	8PG1122-1BA06
50A	8PG1122-1BA07
60A	8PG1122-1BA08
70A	8PG1122-1BA10
80A	8PG1122-1BA11
90A	8PG1122-1BA12
100A	8PG1122-1BA13
110A	8PG1122-1BA14
125A	8PG1122-1BA15
480V 65K 125A 12”	
15A	8PG1112-1BB00
20A	8PG1112-1BB01
25A	8PG1112-1BB02
30A	8PG1112-1BB03
35A	8PG1112-1BB04
40A	8PG1112-1BB05
45A	8PG1112-1BB06
50A	8PG1112-1BB07
60A	8PG1112-1BB08
70A	8PG1112-1BB10
80A	8PG1112-1BB11
90A	8PG1112-1BB12
100A	8PG1112-1BB13
110A	8PG1112-1BB14
125A	8PG1112-1BB15
480V 65K 125A 18”	
15A	8PG1112-1BC00
20A	8PG1112-1BC01
25A	8PG1112-1BC02
30A	8PG1112-1BC03
35A	8PG1112-1BC04
40A	8PG1112-1BC05
45A	8PG1112-1BC06
50A	8PG1112-1BC07
60A	8PG1112-1BC08
70A	8PG1112-1BC10
80A	8PG1112-1BC11
90A	8PG1112-1BC12
100A	8PG1112-1BC13
110A	8PG1112-1BC14
125A	8PG1112-1BC15

Product Description	Catalog Number
480V 65K 125A 24”	
15A	8PG1112-1BD00
20A	8PG1112-1BD01
25A	8PG1112-1BD02
30A	8PG1112-1BD03
35A	8PG1112-1BD04
40A	8PG1112-1BD05
45A	8PG1112-1BD06
50A	8PG1112-1BD07
60A	8PG1112-1BD08
70A	8PG1112-1BD10
80A	8PG1112-1BD11
90A	8PG1112-1BD12
100A	8PG1112-1BD13
110A	8PG1112-1BD14
125A	8PG1112-1BD15
480V 65K 125A 36”	
15A	8PG1112-1BE00
20A	8PG1112-1BE01
25A	8PG1112-1BE02
30A	8PG1112-1BE03
35A	8PG1112-1BE04
40A	8PG1112-1BE05
45A	8PG1112-1BE06
50A	8PG1112-1BE07
60A	8PG1112-1BE08
70A	8PG1112-1BE10
80A	8PG1112-1BE11
90A	8PG1112-1BE12
100A	8PG1112-1BE13
110A	8PG1112-1BE14
125A	8PG1112-1BE15
480V 65K 125A 48”	
15A	8PG1112-1BF00
20A	8PG1112-1BF01
25A	8PG1112-1BF02
30A	8PG1112-1BF03
35A	8PG1112-1BF04
40A	8PG1112-1BF05
45A	8PG1112-1BF06
50A	8PG1112-1BF07
60A	8PG1112-1BF08
70A	8PG1112-1BF10
80A	8PG1112-1BF11
90A	8PG1112-1BF12
100A	8PG1112-1BF13
110A	8PG1112-1BF14
125A	8PG1112-1BF15

FCB catalog numbers

Product Description	Catalog Number
480V 65K 250A 18”	
150A	8PG1112-1BG16
175A	8PG1112-1BG17
200A	8PG1112-1BG18
225A	8PG1112-1BG20
250A	8PG1112-1BG21
480V 65K 250A 24”	
150A	8PG1112-1BH16
175A	8PG1112-1BH17
200A	8PG1112-1BH18
225A	8PG1112-1BH20
250A	8PG1112-1BH21
480V 65K 250A 36”	
150A	8PG1112-1BI16
175A	8PG1112-1BI17
200A	8PG1112-1BI18
225A	8PG1112-1BI20
250A	8PG1112-1BI21
480V 65K 250A 48”	
150A	8PG1112-1BJ16
175A	8PG1112-1BJ17
200A	8PG1112-1BJ18
225A	8PG1112-1BJ20
250A	8PG1112-1BJ21
480V 65K 250A 60”	
150A	8PG1112-1BK16
175A	8PG1112-1BK17
200A	8PG1112-1BK18
225A	8PG1112-1BK20
250A	8PG1112-1BK21

Full Voltage Non-Reversing (FVNR) catalog units

Common tiastar FVNR units are available as catalog numbers. Orders can be placed via Industry Mall or COMPAS. Units are 480V, 60Hz, 65kA, NEMA 12, Type 1 B-d wiring, 100kAIC. Units include: 1 N.O./1 N.C. auxiliary contacts, pilot device housing for up to four 22 mm devices, door, wiring diagram, and unit installation manual.

FVNR Catalog Numbering System

8	P	G	1	1		2	–		A			

Class

8PG11	tiastar MCC

Unit Size

1	Standard
2	High Density

Compartment type

2	Plug-in units

Overload type

1	ESP200
2	SIMOCODE pro C[1,2]
3	SIMOCODE pro V[1,2]

Product type

A	FVNR

Horsepower

A	0	0	1/4
A	0	1	1/3
A	0	2	1/2
A	0	3	3/4–1
A	0	4	1.5
A	0	5	2-3
A	0	6	4
A	0	7	5
A	0	8	7.5–10
A	1	0	15–20
A	1	1	25
A	1	2	30
A	1	3	40–50
A	1	4	60–75
A	1	5	100



tiastar 12" ESP FVNR catalog unit

1 Includes Current Only Module
2 Not available with High Density

Note: All circuit breakers are calibrated for 40° C.

FVNR catalog numbers

Product Description	Catalog Number
High Density ESP200 Overload Units	
6”, 1/4 HP HD-FVNR SIZE 1, 1A ETI CB, ESP200 0.25-1A, CPT	8PG1122-1AA00
6”, 1/3 HP HD-FVNR SIZE 1, 2A ETI CB, ESP200 0.25-1A, CPT	8PG1122-1AA01
6”, 1/2 HP HD-FVNR SIZE 1, 3A ETI CB, ESP200 0.75-3.4A, CPT	8PG1122-1AA02
6”, 3/4 - 1 HP HD-FVNR SIZE 1, 5A ETI CB, ESP200 0.75-3.4A, CPT	8PG1122-1AA03
6”, 1.5 HP HD-FVNR SIZE 1, 10A ETI CB, ESP200 0.75-3.4A, CPT	8PG1122-1AA04
6”, 2 - 3 HP HD-FVNR SIZE 1, 10A ETI CB, ESP200 3-12A, CPT	8PG1122-1AA05
6”, 4 HP HD-FVNR SIZE 1, 25A ETI CB, ESP200 3-12A, CPT	8PG1122-1AA06
6”, 5 HP HD-FVNR SIZE 1, 30A ETI CB, ESP200 3-12A, CPT	8PG1122-1AA07
6”, 7.5 - 10 HP HD-FVNR SIZE 1, 40A ETI CB, ESP200 5.5-22A, CPT	8PG1122-1AA08
6”, 15 - 20 HP HD-FVNR SIZE 2, 50A ETI CB, ESP200 10-40A, CPT	8PG1122-1AA10
6”, 25 HP HD-FVNR SIZE 2, 100A ETI CB, ESP200 10-40A, CPT	8PG1122-1AA11
12”, 30 HP HD-FVNR SIZE 3, 100A ETI CB, ESP200 25-100A, CPT	8PG1122-1AA12
12”, 40 - 50 HP HD-FVNR SIZE 3, 125A ETI CB, ESP200 25-100A, CPT	8PG1122-1AA13
ESP200 Overload Units	
12”, 1/4 HP FVNR SIZE 1, 1A ETI CB, ESP200 0.25-1A, CPT	8PG1112-1AA00
12”, 1/3 HP FVNR SIZE 1, 2A ETI CB, ESP200 0.25-1A, CPT	8PG1112-1AA01
12”, 1/2 HP FVNR SIZE 1, 3A ETI CB, ESP200 0.75-3.4A, CPT	8PG1112-1AA02
12”, 3/4 - 1 HP FVNR SIZE 1, 5A ETI CB, ESP200 0.75-3.4A, CPT	8PG1112-1AA03
12”, 1.5 HP FVNR SIZE 1, 10A ETI CB, ESP200 0.75-3.4A, CPT	8PG1112-1AA04
12”, 2 - 3 HP FVNR SIZE 1, 10A ETI CB, ESP200 3-12A, CPT	8PG1112-1AA05
12”, 4 HP FVNR SIZE 1, 25A ETI CB, ESP200 3-12A, CPT	8PG1112-1AA06
12”, 5 HP FVNR SIZE 1, 30A ETI CB, ESP200 3-12A, CPT	8PG1112-1AA07
12”, 7.5 - 10 HP FVNR SIZE 1, 40A ETI CB, ESP200 5.5-22A, CPT	8PG1112-1AA08
12”, 15 - 20 HP FVNR SIZE 2, 50A ETI CB, ESP200 13-52A, CPT	8PG1112-1AA10
12”, 25 HP FVNR SIZE 2, 100A ETI CB, ESP200 13-52A, CPT	8PG1112-1AA11
18”, 30 HP FVNR SIZE 3, 100A ETI CB, ESP200 25-100A, CPT	8PG1112-1AA12
18”, 40 - 50 HP FVNR SIZE 3, 125A ETI CB, ESP200 25-100A, CPT	8PG1112-1AA13
24”, 60 - 75 HP FVNR SIZE 4, 150A ETI CB, ESP200 50-200A, CPT	8PG1112-1AA14
24”, 100 HP FVNR SIZE 4, 250A ETI CB, ESP200 50-200A, CPT	8PG1112-1AA15

