

TIASTAR™ Motor Control Center

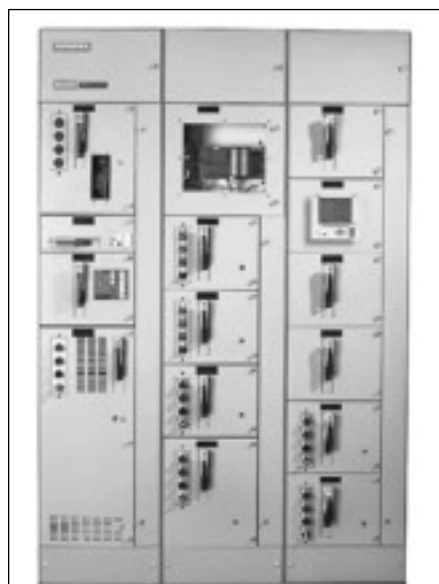
Overview of TIASTAR

Siemens Energy & Automation introduces the TIASTAR (tie-star) Motor Control Center to meet the growing needs of our consumers. The TIASTAR MCC enhancements have been created from listening to our customers and offering a wider selection of options.

Providing the best of Siemens' proven motor control centers (MCCs), System 89 and Model 95+, TIASTAR is designed to be the industry's leading value.

From its sturdy metal cabinet to the best-of-breed Siemens technology within, TIASTAR has no equal. Siemens' TIASTAR MCC with PROFIBUS-DP communications combines heavy-duty industrial construction and user friendly features to deliver detailed diagnostics and control by communicating between MCC units and a PLC or DCS. Unlike other manufacturers' network offerings, Siemens' offering is non-proprietary and is designed to simplify, not complicate, your life. So whatever you need, you can rest assured that your TIASTAR MCC can meet your needs.

While we think Siemens' TIASTAR MCC is a wise investment, it is important for you to know that advanced capabilities can be added any time during the life of the product. Siemens doesn't think you should pay for pre-wiring or design features that don't have an immediate payback.



TIASTAR Motor Control Center

General Features and Benefits

The most effective means for grouping low voltage motor starters, associated control and distribution equipment is through the use of motor control centers. Siemens MCCs allow grouping this equipment in a common sheet steel enclosure. All 36" motor starter units (through NEMA Size 5 for FVNR) and all feeder disconnects through 250 amperes can be mounted with drawout construction.

All devices within the MCC are powered from a common horizontal bus and three phase vertical bus located in each section. Once installed in its centralized operating plant location, manual supervision and monitoring can be performed safely, and remote supervision can be provided through the Siemens ACCESS™ data communication system.

Domestic Design Standards

The following are the principal domestic standards which apply to motor control center design, testing, construction and application. The TIASTAR Motor Control Center complies fully with the latest version of all these standards.

NEMA

- AB-1 Molded Case Circuit Breakers
- ICS 1 General Standards for Industrial Control
- ICS 2 Standard for Industrial Control Devices, Controllers and Assemblies
- ICS 18 Standard for Motor Control Centers

UL

- 845 Motor Control Centers
- 508 Industrial Control Equipment
- 891 Switchboard Design
- 94 Test for Flammability of Plastic Materials for Parts, Devices, and Appliances
- 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures
- 991 Tests for Safety-related Controls Employing Solid-state Devices

NFPA – National Fire Protection Association

- 70 National Electrical Code

IEEE

- IEEE-STD-693-1997, IEEE Recommended Design Practice for Seismic Design of Substations

Product Overview

Construction Details

Siemens TIASTAR Motor Control Centers are composed of a number of vertical sections bolted together. That allows for future addition of MCC vertical units so the equipment can expand with customer needs. The standards structure is 90 in. (2286 mm) high, plus a 1.125 in. (29 mm) high channel sill. Front-only structures can be either 15 in. (381 mm) or 20 in. (508 mm) deep. Back-to-back mounted structures are 30 in. (762 mm) or 40 in. (1016 mm) deep, and consist of two horizontal and vertical buses. This allows for correct bus phasing on the front or rear. Siemens provides a 21 in. back-to-back design, consisting of a common horizontal and vertical bus structure, for applications where available footprint is limited.

UL Listed Starters

Siemens offers a wide range of UL Listing for the industry – from NEMA Size 0 through 6, including reduced voltage, two-speed, wye-delta and part-winding type starters.

Drives and Soft Starts

Siemens VFD (variable frequency drives) and RVSS (reduce voltage solid state starters) are available in our MCC. The range for VFD is fractional hp to 300 hp-VT and 1hp to 600 hp for RVSS. These applications are designed to meet the robust industrial environment and are cost effective for today's market.

Power Monitoring

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. Siemens TIASTAR MCCs are fully capable of installing any of Siemens power meters for your needs. Please review the full line of Siemens power meters at www.sea.siemens.com.

Overload Protection

Siemens understands customer needs vary from motor to motor. That is why we offer 4 lines of overload protection. For basic needs you can specify bi-metal ambient compensated overloads. If single phase is a concern our customers can specify ESP100, and for the most advanced motor protection, customers can consider SIMOCODE overloads that provide detailed information and control.

ESP100 Solid State Overloads

ESP100 solid state overload relays are self powered, requiring no separate 120V source to power the circuit board. They provide phase loss protection, fewer connection points and high repeat trip accuracy which results in longer motor life and cost savings. NEMA Class 10, 20 and 30 trip curves are available for a variety of applications.

The ESP100 solid state overload provides phase loss protection for the motor by tripping within three seconds upon complete loss of one phase of a three phase motor branch circuit.

Each overload has at least a 2:1 current adjustment range with the adjustment dial reading out in full load amps. In addition to the markings on the dial there are audible clicks which allow for extremely fine tuning.

The heaterless construction of these overloads minimizes energy costs and the costs of cabinet ventilation or cooling. Solid state overloads can be used at temperatures from -30°C to +70°C and are rated for 50Hz and 60Hz applications.

ESP100 panel mounted overloads can be used to upgrade existing starter applications where panel mounted thermal overloads are used. In addition, ESP100 overloads can be panel mounted when used with other types of controllers, such as DP, IEC contactors, and soft starts.

ESP100 overloads can be used on high voltage applications, making them ideal for use with vacuum contactors and other high voltage control.

ESP100 overloads can be retrofitted on existing contactors using the retrofit plate suffixes or on other brands using the plates listed in the competitive retrofit plates table on page 16-48.