FVNR catalog numbers

Product Description	Catalog Number
SIMOCODE PRO C[1 2 3]	
12”, 1/4 HP FVNR SIZE 1, 1A ETI CB, SIMOCODE PRO C 0.3-3 AMPS, CPT	8PG1112-2AA00
12”, 1/3 HP FVNR SIZE 1, 2A ETI CB, SIMOCODE PRO C 0.3-3 AMPS, CPT	8PG1112-2AA01
12”, 1/2 HP FVNR SIZE 1, 3A ETI CB, SIMOCODE PRO C 0.3-3 AMPS, CPT	8PG1112-2AA02
12”, 3/4 - 1 HP FVNR SIZE 1, 5A ETI CB, SIMOCODE PRO C 0.3-3 AMPS, CPT	8PG1112-2AA03
12”, 1.5 HP FVNR SIZE 1, 10A ETI CB, SIMOCODE PRO C 2.4-25 AMPS, CPT	8PG1112-2AA04
12”, 2 - 3 HP FVNR SIZE 1, 10A ETI CB, SIMOCODE PRO C 2.4-25 AMPS, CPT	8PG1112-2AA05
12”, 4 HP FVNR SIZE 1, 25A ETI CB, SIMOCODE PRO C 2.4-25 AMPS, CPT	8PG1112-2AA06
12”, 5 HP FVNR SIZE 1, 30A ETI CB, SIMOCODE PRO C 2.4-25 AMPS, CPT	8PG1112-2AA07
12”, 7.5 - 10 HP FVNR SIZE 1, 40A ETI CB, SIMOCODE PRO C 2.4-25 AMPS, CPT	8PG1112-2AA08
12”, 15 - 20 HP FVNR SIZE 2, 50A ETI CB, SIMOCODE PRO C 10-100 AMPS, CPT	8PG1112-2AA10
12”, 25 HP FVNR SIZE 2, 100A ETI CB, SIMOCODE PRO C 10-100 AMPS, CPT	8PG1112-2AA11
18”, 30 HP FVNR SIZE 3, 100A ETI CB, SIMOCODE PRO C 10-100 AMPS, CPT	8PG1112-2AA12
18”, 40 - 50 HP FVNR SIZE 3, 125A ETI CB, SIMOCODE PRO C 10-100 AMPS, CPT	8PG1112-2AA13
24”, 60 - 75 HP FVNR SIZE 4, 150A ETI CB, SIMOCODE PRO C 20-200 AMPS, CPT	8PG1112-2AA14
24”, 100 HP FVNR SIZE 4, 250A ETI CB, SIMOCODE PRO C 20-200 AMPS, CPT	8PG1112-2AA15
SIMOCODE PRO V[1 2 3]	
12”, 1/4 HP FVNR SIZE 1, 1A ETI CB, SIMOCODE PRO V 0.3-3 AMPS, CPT	8PG1112-3AA00
12”, 1/3 HP FVNR SIZE 1, 2A ETI CB, SIMOCODE PRO V 0.3-3 AMPS, CPT	8PG1112-3AA01
12”, 1/2 HP FVNR SIZE 1, 3A ETI CB, SIMOCODE PRO V 0.3-3 AMPS, CPT	8PG1112-3AA02
12”, 3/4 - 1 HP FVNR SIZE 1, 5A ETI CB, SIMOCODE PRO V 0.3-3 AMPS, CPT	8PG1112-3AA03
12”, 1.5 HP FVNR SIZE 1, 10A ETI CB, SIMOCODE PRO V 2.4-25 AMPS, CPT	8PG1112-3AA04
12”, 2 - 3 HP FVNR SIZE 1, 10A ETI CB, SIMOCODE PRO V 2.4-25 AMPS, CPT	8PG1112-3AA05
12”, 4 HP FVNR SIZE 1, 25A ETI CB, SIMOCODE PRO V 2.4-25 AMPS, CPT	8PG1112-3AA06
12”, 5 HP FVNR SIZE 1, 30A ETI CB, SIMOCODE PRO V 2.4-25 AMPS, CPT	8PG1112-3AA07
12”, 7.5 - 10 HP FVNR SIZE 1, 40A ETI CB, SIMOCODE PRO V 2.4-25 AMPS, CPT	8PG1112-3AA08
12”, 15 - 20 HP FVNR SIZE 2, 50A ETI CB, SIMOCODE PRO V 10-100 AMPS, CPT	8PG1112-3AA10
12”, 25 HP FVNR SIZE 2, 100A ETI CB, SIMOCODE PRO V 10-100 AMPS, CPT	8PG1112-3AA11
18”, 30 HP FVNR SIZE 3, 100A ETI CB, SIMOCODE PRO V 10-100 AMPS, CPT	8PG1112-3AA12
18”, 40 - 50 HP FVNR SIZE 3, 125A ETI CB, SIMOCODE PRO V 10-100 AMPS, CPT	8PG1112-3AA13
24”, 60 - 75 HP FVNR SIZE 4, 150A ETI CB, SIMOCODE PRO V 20-200 AMPS, CPT	8PG1112-3AA14
24”, 100 HP FVNR SIZE 4, 250A ETI CB, SIMOCODE PRO V 20-200 AMPS, CPT	8PG1112-3AA15

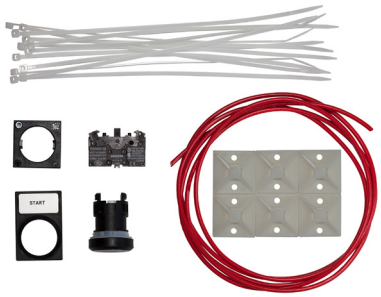
1 Includes Current Only Module
2 Not available with High Density
3 Includes Base Unit Only

Common modifications kits

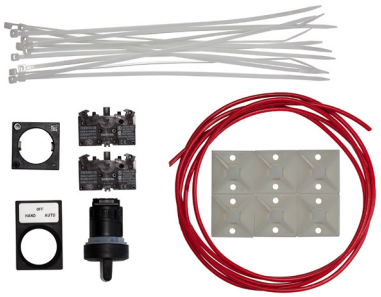
Common modification kits includes pilot device(s), 16 gauge MTW wiring, wire tie, anchor, legend plate, wiring diagram, and installation guide.

Product Name	Kit Type
Pushbutton	**Product MLFB**
22MM Start - Stop Pushbutton Kit	8PG1182-1KA00
22MM Emergency Stop Pushbutton Kit[1]	8PG1182-1KA01
30MM Start - Stop Pushbutton Kit	8PG1182-1KA02
30MM Emergency Stop Pushbutton Kit[1]	8PG1182-1KA03
Selector Switch	**Product MLFB**
22MM Hand - Off - Auto Selector Switch Kit	8PG1182-1KB00
22MM Start - Stop Selector Switch Kit	8PG1182-1KB01
22MM Off - On Selector Switch Kit	8PG1182-1KB02
30MM Hand - Off - Auto Selector Switch Kit	8PG1182-1KB03
30MM Start - Stop Selector Switch Kit	8PG1182-1KB04
30MM Off - On Selector Switch Kit	8PG1182-1KB05
Pilot Lights	**Product MLFB**
22MM Off Pilot Light 120V Kit	8PG1182-1KC00
22MM On - Off Pilot Lights 120V Kit	8PG1182-1KC01
22MM Running - Off Pilot Lights 120V Kit	8PG1182-1KC02
22MM Running Pilot Light 120V Kit	8PG1182-1KC03
22MM Led Running Pilot Light 120V Kit	8PG1182-1KC04
22MM Led On - Off Pilot Lights 120V Kit	8PG1182-1KC05
22MM Push-To-Test On Pilot Light 120V Kit	8PG1182-1KC06
22MM Push-To-Test On - Off Pilot Lights 120V Kit	8PG1182-1KC07
22MM Led Push-To-Test On Pilot Light 120V Kit	8PG1182-1KC08
22MM Led Push-To-Test On - Off Pilot Lights 120V Kit	8PG1182-1KC10
30MM Off Pilot Light 120V Kit	8PG1182-1KC11
30MM On - Off Pilot Lights 120V Kit	8PG1182-1KC12
30MM Running - Off Pilot Lights 120V Kit	8PG1182-1KC13
30MM Running Pilot Light 120V Kit	8PG1182-1KC14
30MM Led Running Pilot Light 120V Kit	8PG1182-1KC15
30MM Led On - Off Pilot Lights 120V Kit	8PG1182-1KC16
30MM Push-To-Test On Pilot Light 120V Kit	8PG1182-1KC17
30MM Push-To-Test On - Off Pilot Lights 120V Kit	8PG1182-1KC18
30MM Led Push-To-Test On Pilot Light 120V Kit	8PG1182-1KC20
30MM Led Push-To-Test On - Off Pilot Lights 120V Kit	8PG1182-1KC21

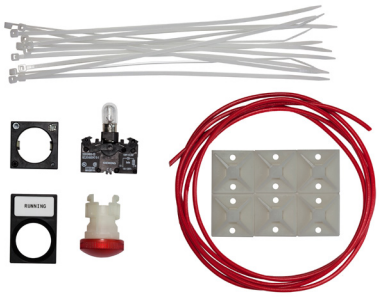
1 For an emergency stop device according to EN 418, please see the industrial controls catalog.



Pushbutton kit



Selector switch kit



Pilot light kit

NOTE: Standard 30MM NEMA 1 Pilot Device Housing Kit (8PG1192-1DF06) and 30MM NEMA 12 Pilot Device Housing Kit (8PG1192-1DF07) are available.

Other modification kits



To order other parts for MCC modifications, refer to the "tiastar and legacy Motor Control Center Aftermarket Renewal Parts Catalog" which is literature order number MCCS-AFTMKT-0613. Find information on ordering Splice kits, Drip Shield kits, Door kits, Terminal Blocks, etc.

Dimensions and drawings

Structures

The standard structure is 90" (2286 mm) high, plus a 1.125" (29 mm) high channel sill. Front-only (FO) structures can be either 15" (381 mm) or 20" (508 mm) deep. Siemens provides a 21" (533mm) true back-to-back (BTB) design, consisting of a common horizontal and vertical bus structure, for applications where available footprint is limited. Moreover, we provide other back-to-back (BTB) mounted double deep structures which are 30.5" (775 mm) or 40.5" (1029 mm) deep, and consist of two horizontal and vertical buses. This allows for correct bus phasing on the front or rear. The standards structure is 90" (2286 mm) high, plus a 1.125" (29 mm) high channel sill.