ESP100 Solid State Overload

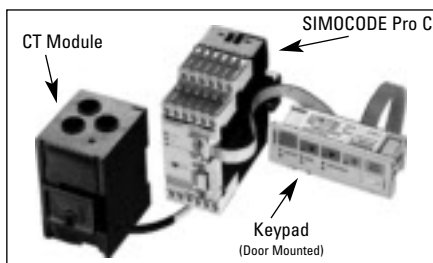
SIMOCODE Pro

SIMOCODE Pro is the latest generation of Motor Management System ("Smart Overload") bringing a new level of flexibility and functionality within the Siemens smart motor control center. By means of a PROFIBUS DP interface, it can easily be linked to higher-level automation systems. SIMOCODE Pro implements all motor protection and control functions, determines operational, diagnostic and statistical data and organizes the communication between the automation system and MCC bucket.

The SIMOCODE Pro consists of two device series with different levels of functionality:

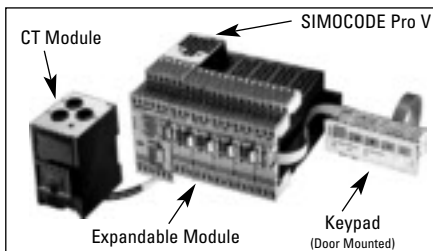
SIMOCODE Pro C (Compact)

The compact motor management system can be used for Full Voltage Non-reversing (FVNR) starters, Full Voltage Reversing (FVR) starters, and base overload functionality.



SIMOCODE Pro V (Variable)

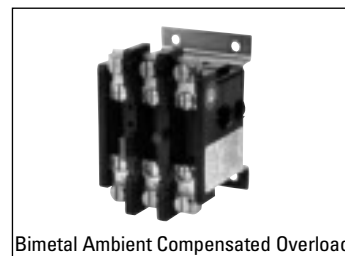
The variable motor management system has an even greater range of functions, including voltage and power monitoring and expandable modules for additional I/O, as well as temperature and ground fault protection.



Note: For detailed information on the SIMODE Pro please contact the local Siemens Sales Office.

Thermal Overloads Bimetal Ambient Compensated

Bimetal ambient compensated overload relays protect both the motor and equipment by opening the control circuit when the motor experiences an overload condition. The bimetal overload relay may be set for either manual or automatic reset and can be supplied with standard Class 20 heater elements or optional Class 10 heater elements as required. An ambient compensated model of the bimetal overload is available.

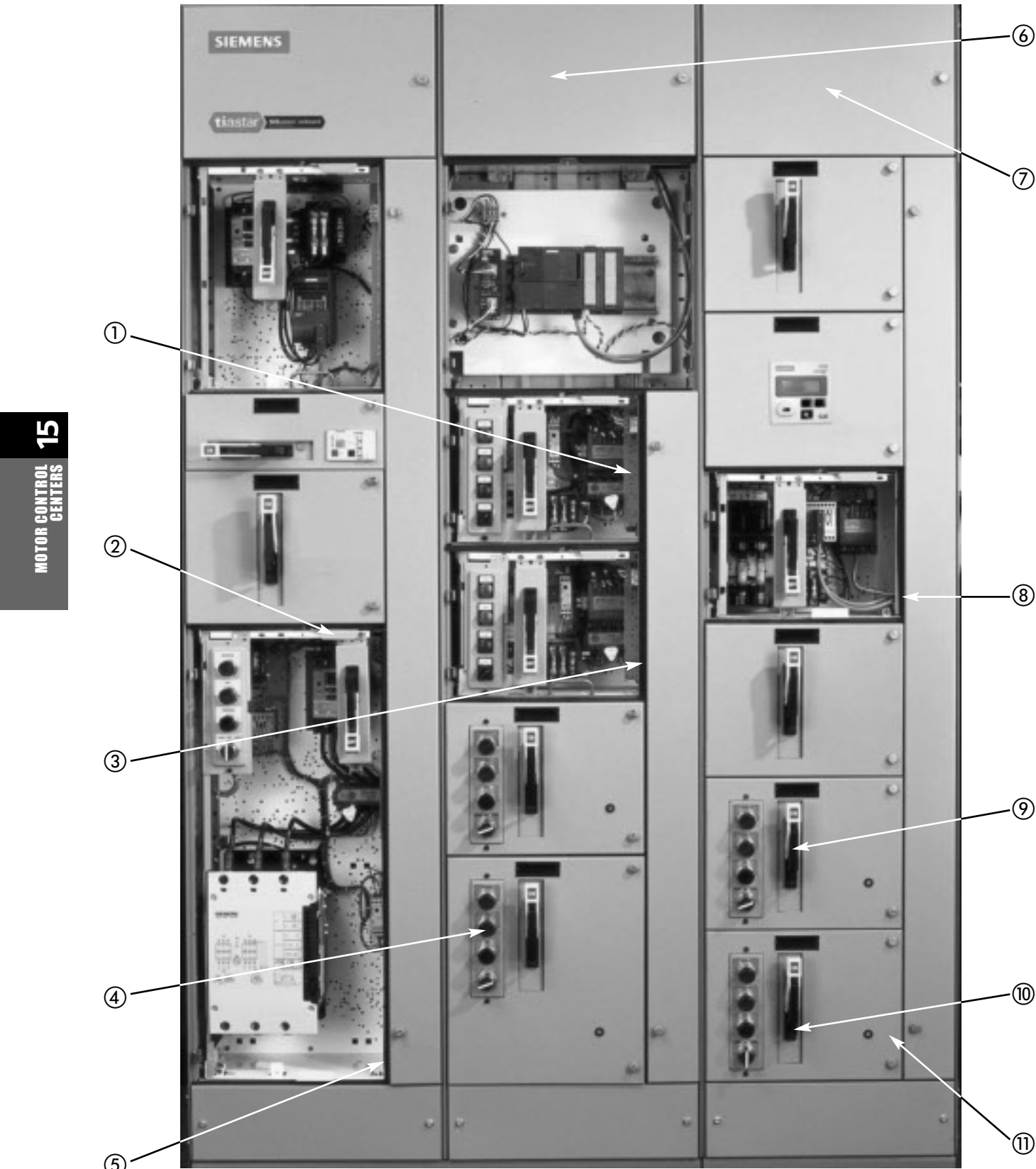


Bimetal Ambient Compensated Overload

Motor Control Centers

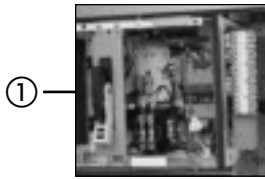
Product Overview

Quality Features Exceed Standards



Motor Control Centers

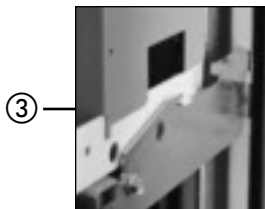
Product Overview



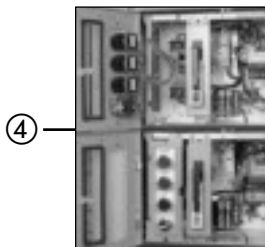
For ease in wiring and inspection, terminal blocks are mounted on a swing-out side barrier.