Structure	
Height	NEMA 1, 2, or 12 91.125" (2315mm)
	NEMA 3R 100" (2540 mm)
Front Mounted Only Structure (FO)	
Width	20" (508 mm) 24" (610 mm) 30" (762 mm)
Depth	15" (381 mm) 20" (508 mm)
Back-to-Back Structure	
Width	20" (508 mm) 30" (762 mm)
Depth	21" (533 mm)
Double Deep Structure	
Width	20" (508 mm) 30" (762 mm)
Depth	30.5" (775 mm) 40.5" (1029 mm)

Vertical Wireway	
Height	72" (1829 mm)
Width	4" (102 mm)
Depth	9″ (229mm)
Cross Section	36 sq." (914 sq. mm)
Top Horizontal Wireway	
Height	12" (305 mm)
Depth	7" (178 mm)
Bottom Horizontal Wireway	
Height	6" (305 mm)
Width	15" (381 mm) 20" (508 mm) 30" (762 mm)
Pull Box (Top Hat)	
Height	12" (305 mm) 18" (457 mm) 24" (610 mm)
Width	20" (508 mm) 30" (762 mm)
Depth	15" (381 mm) 20" (508 mm)

Bus drawings

Available Locations Of Ground And Full Length Neutral

Section	Neutral	Ground
Typical	CD	ABCD
With Vertical Ground Bus	C	AC
Main Lug Only	CD	BCD
Main Disconnect	CD	BCD
Service Entrance	C	ABCD

Notes:
1. Location B and D is available on 21" back-to-back structures only.
2. When continuous (full length) neutral bus is specified, it must be located in the bottom of the structure. Full length neutral bus requires that the ground be located in the top of the structure. The standard location is C.

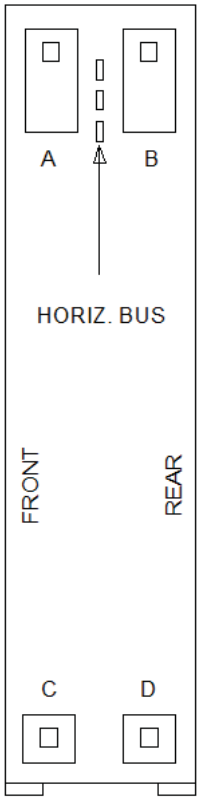


Figure 57: Side view

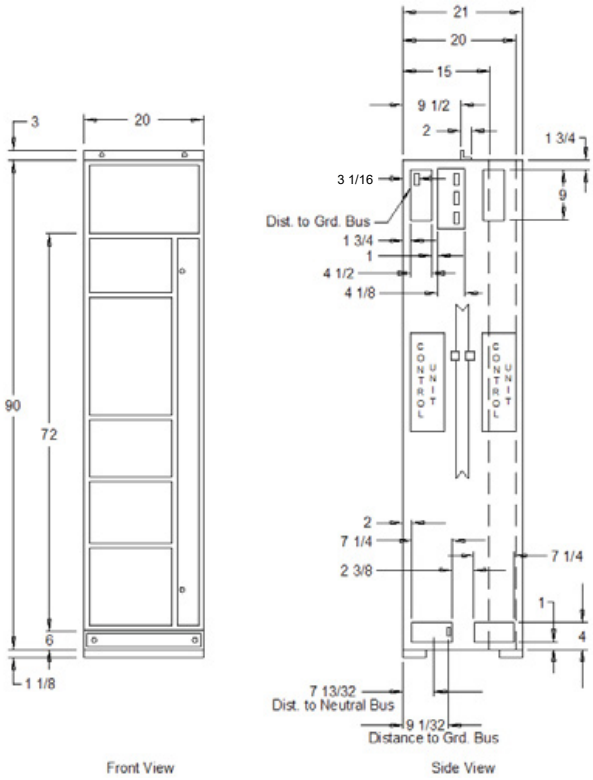


Figure 58: Mounting dimensions

Bus mounting dimensions

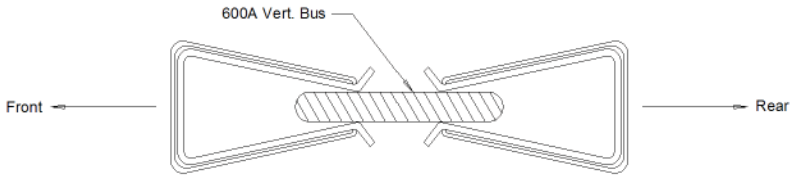


Figure 59: Stab-on connection

Bus drawing

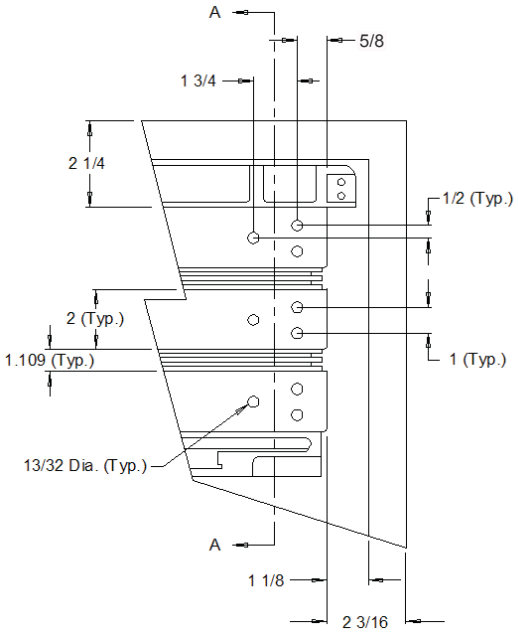


Figure 60

Qty./Phase		
AMP	**Size 50 °C**	**65 °C**
600	(1) 1/4 x 2	1/8 x 2
800	(1) 3/8 x 2	3/16 x 2
1200	(2) 1/4 x 2	3/8 x 2
1600	(2) 3/8 x 2	
2000	(4) 3/8 x 2	
2500[1]		(4) 3/8 x 2

1 2500A available in NEMA 1 Enclosure only.

Mounting of single and double bus bars

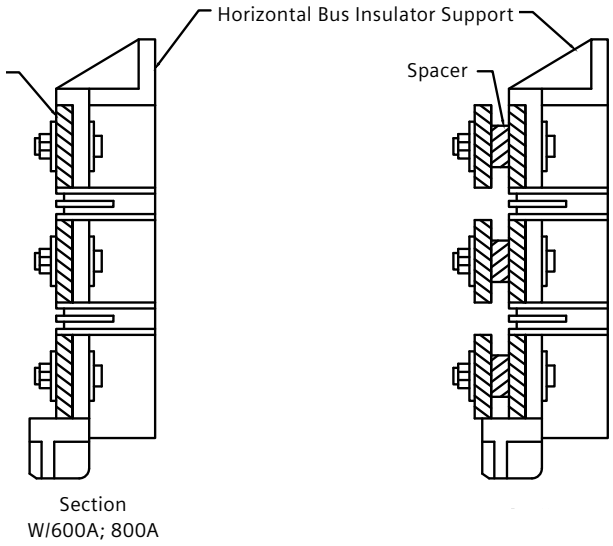


Figure 61: Section view of single and double bus bars

All dimensions are shown in inches unless otherwise specified.

Vertical bus dimensions and availability

Vertical Bus		Available Structures			
Amp Rating	Size	15	20	20 Back-to-Back	24
300	3/8 x 3/4	X	X	—	X
600	3/8 x 1 1/2	X	X	X	X
800	3/8 x 1 1/2	X	X	X	X

Bus Bar Phase

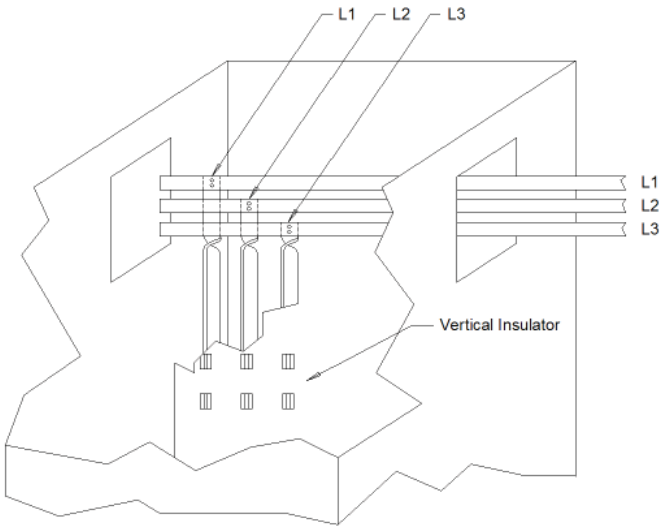
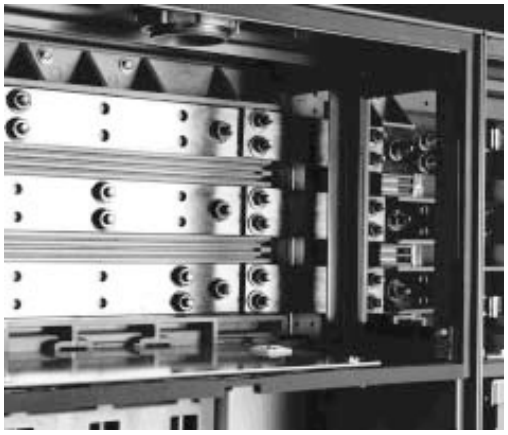


Figure 62: Front view of bus bar

Horizontal Bus Link

For joining two sections in the field.



Front view

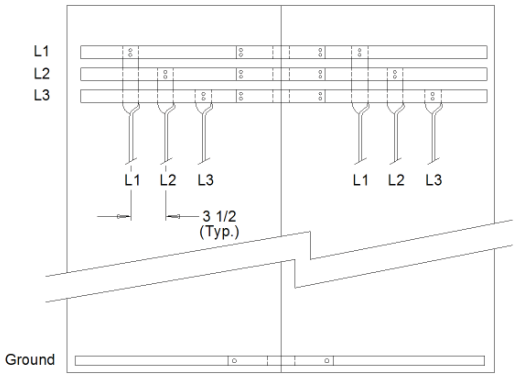


Figure 63: Front view horizontal bus link

All dimensions are shown in inches unless otherwise specified.

Wireway dimensions

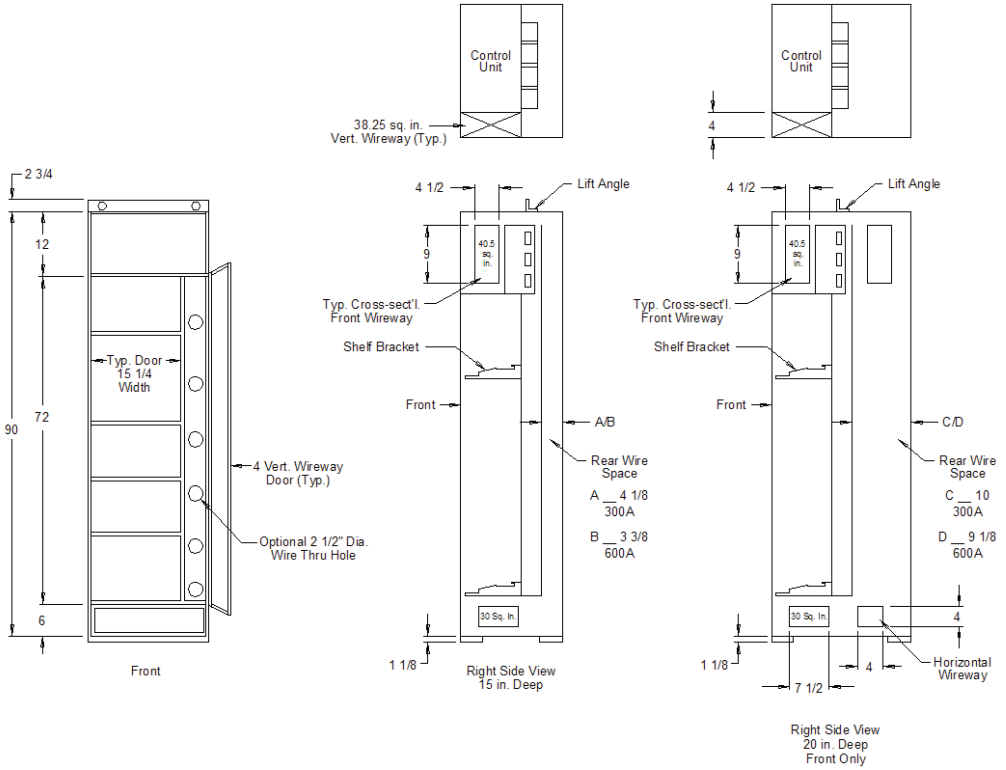


Figure 64: Front and right-side views of wireway drawings

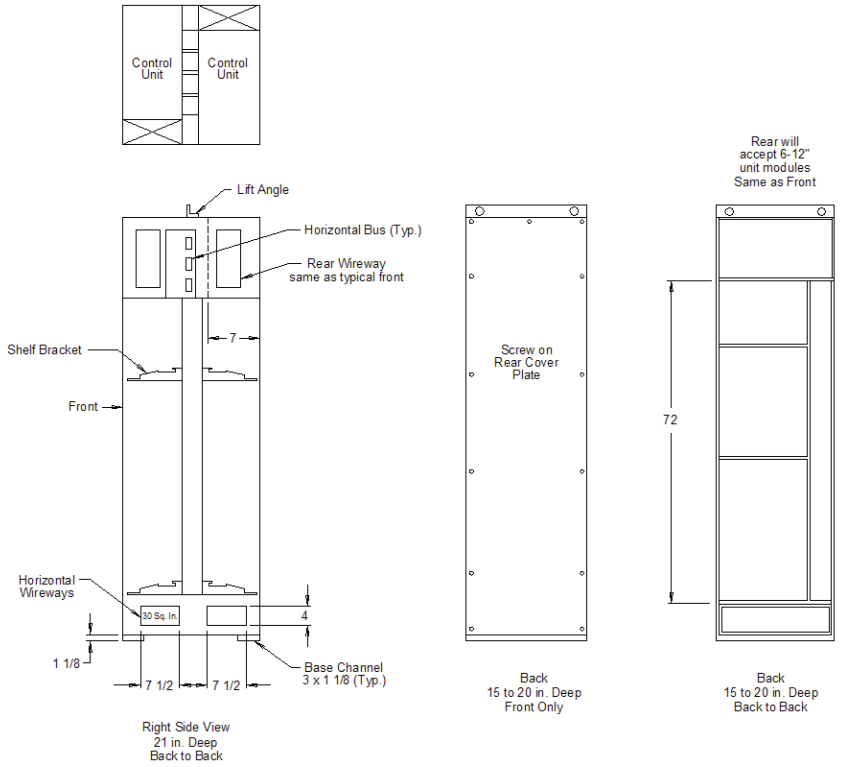


Figure 65: Back and right-side views of wireway drawings

All dimensions are shown in inches unless otherwise specified.

Blank section

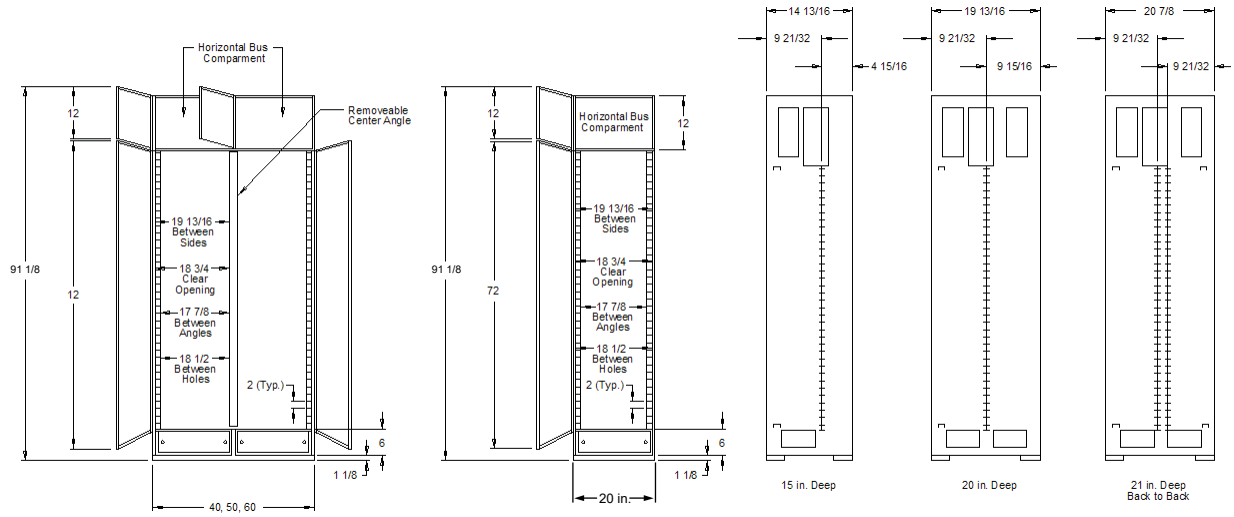


Figure 66: Dimensions of blank sections

Plug-in unit

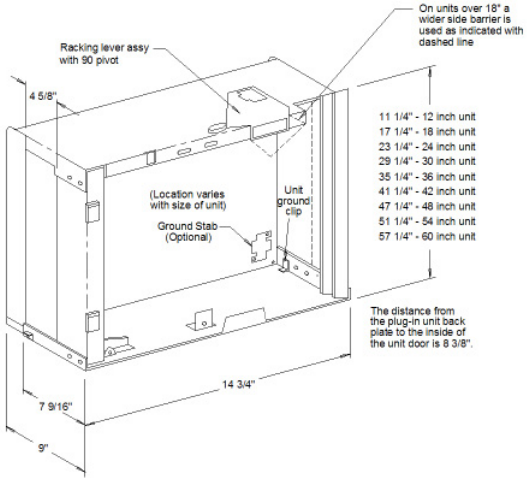


Figure 67: Isometric view of plug-in unit with dimensions

Fixed mounting panel dimensions

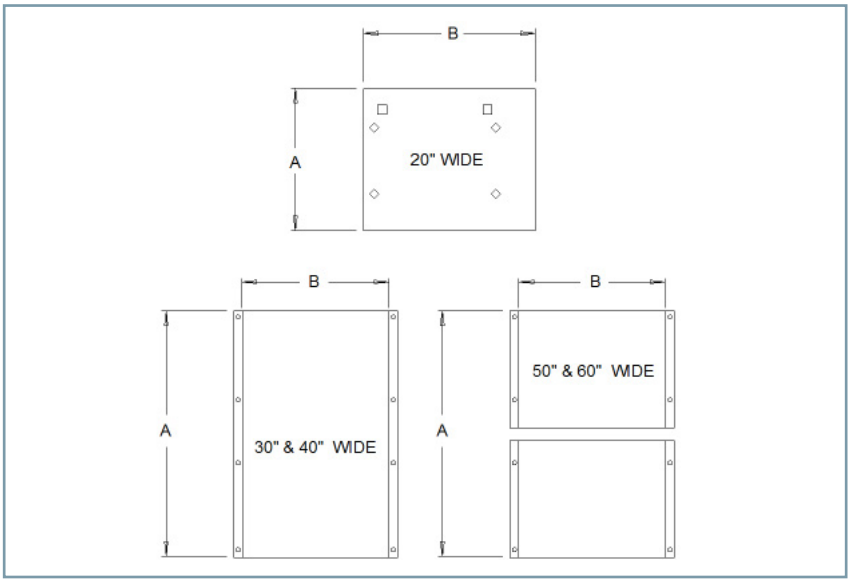
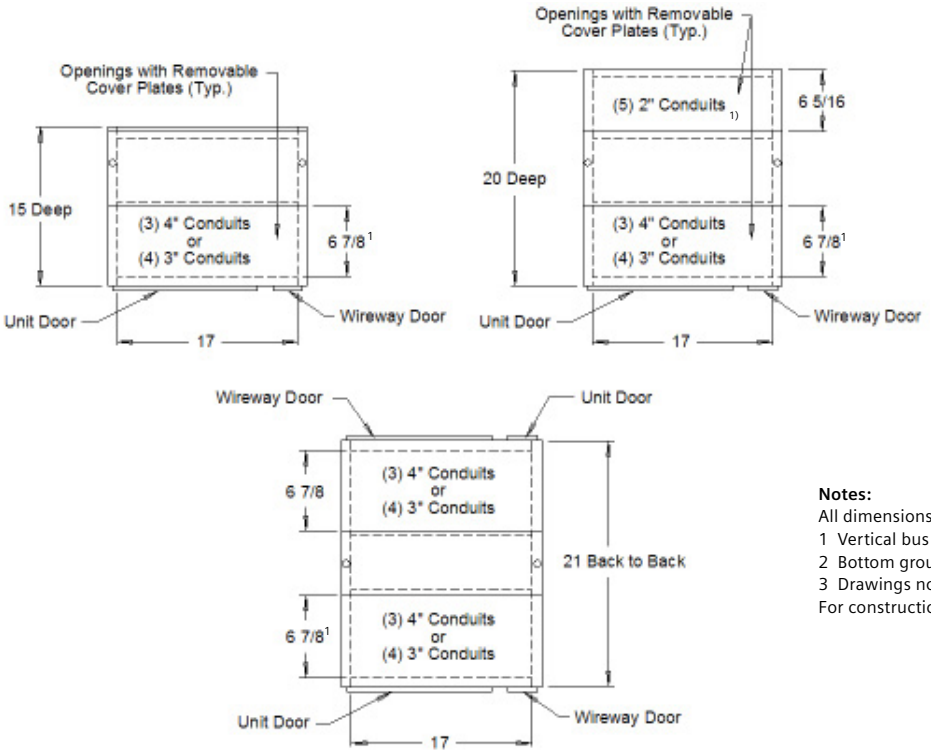