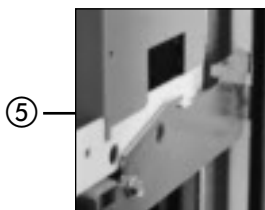
A racking lever on all plug-in units ensures that they are fully engaged with the vertical bus. An interlock with the disconnect device ensures that a plug-in unit is not inserted or removed from the vertical bus when the unit is energized.



A positive stop in the "TEST" position indicates that a plug-in unit is fully withdrawn from the vertical bus.



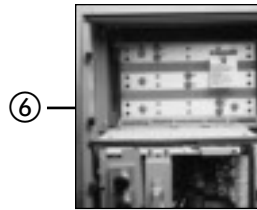
Pilot devices are mounted on a sturdy formed-metal panel attached with two captive screws to the MCC unit door for easy access to internal components. For unit removal and test, the pilot device panel is easily removed from the door and mounted on the unit.



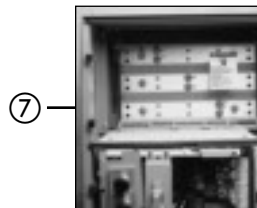
A positive stop mechanism prevents the unit from falling out of the structure during unit removal.

Important Additional Features:

- All wiring and components meet or exceed the requirements of UL, CSA, ENEMA, EEMAC, and NEC
- Pre-wired components are professionally harnessed to industrial terminal blocks
- Full depth wire tie rods are standard in each vertical wireway
- White interior increases visibility for easy wiring, maintenance and inspection
- Modular units are fully interchangeable
- Each TIASTAR MCC is designed to satisfy your most exacting specifications
- White on black base operating handle is easy to identify

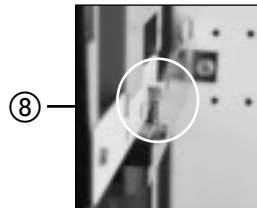


The horizontal bus compartment is isolated from the horizontal wireways by a crystal clear polycarbonate barrier that makes visible and infrared maintenance inspection a breeze. The barrier is easily removed when access to the horizontal bus is required.

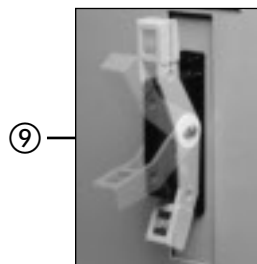


Horizontal bus design keeps the bus in the top 12" of the structure, never behind units, for easy maintenance and accessibility.

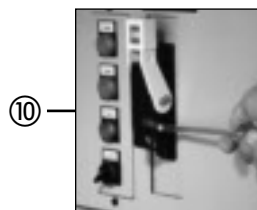
Copper bus and heavy-duty insulators safely distribute power to sections. Copper bus, standard throughout, is conservatively rated at 50-degree rise and provides up to an optional 100,000A withstand capacity.



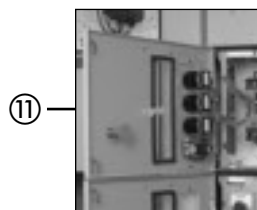
A copper clip on plug-in units engages and grounds units at all times.



The unit disconnect operating handle features a simple, rugged design. "ON" and "OFF" are clearly indicated by position, color and word. The "TRIP" indication is clearly displayed on circuit breaker equipped units.



A screwdriver operated defeater mechanism allows access to an energized unit by authorized personnel.



All doors swing open a minimum of 110° for easy unit access and removal.



Plug-in 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.

Dimensions

Height: 91.125 in. (2318 mm)
(Front Mounted Only Structure)

Width: 20 in. (508 mm)
24 in. (610 mm)
30 in. (762 mm)

Depth: Standard: 15 in. (381 mm)
Optional: 20 in. (508 mm)
Optional*: 31 or 41 in.
(762 or 1016 mm)

*(Front mtd. only structures mtd.
Back-to-Back)

(Back-to-Back structure)

Width: 20 in. (508 mm)
30 in. (762 mm)

Depth: 21 in. (533 mm)

Vertical Wireway Height:

72 in. (1829 mm)
Width: 4 in. (127 mm)
Depth: 10 in. (203 mm)
Cross Section: 38.25 square in.
(972 square mm)

Top Horizontal Wireway
Front Mounted Only and
Back-to-Back Mounted

Height: 12 in. (305 mm)
Depth: 7 in. (178 mm)

Bottom Horizontal Wireway
Front Mounted Only

Height: 6 in. (152 mm)
Depth: 15 in. (381 mm)
20 in. (508 mm)

or Back-to-Back Mounted

Height: 6 in. (152 mm)
Depth: 30 or 40 in.
(762 or 1016 mm)

Structural Gauge Chart

Structural Parts	
Divider Sheets	14 ga.
Side Sheets	14 ga.
Center Bottom Cross Ties	12 ga.
Rear-Channel	
(Front Mounting only)	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, 14 ga.
Side Barrier Plate	18 ga.
Angles	14 ga.
Doors	13, 14 ga.

Finish (Ext.) ANSI 61 Light Gray

Electrostatically applied dry powder paint
is standard.

Plating

All power bus, copper tin-plated as std.
Silver plating available by request.

Horizontal Bus

Ampere Ratings

Standard:	600A, tin-plated Cu
Optional:	800A, Cu
	1200A, Cu
	1600A, Cu
	2000A, Cu
	2500A, Cu

Vertical Bus

Ampere Ratings

Standard:	300A, tin-plated
Optional:	600A, Cu

Neutral Bus (Bottom Mounted)

Optional:	Full neutral Cu
Optional:	Neutral landing pad
Ratings:	600A to 1600A

Bus Bracing

Standard:	42,000A,
Optional:	65,000A, and
	100,000A Sym.

Incoming Line Terminations

Incoming line arrangements are
available in many configurations
from 600A to 2500A.

Barriers

Standard:	
Isolation Barrier:	Grounded sheet steel with stab openings.
Standard:	Inserts to cover unused openings in V-bus barrier.
Optional:	Automatic shutter mechanism.

Ground Bus (Bottom Mounted)

Required for UL labeling

Standard: .25 in. x 1 in. unplated Cu.
Optional ground bus available up to
1200A.

Vertical ground bus available as
option, rating 300A.

Also available with motor ground
terminations.

Weight Table

Dimensions inches (mm)			Type	Shipping Weight per Section in lbs. (kg)
H	W	D		
91.13 (2315)	20 (508)	15 (381)	front only	550 lbs. (250)
	20 (508)	20 (508)		600 lbs. (273)
	20 (508)	30 (762)	back-to-back	850 lbs. (386)
	30 (762)	20 (508)	front only	800 lbs. (364)
	20 (508)	21 (533)	back-to-back	900 lbs. (409)

Wiring Specifications

Control on Units

16 gauge
19 strand bonded copper
105°C – 600V

Interconnection Control Wiring
Between Units

14 gauge
19 strand copper
105°C – 600V

Power Wiring – Sized to suit
maximum HP rating of unit

12 gauge to 2 gauge
19 strand copper
105°C – 600V

1 gauge to 500 MCM

19 strand to 37 strand copper
105°C – 600V

Enclosure Types

NEMA 1 (Standard) – Indoor
NEMA 1A Gasketed – Indoor
NEMA 2 – Drip-proof – Indoor
NEMA 12 – Dust tight – Indoor
NEMA 3R – Rainproof – Outdoor
(Non-walk-in)

MCC Shutter Mechanism

Automatic shutter mechanisms when
specified will be supplied at the stab
in location of each plug-in unit and
requested future space. Unused stab
openings will be covered with snap-in
hole plugs.

Pull Box (Top Hat)

Available in 12 in., 18 in. or 24 in. high;
20 in. or 30 in. wide; 15 in. or 20 in. deep.

Motor Control Centers

Wiring Classifications

Siemens MCC's are available as either Class I or Class II assemblies utilizing either Type A, Type B, or Type C wiring as defined in NEMA ICS18-2001(3.1) and NEMA ICS18-2001(3.3). Below are the NEMA class and type definitions:

Class I — Independent Units (NEMA ICS18-2001(3.2.1))

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:

- 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).
- 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 (NEMA ICS18-2001(3.2.2))

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 (NEMA ICS18-2001(3.2.3))

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.

Types of Wiring — NEMA ICS18-2001(3.3.1)

Type A (NEMA ICS18-2001 (3.3.1.1))

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

Technical / Dimensions

Type B (NEMA ICS18-2001(3.3.1.2))

a. 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:

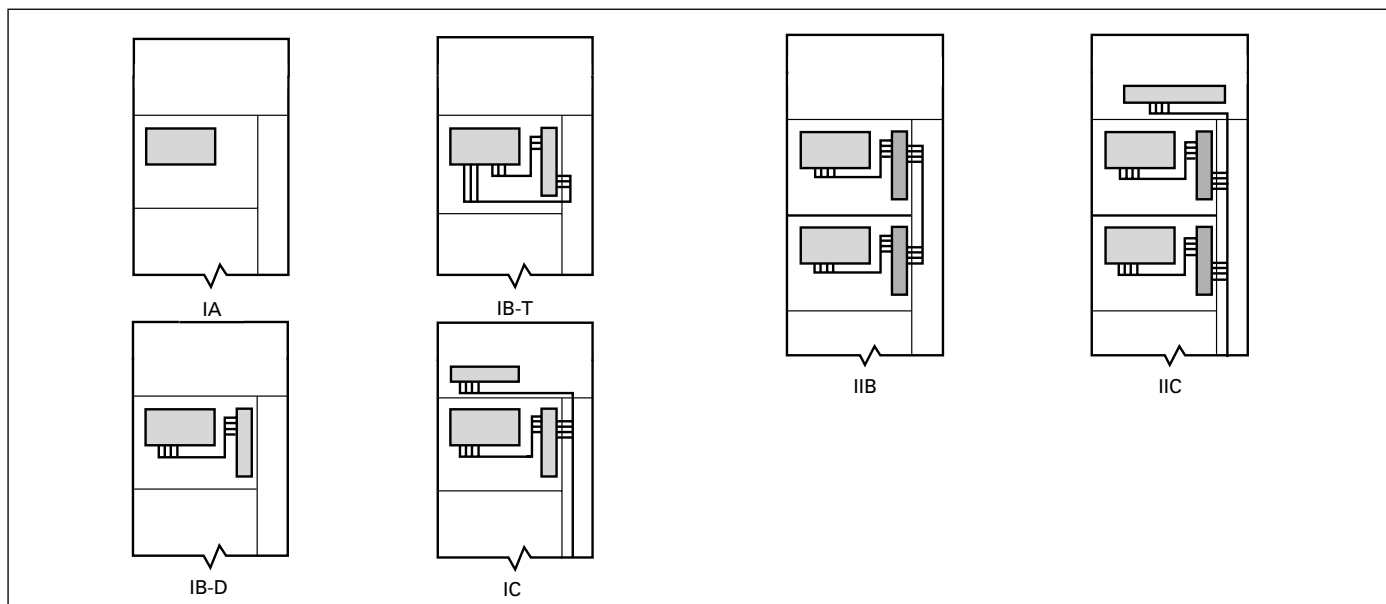
- B-D connects directly to the device terminals, which are located immediately adjacent and readily accessible to the vertical wireway.
- B-T connects directly to a **load** terminal block in, or adjacent to, the unit.

b. 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.

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

Type C (NEMA ICS18-2001(3.3.1.3))

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.