Figure 68: Fixed mounting panel dimensions

Unit Space	20" A	W B	30" A	W B	40" A	W B	50" A	W B	60" A	W B
12	9	17 7/8								
18	15	17 7/8								
24	21	17 7/8								
30	27	17 7/8								
36	33	17 7/8	33	27½						
42	39	17 7/8								
48	45	17 7/8								
54	51	17 7/8								
60	57	17 7/8								
66	63	17 7/8								
72	69	17 7/8	70	27½	70	37½	70	47½	70	57½

Conduit entry and transformer mounting



Notes:
All dimensions given in inches.
1 Vertical bus is 10 5/8" from bottom of base.
2 Bottom ground bus is 7/8" from bottom of base.
3 Drawings not for construction.
For construction, obtain certified drawings from the factory

Figure 69: Top conduit entry for 15" and 20" deep, and back-to-back

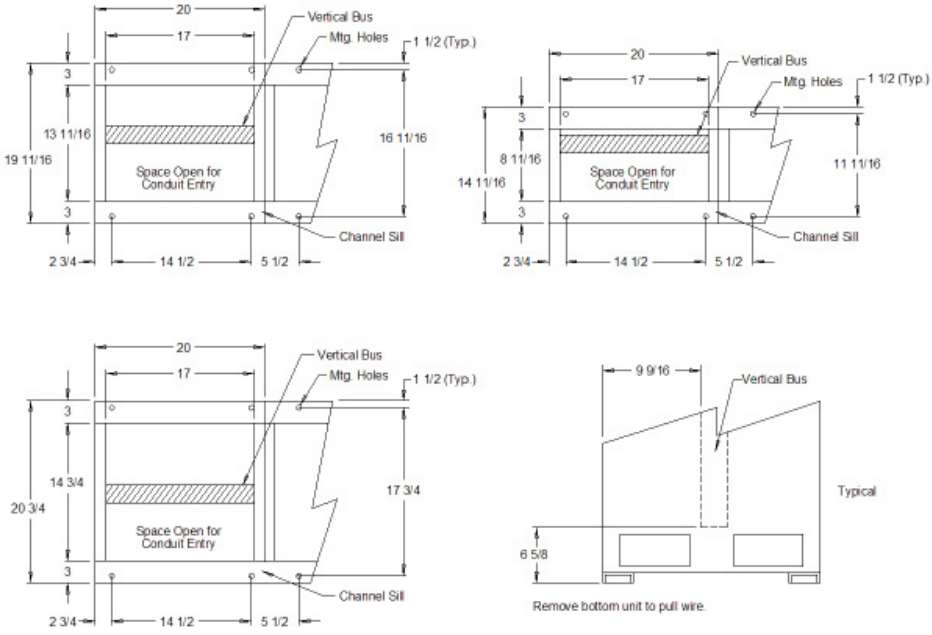


Figure 70: Bottom conduit entry for 15" and 20" deep and back-to-back

1 Front, top, conduit space for 2000A and 2500A horizontal bus or for insulated horizontal bus is 4 1/8"

Conduit entry and transformer mounting

Wireway auto transformer mounting and bottom conduit entry restrictions

Size 2-4
Reduced Voltage
Auto Transformers

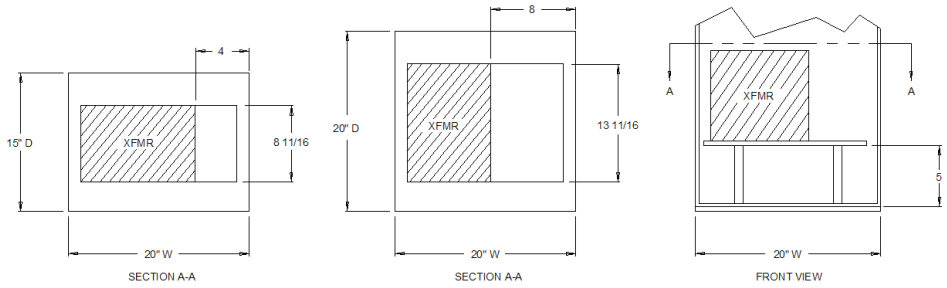


Figure 71: Size 2-4 reduced voltage auto transformers

Size 5-6
Reduced Voltage
Auto Transformers

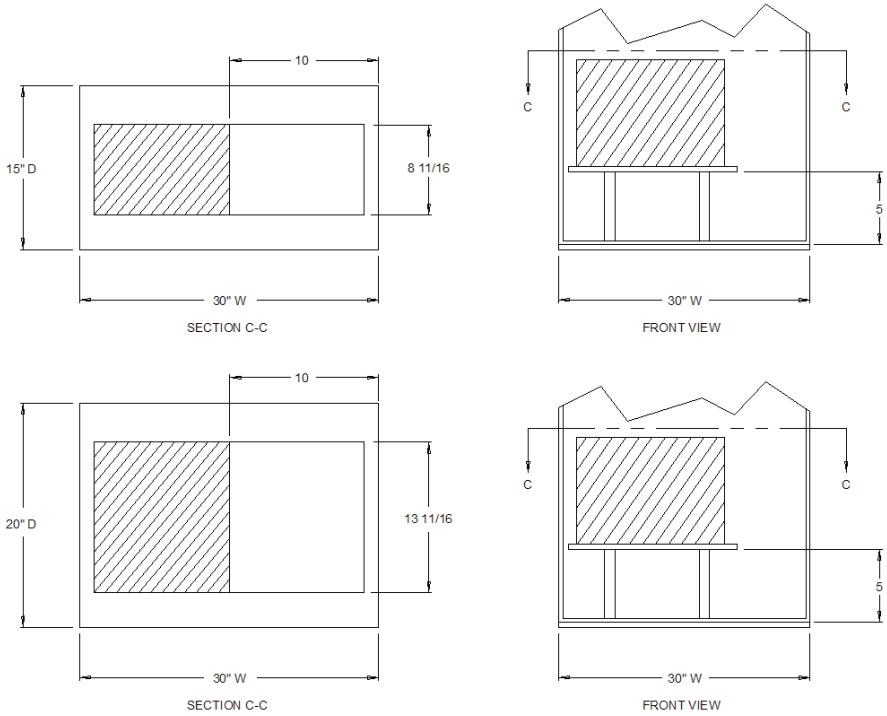
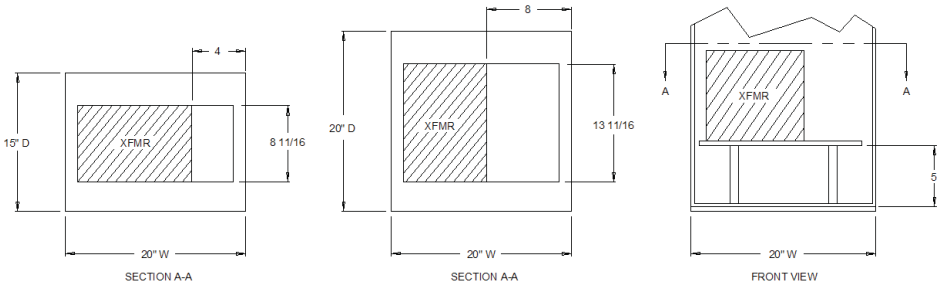


Figure 72: Size 5-6 reduced voltage auto transformers

Notes:
1 All dimensions given in inches.
2 Bottom mounted transformers will reduce conduit entry space.
3 Drawings not for construction.
For construction, obtain certified drawings from the factory.

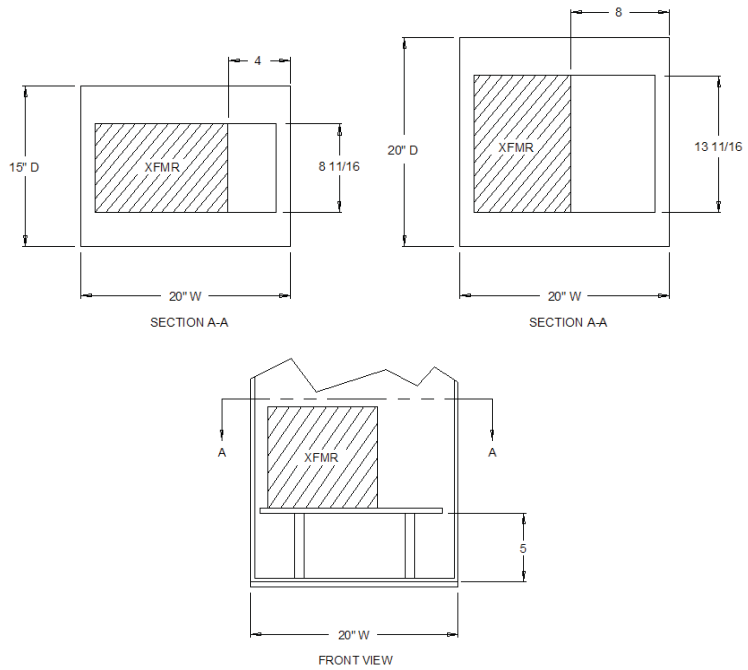
Conduit entry and transformer mounting

Lighting transformer mounting and conduit entry restrictions



1-5 kVA Single Phase

Figure 73: 1-5 kVA single phase



7 1/2 kVA Single Phase

Figure 74: 7-1/2 kVA single phase

Notes:
1 All dimensions given in inches.
2 Bottom mounted transformers will reduce conduit entry space.
3 Drawings not for construction.
For construction, obtain certified drawings from the factory.
4 Conduit entry is not recommended between 20-45 KVA single phase and all 3 phase lighting transformers.