Motor Control Centers

Starter Ratings and Dimensions

Technical / Dimensions

MCC Starter Ratings and Dimensions

NEMA Size	Maximum Horsepower Rating			Circuit Breaker Type (For Maximum HP at 460V)			Fusible Type (For Maximum HP at 460V)				
				Standard Breaker Type	Dimensions in Inches (mm) Unit Height ① W = Width, D = Depth	kA Interrupting Rating at 480 V②③	Standard Disconnect Sw/Fuse Clip Sizes	Dimensions in Inches (mm) Unit Height ① W = Width, D = Depth	kA Interrupting Rating at 480 V②③		
	208 V	230 V	460 V								
Full Voltage — UL Listed				—	FVNR	FVR	IR Std./Opt.	—	FVNR	FVR	IR
0-1	7.5	7.5	10	MCP	12 (305)	18 (457)	42 / 100	30 / 30	12 (305)	18 (457)	100
2	10	15	25		12 (305)	24 (610)		60 / 60	12 (305)	24 (610)	
3	25	30	50		18 (457)	30 (762)		100 / 100	24 (610)	36 (914)	
4	40	50	100	FD6-ETI	24 (610)	36 (914)	42 / 100	FD6MCS / 200	42 (1067)	48 (1219) ④	
5	75	100	200	JD6-ETI	36 (914)	72 (1829)④		JD6MCS / 400	72 (1829) ④	72 (1829) ④ 30W (762W) ④	
6⑤	150	200	400	LD6-ETI	48 (1219)	72 (1829) 30W (762W)		MD6MCS / 600	72 (1829)	72 (1829) 30W (762W)	
7⑤	—	300	600	ND6	72 (1829) 30W 20D (762W 508D)	N/A	42 / 100	ND6MCS / 1200	72 (1829) 40W 20D (1016W 508D)	N/A	

Two Speed, Constant Or Variable Torque — UL Listed				—	2S2W	2S1W	IR Std./Opt.	—	2S2W	2S1W	IR
0-1	7.5	7.5	10	MCP	24 (610)	24 (610)	42 / 100	30 / 30	24 (610)	24 (610)	100
2	10	15	25		24 (610)	24 (610)		60 / 60	24 (610)	24 (610)	
3	25	30	50		30 (762)	36 (914)		100 / 100	36 (914)	48 (1219)	
4	40	50	100	FD6-ETI	36 (914)	48 (1219)	42 / 100	FD6MCS / 200	48 (1219)	60 (1524) ^④	
5 ^④	75	100	200	JD6-ETI	72 (1829) 30W (762W)	72 (1829) 30W (762W)		JD6MCS / 400	72 (1829) 30W (762W)	72 (1829) 30W (762W)	
6 ^⑤	150	200	400	LD6-ETI	72 (1829) 30W (762W)	Consult Siemens		MD6MCS / 600	72 (1829) 40W (1016W)	Consult Siemens	

Two Speed, Constant Horsepower — UL Listed				—	2S2W-CH	2S1W-CH	IR Std./Opt.	—	2S2W-CH	2S1W-CH	IR
0-1	7.5	7.5	10	MCP	24 (610)	24 (610)	42 / 100	30 / 30	24 (610)	24 (610)	100
2	10	15	25		24 (610)	24 (610)		60 / 60	24 (610)	24 (610)	
3	25	30	50		30 (762)	36 (914)		100 / 100	36 (914)	48 (1219)	
4 ^④	40	50	100	FD6-ETI	30 (762)	48 (1219)	42 / 100	FD6MCS / 200	48 (1219)	60 (1524) ^④	
5 ^④	75	100	200	JD6-ETI	72 (1829) 30W (762W)	72 (1829) 30W (762W)		JD6MCS / 400	72 (1829)	72 (1829) 30W (762W)	
6 ^④	150	200	400	LD6-ETI	72 (1829) 30W (762W)	Consult Siemens		MD6MCS / 600	72 (1829) 40W (1016W)	Consult Siemens	

Reduced Voltage Autotransformer Non-Reversing, Closed Transition — UL Listed				—	RVAT ^⑤	IR Std./Opt.	—	RVAT ^⑤	IR
2 ^④	10	15	25	MCP	42 (1067)	42 / 100	60 / 60	42 (1067)	100
3 ^④	25	30	50		42 (1067)		100 / 100	48 (1219)	
4 ^④	40	50	100	FD6-ETI	48 (1219)		FD6MCS / 200	60 (1524)	
5 ^⑤	75	100	200	JD6-ETI	72 (1829), 30W (762W)	42 / 100	JD6MCS / 400	72 (1829), 30W (762W)	
6 ^⑤	150	200	400	LD6-ETI	72 (1829) 30W (762W)		MD6MCS / 800	72 (1829) 30W (762W)	
7 ^⑤	300	300	600	ND6	72 (1829) 50W 20D (1270W 508D)		ND6MCS / 1200	72 (1829) 50W 20D (1270W 508D)	

Two Step Part Winding, Star Connected ^⑥ — UL Listed				—	RVPW	IR Std./Opt.	—	RVPW	IR
1	10	10	15	MCP	24 (610)	42 / 100	60 / 60	24 (610)	100
2	20	25	40		36 (914)		100 / 100	24 (610)	
3	40	50	75		36 (914)		FD6MCS / 200	48 (1219)	
4 ^④	75	75	150	JD6-ETI	36 (914)	42 / 100	JD6MCS / 400	72 (1829) ^④	
5 ^④	125	150	350	LD6-ETI	72 (1829)		LD6MCS / 600	72 (1829) 30W (762W)	
6 ^⑤	—	250	500	MD6	72 (1829) 30W (762W)		MD6MCS / 600	72 (1829) 30W (762W)	

① The addition of oversize CPT's (above 50VA), relays, timers, etc. may increase unit height.

② Consult Siemens for other voltages.

③ Interrupting ratings are 25 kAIC when not UL Listed.

④ Stationary units (not plug-in).

⑤ Fixed mounted unit – space behind not available.

⑥ Based on each winding handling 50%. Consult Siemens for other ratings.

Note: For Half Size Starters, contact Siemens.

Motor Control Centers

Starter Ratings and Dimensions

Technical / Dimensions

MCC Starter Ratings and Dimensions (cont'd)

NEMA Size	Maximum Horsepower Rating			Circuit Breaker Type (For Maximum HP at 460V)				Fusible Type (For Maximum HP at 460V)			
	208 V	230 V	460 V	Standard Breaker Type	Dimensions in Inches (mm) Unit Height ① W = Width, D = Depth	kA Interrupting Rating at 480 V ②		Standard Disconnect Sw / Fuse Clip Sizes	Dimensions in Inches (mm) Unit Height ① W = Width, D = Depth	kA Interrupting Rating at 480 V ②	
Reduced Voltage Wye Delta, Open and Closed Transition											
				—	YDO	YDC	IR Std./Opt.	—	YDO	YDC	IR
2	20	25	40	MCP	30 (762)	42 (1067)	42 / 100	100 / 100	36 (914)	48 (1219)	100
3	25	30	60	MCP	30 (762)	42 (1067)	42 / 100	250MCS / 200	48 (1219)	60 (1524)	
4	60	60	125	FD6-ETI	36 (914)	48 (1219)	42 / 100	400MCS / 400	72 (1829) ④	72 (1829) ④	
5③	150	150	300	LD6-ETI	72 (1829) ④ 30W (762W)	72 (1829) ④ 30W (762W)	42 / 100	600MCS-600	72 (1829) ④ 30W (508W)	72 (1829) ④ 30W (508W)	

Solid State Reduced Voltage Open and Closed Transition

				—	⑤	IR Std./Opt.	—	⑤	IR
1	7.5	7.5	10	CED6-ETI	18 (457) ⑥	42 / 100	(30 / 30)	18 (457) ⑥	100
2	10	15	25	CED6-ETI	36 (914) ⑥		(60 / 60)	36 (914) ⑥	
3	25	30	50	CED6-ETI	36 (914) ⑥		(ED MCS / 100)	36 (914) ⑥	
4	40	50	100	CFD6-ETI	36 (914)		(ED MCS / 100)	60 (1524)	
5	75	100	200	CJD6-ETI	48 (1219) ③		(ED MCS / 100)	60 (1524) ③	
6	150	150	350	CLD6-ETI	72 (1829) ③		(ED MCS / 100)	72 (1829) ③ ④	

Compact Units — Available FVNR Only — UL Listed

				—	Circuit Breaker Type	Fusible Type	IR Std./Opt.
0-1	7.5	7.5	10	MCP	6 (152) ⑥	6 (152) ⑥	42 / 100

① The addition of oversize CPT's (above 50VA), relays, timers, etc. may increase unit height.

② Consult Siemens for other voltages.

③ Stationary units — Not plug in.

④ Requires 30 in. (762 mm) wide structure.

⑤ Bypass and / or isolation requires additional space.

⑥ 15 HP at 230V requires additional unit space.

⑦ Consult Siemens.

⑧ The addition of relays, timers, etc. will require additional space.

⑨ Unit includes rated line side isolation starter and J fuses.

Lighting Panelboards Applied in MCC's

Amp Rating	Number Of Circuits	Panel	Height In Inches (mm)		
			1Ø, 3W 240/120	3Ø, 4W 208Y/120	3Ø, 4W 277/480
Main Lug Only					
225	18	1 to 18	30 (762)	30 (762)	30 (762)
	30	1 to 30	36 (914)	36 (914)	36 (914)
	42	1 to 42	42 (1067)	42 (1067)	42 (1067)
Main Breaker					
225	18	1 to 18	30 (762)	30 (762)	30 (762)
	30	1 to 30	36 (914)	36 (914)	36 (914)
250	42	1 to 42	42 (1067)	42 (1067)	42 (1067)

480V^① Variable Frequency Drives — NEMA 1A MCC Enclosures ②

Rating HP ③	Drive Type	Rated Amperes	Dimensions—In. (mm) ④⑤	
			Mounting Height	Structure W D
2	MM440	4	18 (457) (Plug-in)	20 (508) 15 (381)
5	MM440	8.5	24 (610) (Plug-in)	
	MM440	7.6		
7.5	MM440	11	36 (914) (Plug-in)	
10	MM440	14		
	MM440	19		
15	MM440	23		
	MM440	25		
20	MM440	32	48 (1219) (Plug-in)	
25	MM440	34		
	MM440	34	60 (1524) (Recessed Panel, Fixed Mounted)	
30	MM440	45		
	MM440	46		
40	MM440	52	72 (1829) (Recessed Panel, Fixed-Mounted)	20 (508) 20 (508)
50	MM440	75		
60	MM440	240 Max.	50 (1270) 20 (508)	50 (1270) 20 (508)
75-125	MM440	185 Max.		
150-300	MM440	370 Max.		

① For other available voltage ratings, consult Siemens.

② For other enclosure types, consult Siemens.

③ Ratings are for variable torque applications. Consult Siemens for other applications.

④ Dimensions shown are for circuit breaker or fusible disconnects.

⑤ Drives with bypass and / or isolation require extra mounting space. Consult Siemens for further information.

Distribution Transformers

kVA Rating	Phase	Unit Height In Inches (mm)
1	1	Plate-Mounted in 12 in. (305 mm) space
1.5		
2		
3		
5		
7.5		18 (457) ①
10		
15		
25		24 (610) ① ②
30		
37.5		24 (610) ① ②
9	3 ②	12 (305)
15		18 (457)
25		
30		
45		24 (610)

① Transformer mounted on brackets 6 in. (152 mm) off sills.

② Requires 20 in. (508 mm) deep structure.

Motor Control Centers

Incoming Cable Space, Wiring Troughs, Wiring Terminations

Technical / Dimensions

The National Electrical Code establishes very specific guidelines for minimum cable bending space within motor control centers. Figures 1 through 5 below describe the most common arrangements for terminating main incoming power cables in the MCC. Consult Siemens for incoming line compartment braced for 100,000 amperes symmetrical, short circuit.

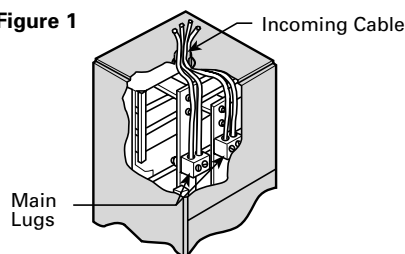
Incoming Cable Space

Description of Incoming Service	Top or Bottom Incoming Section	Cable Entry Top or Bottom	Space Requirements in Inches (mm)	Notes
≤ 350 kcmil Two per Phase	Top — Directly on Main Bus	Either	None	See Figure 3
≤ 600 kcmil One or Two per Phase	Top	Either	Top Wireway plus 12.0 (305) or 18.0 (457)	See Figure 1
≤ 600 kcmil Three or Four per Phase	Top	Top	Top Wireway plus 18.0 (457)	See Figure 1
750 kcmil One or Two per Phase	Top	Top	Top Wireway plus 24.0 (607)	—
350 kcmil One or Two per Phase	Bottom	Bottom	Bottom Wireway plus 18.0 (457)	600 A Maximum See Figure 2
≤ 600 kcmil One or Two per Phase	Bottom	Bottom	Bottom Wireway plus 24.0 (610)	600 A Maximum See Figure 2
≤ 750 kcmil, up to eight per phase	Top or Bottom	Either	Full Structure	Consult Siemens
≤ 500 kcmil One or Two per Phase ≤ 750 kcmil One per Phase to Main Breaker	Top	Bottom	See Breaker / Disconnect	See Figure 4
≤ 500 kcmil One to Four per Phase ≤ 750 kcmil One per Phase to Main Breaker	Top	Top	See Breaker / Disconnect	See Figure 5
Busway or Cable Feed to Line Reactor	Top or Bottom	Either	Consult Siemens	Consult Siemens