Conduit entry and transformer mounting

Lighting transformer mounting and conduit entry restrictions

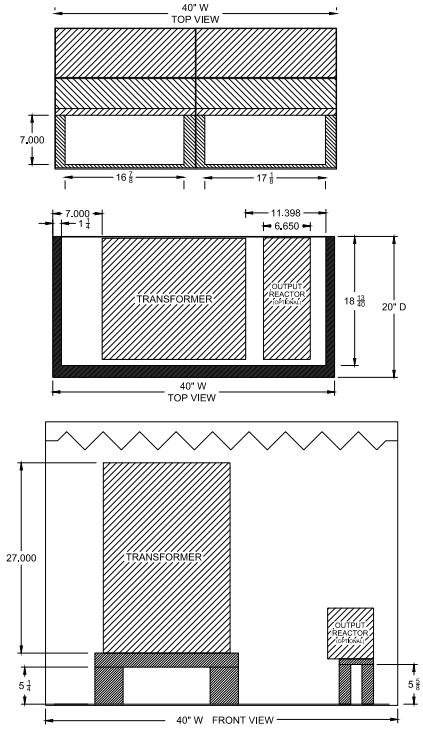


Figure 75: 40" wide

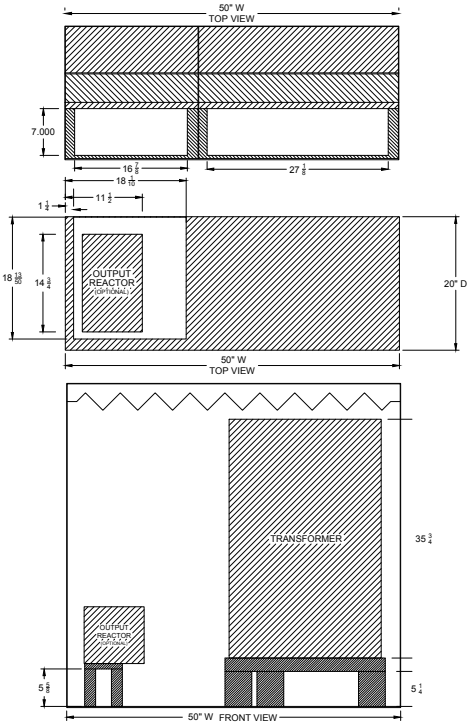


Figure 76: 50" wide

NEMA 3R structure dimensions

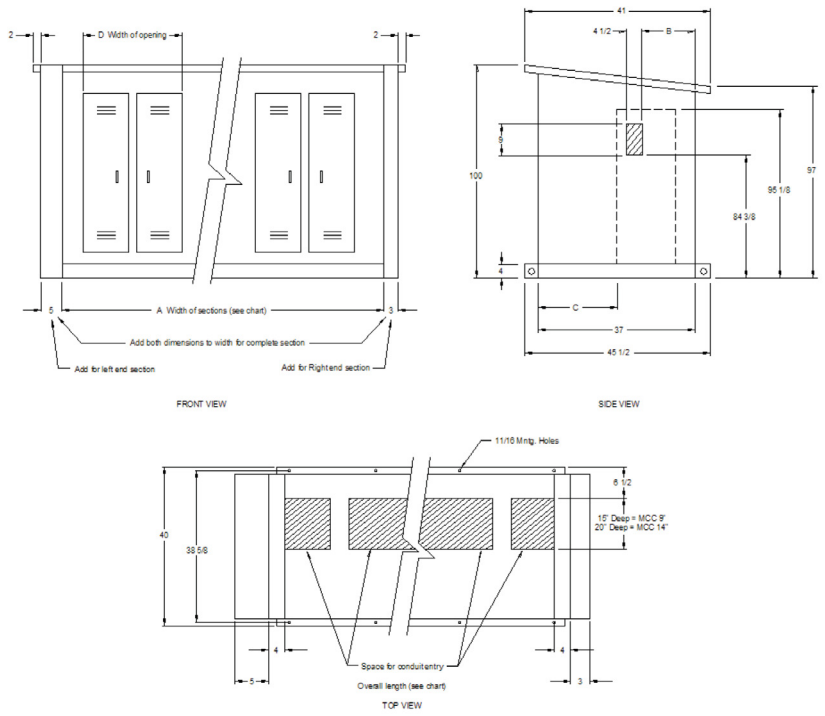


Figure 77: NEMA 3R structure

A	D	Remarks
40	36	(2) 20″ Sections
50	46	(1) 20″ & (1) 30″ Section
60	56	(3) 20″ or (2) 30″ Sections
80	(2) 36	(4) 20″ Sections

Notes:
1 All dimensions given in inches.
2 Shaded areas indicate conduit entries.
3 Drawings not for construction.
For construction, obtain certified drawings from the factory
4 Not available for back-to-back structures.

Duplex structure floor plan and clearance dimensions

				A	B	C	D	E	F	G	H	J
Left-Handed "Structure" Width	Right-Handed "Structure" Width	Vertical Support (Mounting Angle Location)	Panel Orientation	Structure Depth	Panel Surface to inside of Door Brace	Panel Surface to inside of Door	Left-Hand Door Opening Clearance	Right-Hand Door Opening Clearance	Total Opening Available (Door Brace Removed)	Duplex Width	Conduit Entry Space	Conduit Entry Space
—	—	Standard	Standard	15	6.35	8.34	—	—	—	—	—	—
—	—	Standard	Standard	20	6.35	8.34	—	—	—	—	—	—
—	—	Standard	Inverted	15	8.85	10.93	—	—	—	—	—	—
—	—	Standard	Inverted	20	8.25	10.93	—	—	—	—	—	—
—	—	Recessed	Standard	15	9.25	11.20	—	—	—	—	—	—
—	—	Recessed	Standard	20	14.25	16.20	—	—	—	—	—	—
—	—	Recessed	Inverted	15	11.77	13.70	—	—	—	—	—	—
—	—	Recessed	Inverted	20	16.75	18.70	—	—	—	—	—	—
20	—	—	—	—	—	—	18	18	38.88	40	17	17
30	—	—	—	—	—	—	18	18	48.88	50	17	27
30	—	—	—	—	—	—	28	28	58.88	60	17	27

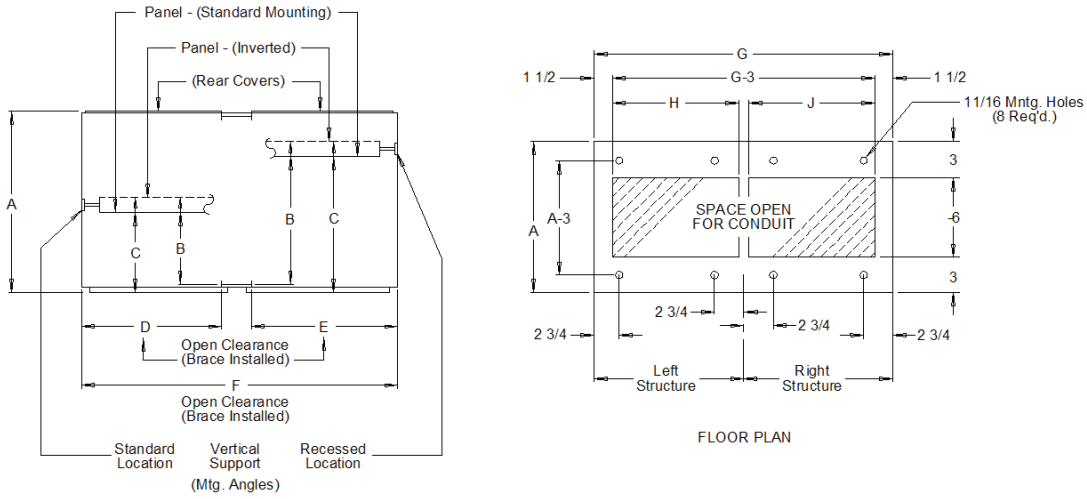


Figure 78: Duplex structure floor plan

Motor Circuit Protector (MCP) selection

Recommended MCP type selection: 30/60Hz squirrel cage motors

MCP selection

	Voltage System																							
	200V 60Hz			208V 60Hz			230V 60Hz			380V 50Hz			415V 50Hz			460V 60Hz			575V 60Hz			
HP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	Starter Size	FLA	MCP	HP
½		2.5	5		2.4	5		2.2	5		1.3	3		0.81	2		1.1	3		0.9	2	½
¾		3.7	10		3.5	10		3.2	10		1.8	5		1.21	3		1.6	5		1.3	3	¾
1	0	4.8	10	0	4.6	10	0	4.2	10		2.3	5		2	5		2.1	5		1.7	5	1
1½		6.9	25		6.6	25		6	25	0	3.3	10	0	2.5	5	0	3	10	0	2.4	5	1½
2		7.8	30		7.5	30		6.8	25		4.3	10		3.5	10		3.4	10		2.7	5	2
3		11.0	40		10.6	40		9.6	30		6.1	25		5	25		4.8	10		3.9	10	3
5	1	17.5	50	1	16.7	50	1	15.2	40		9.7	30		7.5	30		7.6	30		6.1	25	5
7½		25.3	50		24.2	50		22	50	1	14	40	1	11.0	40	1	11.0	40	1	9.0	30	7½
10	2	32.2	100	2	30.8	100	2	28	50		18	50		14	40		14	40		11.0	30	10
15		48.3	125		46.2	125		42	100		27	50		21	50		21	50		17	50	15
20	3	62.1	125	3	59.4	125		54	125	2	34	100	2	28	50	2	27	50	2	22	50	20
25		78.2	150		74.8	150	3	68	125		44	100		35	100		34	100		27	50	25
30	4	92	150	4	88	150		80	150		51	125		40	100		40	100		32	100	30
40		120	250		114	250	4	104	250	3	66	125	3	55	125	3	52	125	3	41	100	40
50		150	250		143	250		130	250		83	150		64	125		65	125		52	125	50
60	5	177	250	5	169	250		154	250	4	103	150	4	80	150		77	150		62	125	60
75		221	400		211	400	5	192	400		128	250		100	150	4	96	150	4	77	150	75
100		285	600		273	600		248	400		165	250		135	250		124	250		99	150	100
125	6	359	600	6	343	600		312	600	5	208	250	5	165	250		156	250		125	250	125
150		414	800		396	800	6	360	600		240	400		200	400	5	180	250	5	144	250	150
200								480	800		320	600		260	400		240	400		192	400	200
250										6	403	800	6	325	600		302	600		242	400	250
300											532	800		385	800	6	361	600	6	289	600	300
350																	414	800		336	600	350
400																	477	800		382	800	400

FLA per NEC 2014 table 430.250. MCP size meets NEC requirements per article 430.110 115% FLA min. continuous amps.