Siemens MCC's are equipped with a 12 in. (305 mm) high, full-width horizontal wireway in the top and 6 in. (152 mm) in the bottom of each structure. A separate vertical wireway connects the top and bottom wiring areas in each vertical section. This wireway is 4 in. (102 mm) wide by 10 in. (254 mm) deep, or 38.25 (972) square inches (mm).

Note: All standard Siemens termination schemes shown herein do comply with applicable cable bending requirements of UL and the NEC.

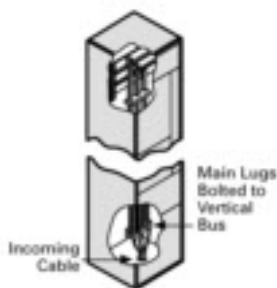
Figure 1



Main Lugs at Top with Top Cable Entry

Can accommodate up to two 600 kcmil cables per phase when using Siemens standard mechanical lugs. A total height of 24 in. (610 mm). This includes 12 in. (305 mm) for the top wireway plus 12 in. (305mm) of unit space. Compression lugs require extra vertical space or the addition of a top hat.

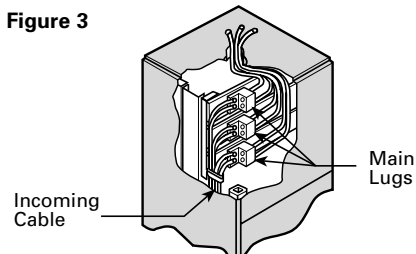
Figure 2



Main Lugs at Bottom with Bottom Cable Entry

Lugs are bolted directly to the bottom of the vertical bus. Can accommodate up to two 350 kcmil per phase in 24 in. (610 mm) high compartment. This includes 6 in. (152 mm) for the bottom wireway plus 18 in. (457 mm) of unit space. Can accommodate up to two 600 kcmil per phase in 30 in. (762 mm) high compartment. This includes 6 in. (152 mm) for the bottom wireway plus 24 in. (610 mm) of unit space.

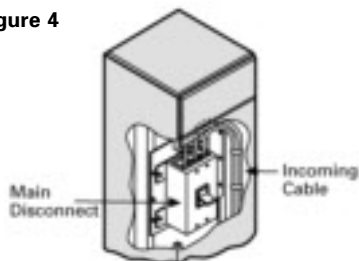
Figure 3



Main Lugs at Top with Top or Bottom Cable Entry

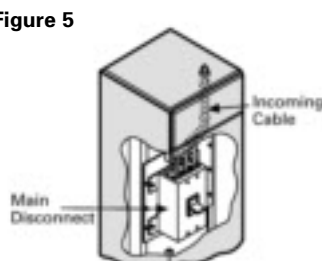
In this arrangement the lugs mount directly on the horizontal bus, eliminating the need to use unit mounting space. The limitation here is 350 kcmil cable per phase.

Figure 4



Main Disconnect with Bottom Cable Entry

Figure 5



Main Disconnect with Top Cable Entry

If bottom entry is used, cables must be properly laced and supported based upon the available short circuit current. See dimensional requirements for molded case breakers and fused switches, consult local sales office.

Motor Control Center Replacement Units

Aftermarket Overview



Product Description (Time Line: 2002 — Current)

Introduced in 2002, Siemens TIASTAR is an advanced SISystem™ (Smart Integrated Solution System) that provides you with seamless control of your physical plant by fusing ASI, PROFIBUS®, and ACCESS™ – as well as most legacy systems – into a robust, fully integrated management system.

Units widths are normally 15" or 20" wide, and 12" tall with 6" increments. Today, we provide you with Siemens breakers and starters. The standard lead-time for delivery is 24 hrs – 3 weeks.

Replacement Capabilities

Starter Units

Replacement starter units are available for all plug-in and Non plug-in units MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT & Pilot Devices
- CB and Fusible
- Relays, Fuses, VFD and Softstarts
- Soft Starts, SIMOCODE, ASI, PROFIBUS
- UL Labeled



SIEMENS

Model 95+



Product Description (Time Line: 1996 — 2001)

The Model 95+ retrofit buckets are designed to fit into Model 95+ MCCs. This upgrade from Model 95 included changes in handles, color, pilot devices, and stabs. Unit widths are normally 15" or 20" wide, and 12" tall with 6" increments.

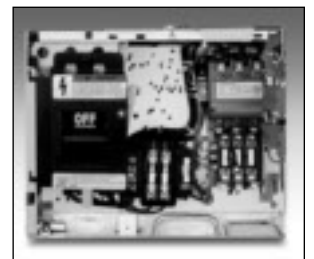
Today, we provide you with Siemens breakers and starters. The standard lead-time for delivery is 24 hrs – 3 weeks.

Replacement Capabilities

Starter Units

Replacement starters are available for all plug-in and Non plug-in units. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and Fusible
- Pilot Devices, VFD, Softstarts and ASI
- Relays, Fuses
- UL Labeled



Motor Control Center Replacement Units

Aftermarket Overview

SIEMENS

Model 95



Product Description (Time Line: 1995 — 1997)

The Model 95 was originally manufactured in Raleigh, NC. Model 95 served as a style template for many old MCC buckets since installation procedures and dimensions stayed the same. Unit widths are normally 15" or 20" wide, and 12" tall with 6" increments.

The original Model came with a variety of CB and starters from ITE, C-H and Siemens 3TF & 3UA Overload. Today, we provide you with Siemens breakers and starters. The standard lead-time for delivery is 24 hrs – 3 weeks.

Replacement Capabilities

Starter Units

Replacement starters are available for all plug-in and Non plug-in units. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and fusible
- Pilot Devices
- Relays and Fuses



SIEMENS

Model 90



Product Description (Time Line: 1986 — 1997)

The Model 90 retrofit buckets are designed to fit into Model 90 MCCs. Unit widths are normally 15" or 20" wide, and 12" tall with 6" increments.