MCP trip ranges are selected to meet maximum settings per NEC table 430.52 and exception C, Art. 430.52. MSCP's are factory set at minimum and can be set to a maximum of 1700% of motor FLA per NEC 430.52 for energy efficient motors.

Above ratings will not exceed maximum size allowed to protect heater coil for energy efficient motor FLAs. Maximum ratings shown on heater coil selection charts are not to be exceeded. Do not use this chart for part winding starters. Use thermal magnetic breaker or fuse for short circuit protection.

3VA Molded Case Circuit Breakers

3VA Molded Case Switch and Motor Circuit Protector

Motor circuit protector TM120M AM[3]

Frame (Breaker Type)	Maximum Ampere Rating	3-Pole Catalog Number	Instantaneous short circuit protection
3VA51 (HEAP)	1	3VA5181-1MU31-0AA0	3 ... 7
		3VA5181-1MH31-0AA0	5 ... 12
	2	3VA5102-1MU31-0AA0	6 ... 14
		3VA5102-1MH31-0AA0	10 ... 24
	3	3VA5103-1MU31-0AA0	9 ... 21
		3VA5103-1MH31-0AA0	15 ... 36
	5	3VA5105-1MU31-0AA0	15 ... 35
		3VA5105-1MH31-0AA0	25 ... 60
	7	3VA5107-1MU31-0AA0	21 ... 49
		3VA5107-1MH31-0AA0	35 84
	10	3VA5191-1MU31-0AA0	30 ... 70
		3VA5191-1MH31-0AA0	50 ... 120
	15	3VA5195-1MU31-0AA0	45 ... 105
		3VA5195-1MH31-0AA0	75 ... 180
	25	3VA5125-1MU31-0AA0	75 ... 175
		3VA5125-1MH31-0AA0	25 ... 300
	30	3VA5130-1MU31-0AA0	90 ... 210
		3VA5130-1MH31-0AA0	150 ... 360
	40	3VA5140-1MU31-0AA0	120 ... 280
		3VA5140-1MH31-0AA0	200 ... 480
	50	3VA5150-1MU31-0AA0	150 ... 350
		3VA5150-1MH31-0AA0	250 ... 600
	70	3VA5170-1MU31-0AA0	210 ... 490
		3VA5170-1MH31-0AA0	350 ... 840
	80	3VA5180-1MU31-0AA0	240 ... 560
		3VA5180-1MH31-0AA0	400 ... 950
	90	3VA5190-1MU31-0AA0	270 ... 630
		3VA5190-1MH31-0AA0	450 ... 1080
	100	3VA5110-1MU31-0AA0	300 ... 700
		3VA5110-1MH31-0AA0	500 ... 1200
	110	3VA5111-1MU31-0AA0	330 ... 770
		3VA5111-1MH31-0AA0	550 ... 1320
	125	3VA5112-1MU31-0AA0	375 ... 875
		3VA5112-1MH31-0AA0	625 ... 1500
3VA52 (HFAP)	150	3VA5215-0MU31-0AA0	450 ... 900
		3VA5215-0MH31-0AA0	900 ... 1800
	200	3VA5220-0MU31-0AA0	600 ... 1200
		3VA5220-0MH31-0AA0	1200 ... 2400
	250	3VA5225-0MU31-0AA0	750 ... 900
		3VA5225-0MH31-0AA0	1250 ... 2500
3VA53 (HJAP)	250	3VA5325-0MU31-0AA0	750 ... 1500
		3VA5325-0MH31-0AA0	1500 ... 3000

Motor circuit protector TM120M AM[2]

Frame (Breaker Type)	Maximum Ampere Rating	3-Pole Catalog Number	Instantaneous short circuit protection
3VA54 (HLAP)	400	3VA5440-0MU31-0AA0	750 ... 1500
		3VA5440-0MH31-0AA0	1200 ... 2400
	500	3VA5450-0MU31-0AA0	1500 ... 3000
		3VA5450-0MH31-0AA0	3000 ... 6000
	600	3VA5460-0MU31-0AA0	1800 ... 3600
		3VA5460-0MH31-0AA0	3000 ... 6000
3VA55 (HMAP)	600	3VA5560-0MH32-0AA0	4800 ... 9600
3VA52 (CFAP)	150	3VA5215-1MU31-0AA0	450 ... 900
		3VA5215-1MH31-0AA0	900 ... 1800
	200	3VA5220-1MU31-0AA0	600 ... 1200
		3VA5220-1MH31-0AA0	1200 ... 2400
	250	3VA5225-1MU31-0AA0	750 ... 900
		3VA5225-1MH31-0AA0	1250 ... 2500
3VA53 (CJAP)	250	3VA5325-1MU31-0AA0	750 ... 1500
		3VA5325-1MH31-0AA0	1500 ... 3000
3VA54 (CLAP)	400	3VA5440-1MU31-0AA0	750 ... 1500
		3VA5440-1MH31-0AA0	2400 ... 4800
	500	3VA5450-1MU31-0AA0	1500 ... 3000
		3VA5450-1MH31-0AA0	3000 ... 6000
	600	3VA5460-1MU31-0AA0	1500 ... 3000
		3VA5460-1MH31-0AA0	3000 ... 6000
3VA55 (CMAP)	600	3VA5560-1MH32-0AA0	4800 ... 9600

1 Rated at 600 V / 347 V AC.
2 SCCR is 100kA at 480 V. SCCR rating is the maximum permissible short circuit current of the MCP in combinaton with an appropriate overload protection device.
3 SCCR is 65kA at 480 V. SCCR rating is the maximum permissible short circuit current of the MCP in combination with an appropriate overload protection device.

Thermal Magnetic Breaker Selection

3 Phase 60Hz Squirrel Cage Motors

Unit Space	200V 60Hz			208V 60Hz			230V 60Hz			380V 50Hz			415V 50Hz			460V 60Hz			575V 60Hz			Unit Space
HP	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	Starter Size	FLA	CB Trip	HP
½		2.5	15		2.4	15		2.2	15		1.3	15		0.81	15		1.1	15		0.9	15	½
¾		3.7	15		3.5	15		3.2	15		1.8	15		1.21	15		1.6	15		1.3	15	¾
1	0	4.8	15	0	4.6	15	0	4.2	15		2.3	15		2	15		2.1	15		1.7	15	1
1½		6.9	15		6.6	15		6	15	0	3.3	15	0	2.5	15	0	3	15	0	2.4	15	1½
2		7.8	15		7.5	15		6.8	15		4.3	15		3.5	15		3.4	15		2.7	15	2
3		11.0	20		10.6	20		9.6	20		6.1	15		5	15		4.8	15		3.9	15	3
5	1	17.5	30	1	16.7	30	1	15.2	25		9.7	20		7.5	15		7.6	15		6.1	15	5
7½		25.3	45		24.2	40		22	40	1	14	25	1	11.0	20	1	11.0	20	1	9.0	15	7½
10	2	32.2	60	2	30.8	50	2	28	45		18	30		14	25		14	25		11.0	20	10
15		48.3	80		46.2	80		42	70		27	45		21	35		21	35		17	30	15
20	3	62.1	100	3	59.4	100		54	90	2	34	60	2	28	50	2	27	45	2	22	40	20
25		78.2	150		74.8	125	3	68	110		44	80		35	60		34	60		27	50	25
30	4	92	150	4	88	150		80	150		51	90		40	70		40	70		32	60	30
40		120	200		114	200	4	104	175	3	66	110	3	55	90	3	52	90	3	41	70	40
50		150	250		143	250		130	225		83	150		64	110		65	110		52	90	50
60	5	177	300	5	169	300		154	250	4	103	175	4	80	150		77	125		62	100	60
75		221	400		211	350	5	192	350		128	225		100	175	4	96	175	4	77	125	75
100		285	500		273	450		248	400		165	300		135	225		124	200		99	175	100
125	6	359	600	6	343	600		312	500	5	208	350	5	165	300		156	250		125	200	125
150		414	700		396	700	6	360	600		240	400		200	350	5	180	300	5	144	250	150
200								480	800	6	320	600		260	450		240	400		192	350	200
250											403	700	6	325	600		302	500		242	400	250
300														385	700	6	361	600	6	289	500	300
350																	414	700		336	600	350
400																	477	800		382	700	400

Circuit breaker trip ratings are selected in accordance with NEC 2014 article 430.52 and table 430.52 assuming motors with locked rotor KVA Code B thru E. Lower trip ratings may be required for motors with Code A. FLA per NEC 2014 table 430.250. Do not use to size heater coils. Use motor NP data.

Maximum ratings shown on Heater Coil selection charts are not to be exceeded. Special applications on motor may require different rating, refer to proper section of NEC to size.

Do not use this chart for part winding starters - Maximum breaker size to be limited to 200% FLA or less, 150% for FLA greater than 100A.

Fuse Selection

UL Standard Fuse Classifications

	K1	K5	K9	RK1	RK5	J	L
Amp Rating Range	0-600	0-600	0-600	0-600	0-600	0-600	601-6000
Interrupting Rating RMS Amps	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Voltage	250 or 600	250 or 600	250 or 600	250 or 600	250 or 600	600	600
Current Limiting Characteristics	High	Moderate	Fair	High	Moderate	High	High
Dual Element Time Delay	No	Yes	Yes	No	Yes	No	Yes[3]
Generic Names	Current Limiting[1]	Current Limiting Time Delay[1]	Current Limiting Time Delay[1]	Current Limiting	Current Limiting Time Delay	Current Limiting	Current Limiting
Rejection Type	No	No	No	Yes	Yes	Inherent	Inherent
Manufacturer Designations	Bussman KTN Bussman KTS	Bussman FRN Bussman FRS		Bussman LPN-RK Bussman KTS-R Mersen A2D Mersen A6D	Bussman LPN-RK Bussman KTS-R Mersen A2D Mersen A6D	Bussman JKS Mersen A4J	Bussman KTU Mersen A4Bt

1 UL does not permit fuses to be marked “current limiting” due to lack of rejection feature.

2 Class J smaller the NEC Code specifications; Class L requires bolt-on fuse blocks. Inherent rejection feature of unique fuse dimensions allows UL marking of “current limiting” features.

3 Class “L” fuses may be marked “Time Delay” although UL does not investigate Time Delay characteristics of such fuses.

Fuse Selection 3 Phase 60Hz Squirrel Cage Motors

Fuse sizes are selected in accordance with NEC 2014 article 430.52 & 57 and table 430.52.

	200V 60Hz				208V 60Hz				230V 60Hz				380V 50Hz			
HP	Starter Size	FLA	Time Delay	Non Delay	Starter Size	FLA	Time Delay	Non Delay	Starter Size	FLA	Time Delay	Non Delay	Starter Size	FLA	Time Delay	Non Delay.
½		2.5	4	5		2.4	4	5		2.2	3.5	4.5		1.3	2	2.8
¾		3.7	5.6	8		3.5	5.6	7		3.2	5	7		1.8	2.8	3.5
1		4.8	8	10		4.6	7	10		4.2	7	9		2.3	3.5	5
1½	0	6.9	10	15	0	6.6	10	15	0	6	9	12	0	3.3	5.6	7
2		7.8	12	17.5		7.5	12	15		6.8	10	15		4.3	7	9
3		11.0	17.5	25		10.6	15	20		9.6	15	20		6.1	10	15
5	1	17.5	30	40	1	16.7	25	30	1	15.2	25	30		9.7	15	20
7½		25.3	40	50		24.2	40	50		22	35	45	1	14	25	30
10	2	32.2	45	60	2	30.8	45	60	2	28	45	60		18	30	30
15		48.3	80	100		46.2	70	90		42	60	90		27	40	60
20	3	62.1	100	125	3	59.4	90	110		54	80	100	2	34	60	70
25		78.2	125	175		74.8	110	150	3	68	100	125		44	70	90
30	4	92	150	200	4	88	150	175		80	125	175		51	80	100
40		120	200	225		114	175	225	4	104	175	200	3	66	100	125
50		150	225	300		143	225	300		130	200	250		83	150	175
60	5	177	300	400	5	169	300	350		154	250	350	4	103	150	200
75		221	350	400		211	350	400	5	192	300	400		128	200	200
100		285	450	600		273	450	600		248	400	400		165	250	350
125	6	359	600	600	6	343	600	600		312	500	600	5	208	300	400
150		414	650	800		396	650	800	6	360	600	700		240	400	400
200										480	800	800		320	500	600
250													6	403	600	800
300														532	800	800
350																
400																

Fuse sizes are selected in accordance with NEC 2014 article 430.52 & 57 and table 430.52.

Fuse Selection 3 Phase 60Hz Squirrel Cage Motors (cont'd.)

Fuse sizes are selected in accordance with NEC 2014 article 430.52 & 57 and table 430.52.

415V 50Hz				460V 60Hz				575V 60Hz				
Starter Size	FLA	Time Delay	Non Delay	Starter Size	FLA	Time Delay	Non Delay	Starter Size	FLA	Time Delay	Non Delay	HP
	0.81	1.25	1.8		1.1	1.8	2.25		0.9	1.4	1.8	½
	1.21	2	2.8		1.6	2.5	3.2		1.3	2	2.8	¾
	2	3	4		2.1	3.2	4.5		1.7	2.8	3.5	1
0	2.5	4	5.6	0	3	4.5	6	0	2.4	4	5	1½
	3.5	5	7		3.4	5	7		2.7	4	5.6	2
	5	8	12		4.8	8	10		3.9	6	8	3
	7.5	12	15		7.6	12	15		6.1	9	12	5
	11.0	17.5	25		11.0	17.5	25		9.0	15	20	7½
1				1				1				
	14	25	30		14	20	30		11.0	17.5	25	10
	21	35	45		21	35	40		17	25	35	15
2	28	45	60	2	27	40	60	2	22	35	45	20
	35	60	60		34	50	60		27	40	60	25
	40	60	80		40	60	80		32	50	70	30
3	55	80	100	3	52	80	100	3	41	60	80	40
	64	100	125		65	100	125		52	80	100	50
	80	125	175		77	125	175		62	100	125	60
4				4				4				
	100	150	200		96	150	200		77	125	175	75
	135	200	300		124	200	225		99	150	200	100
5	165	250	350	5	156	250	350	5	125	200	250	125
	200	300	400		180	300	400		144	225	300	150
	260	400	600		240	400	400		192	300	400	200
6	325	500	600		302	450	600		242	400	500	250
	385	600	800		361	600	700		289	450	600	300
				6	414	650	800	6	336	500	600	350
					477	800	800		382	600	700	400

Fuse sizes are selected in accordance with NEC 2014 article 430.52 & 57 and table 430.52.

Size fuses, time delay or non-time delay, in accordance with the NEC permitted fuse size as noted below:

Starter Size	Maximum Fuse Size		
	Class R	Class J	Class L
0	30	60	-
1	60	120	-
2	100	200	-
3	200	400	-
4	200	400	-
5	400	800	-
6	600	800	800

If the calculated rating is between standard sizes, the next larger size may be used. Fuse size may not exceed switch size.

Minimum switch size per NEC 430.110 must be 115% of FLA of motor. Do not use this chart for part winding motors. Size as follows: maximum fuse size

limited to 150% FLA for dual element fuses and 200% for non-delay type fuses.

Approximate AC Motor Amps

Use only When Motor Full Load Current is Not Known

Motor Amps will vary depending on the type and manufacture of the motor. These average values, usually for T frame motors with service factor of 1.15 are to be used only as a guide. The formulas on the previous page may be used to obtain approximate amps for other motors.

NOTE:
Actual Motor Amps may be higher or lower than the values listed below for a particular motor. For more reliable motor protection, NEC requires selection of heater elements by using the motor nameplate data. Motor nameplate data must be checked to determine proper size of heater coil before motor is energized.

3 Phase

		200V	208V	230V	380V	415V	460V	575V
KW	HP	FLA	FLA	FLA	(50Hz) FLA	(50Hz) FLA	FLA	FLA
—	0.25(¼)	—	1.39	1.2	—	—	0.6	0.84
—	0.33(⅓)	—	1.69	1.46	—	—	0.73	0.58
0.37	0.5	2.5	2.4	2	1.3	.81	1.1	.9
0.55	0.75	3.7	3.5	3.2	1.8	1.21	1.6	1.3
0.75	1	4.8	4.6	4.2	2.3	2	2.1	1.7
1.1	1.5	6.9	6.6	6.0	3.3	2.5	3	2.4
1.5	2	7.8	7.5	6.8	4.3	3.5	3.4	2.7
2.2	3	11	10.6	9.6	6.1	5	4.8	3.9
3.7	5	17.5	16.7	15.2	9.7	7.5	7.6	6.1
5.5	7.5	25.3	24.2	22	14	11	11	9
7.5	10	32.2	30.8	28	18	14	14	11
11	15	48.3	46.2	42	27	21	21	17
15	20	62.1	59.4	54	34	28	27	22
18.5	25	78.2	74.8	68	44	35	34	27
22	30	92	88	80	51	40	40	32
30	40	120	114	104	66	55	52	41
37	50	150	143	130	83	64	65	52
45	60	177	169	154	103	80	77	62
55	75	221	211	192	128	100	96	77
75	100	285	273	248	165	135	124	99
90	125	359	343	312	208	165	156	125
110	150	414	396	360	240	200	180	144
147	200	552	528	480	320	260	240	192
185	250				403	325	302	242
220	300				532	385	361	289
257	350				620	450	414	336
295	400				709	500	477	382
335	450				797	728	515	412
375	500				886	809	590	472
445	600						656	523
	700						716	571
	800						775	618

Aftermarket

Siemens is committed to serving our customers and supporting a full line of replacement components, renewal parts, and aftermarket units to maintain the value and use of existing tiastar and previous generation motor control centers.

Renewal parts

Renewal parts for tiastar and legacy MCC are now available via Industry Mall and COMPAS. These kits represent the most requested renewal parts for field retrofit installations. Please use the MCC Aftermarket Renewal Parts Catalog, MCCS-AFTMKT-0613, which is available at ***www.usa.siemens.com/mccaftermarket*** to select the ordering items required.



MCC aftermarket request form

For an MCC aftermarket quote, please visit ***http://www.usa.siemens.com/mccaftermarket*** and fill out the online request form. Your request will be processed by a representative who will follow-up with you. For assistance in identifying the MCC, please use the MCC Identification Guide: CCBR-MCCAR-0813.



Additional information

Those who are new to the industrial technologies might find the STEP (Siemens Technical Education Program) website and the MCC course helpful. The link to the MCC Online Training Course can be found here: ***www.usa.siemens.com/step***



For additional information on tiastar MCC including installation instructions, specifications, and sample drawings go to ***usa.siemens.com/MCC***

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Order No. SIEA-C40019-00-4AUS

09/2026

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