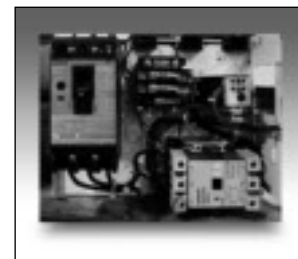
The original Model came with a variety of CB and starters from ITE, C-H, and Siemens 3TF & 3UA Overload. Today, we provide you with Siemens breakers and starters. The standard lead-time for delivery is 24 hrs – 3 weeks.

Replacement Capabilities

Starter Units

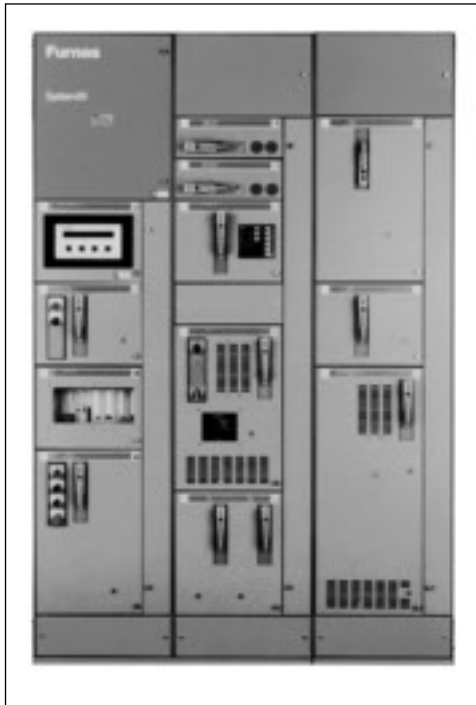
Replacement starters are available for all plug-in and Non plug-in units. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and Fusible
- Pilot Devices
- Relays and Fuses



Motor Control Center Replacement Units

Aftermarket Overview



Product Description (Time Line: 1979 — 2001)

This is an upgrade from Class 89 developed by Furnas in 1965. Bucket structures are normally 15" or 20" wide, and 12" tall with 6" increments.

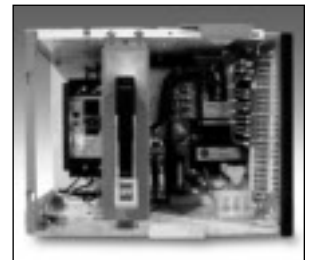
The original System 89 came with a variety of CB and starters from Westinghouse, GE and Furnas Electric. Today, we provide you with Siemens breakers and starters. The standard lead-time for delivery is 24 hrs – 3 weeks.

Replacement Capabilities MCC Plant: West Chicago

Starter Units

Replacement starter units are available for all plug-in and non plug-in unit MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and Fusible
- Pilot Devices
- Relay, Fuses, VFD and Softstarts
- UL Labeled



15
MOTOR CONTROL
CENTERS



Product Description (Time Line: 1975 — 1996)

The Marq21 retrofit buckets are designed to fit into Marq21 MCCs. Marq21 was created from the forge of two of the world's foremost electrical companies, Siemens-Allis. Units widths are normally 15" or 20" wide, and 12" tall with 6" increments.

The original Marq21 came with a variety of CB and starters from ITE and Allis-Chambers. The standard lead-time for delivery is 24 hrs – 3 weeks.

Note: Original components are not available. Today, we provide you with Sentron breakers and Siemens starters.

Replacement Capabilities

Starter Units

Replacement starters are available for all plug-in and Non plug-in units. A complete units for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and fusible
- Pilot Devices
- Relays and Fuses
- UL Labeled

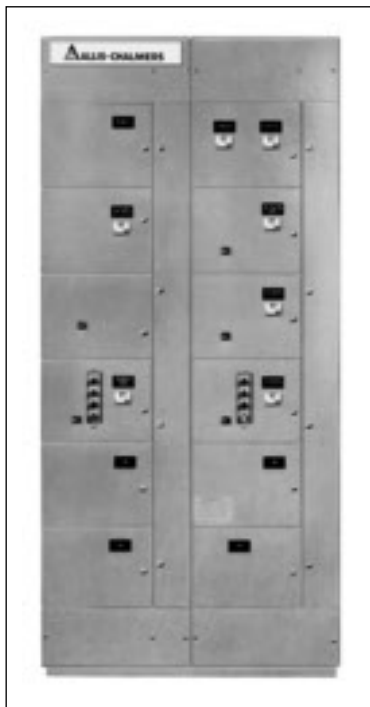
Motor Control Center Replacement Units

Aftermarket Overview



VALUELINE
mark 2
MOTOR CONTROL CENTER

Mark 2



Product Description (Time Line: 1972 — 1975)

The Mark 2 retrofit buckets are designed to fit into their old design. This is an upgrade from the Mark 1 in ValueLine family. Unit widths are normally 15" or 20" wide, and 12" tall with 6" increments.

The original Mark 2 came with a variety of CB and starters from Westinghouse and Allis-Chalmers. The standard leadtime for delivery is 24 hrs – 3 weeks.

Add-on MCCs:

New TIASTAR MCC can be spliced to existing line-up.

Note: Original components are not available. Today, we provide you with Sentron breakers and Siemens starters.

Replacement Capabilities

Starter Units

Replacement starters are available in plug-in Non plug units. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and Fusible
- Pilot Devices
- Relays, Fuses
- UL Labeled



GOULD

5600



Product Description (Time Line: 1971 — 1992)

The 5600 MCC retrofit buckets are designed to fit into their old design. 5600 units are 15" wide buckets and the fix mounted panels are 20" wide.

The original Gould came with a variety of old CB and starters from ITE, Rowan, and AMP-CAP. These buckets are available up to NEMA size 5. The standard lead-time for delivery is 24 hrs – 3 weeks.

Note: Original components are not available. Today, we provide you with Sentron™ breakers and Siemens starters.

Replacement Capabilities

Starter Units

Replacement starters are available for all plug-in and Non plug-in units. A complete unit for adding to an existing MCC includes a unit door, divider pans and all necessary mounting hardware. Features of the replacement units include:

- Siemens Starter Size 1-6
- CT, CPT, PT
- CB and Fusible
- Pilot Devices, Relays, and Fuses
- UL Labeled
- Shelf is ordered separately

