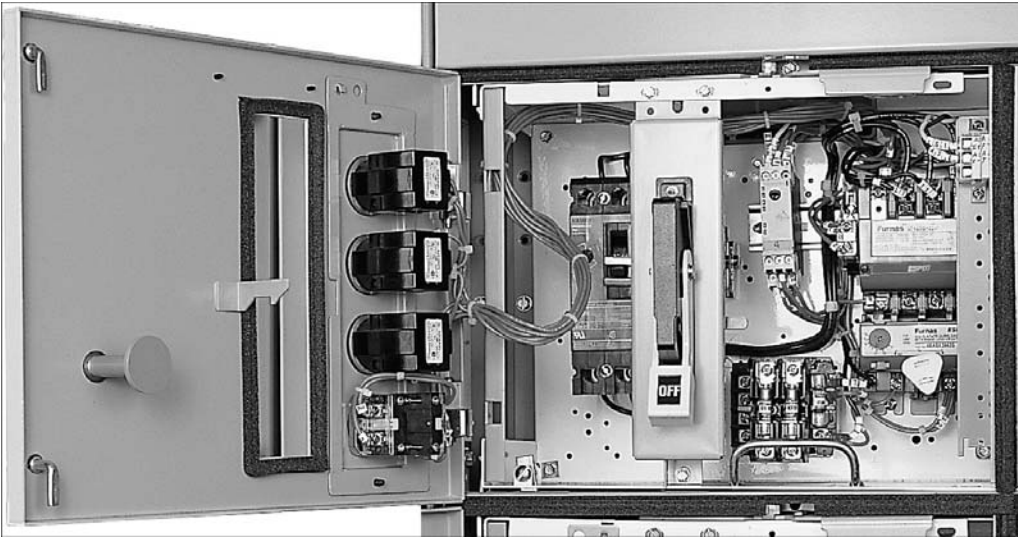



**TIASTAR Motor Control Center  
Installation And Maintenance Instructions For Units Only**



	<b>⚠ DANGER</b>
	<p><b>Hazardous voltage.</b>  <b>Will cause death or serious injury.</b></p> <p>Always de-energize and ground the equipment before maintenance. Read and understand this manual before installing, operating or maintaining the equipment. Maintenance should be performed only by qualified personnel. The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel may result in dangerous conditions which may cause death or serious injury, or equipment or property damage. Follow all safety instructions contained herein.</p>

THIS EQUIPMENT CONTAINS HAZARDOUS VOLTAGES. DEATH, SERIOUS PERSONAL INJURY, OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES, AND MAINTENANCE PROCEDURES CONTAINED HEREIN.

THE SUCCESSFUL AND SAFE OPERATION OF THIS EQUIPMENT IS DEPENDENT UPON PROPER HANDLING, INSTALLATION, OPERATION AND MAINTENANCE.

**SIGNAL WORDS**

The signal words "**DANGER**", "**WARNING**" and "**CAUTION**" used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as:

**DANGER** - For the purpose of this manual and product labels, **DANGER** indicates an imminently hazardous situation which, if not avoided will result in death or serious injury.

**WARNING** - For the purpose of this manual and product labels, **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION** - For the purpose of this manual and product labels, **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**QUALIFIED PERSON**

For the purposes of this manual and product labels, a qualified person is one who is familiar with the installation, construction, operation or maintenance of the equipment and the hazards involved. In addition this person has the following qualifications:

- (a) is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- (b) is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- (c) is trained in rendering first aid.

## Table of Contents

<b>Receiving</b> .....	<b>4</b>
<b>Addition And Replacement Of Control Units</b> .....	<b>4</b>
Adding To A Blank Unit Space .....	<b>4</b>
Replacement With A Unit Of The Same Size .....	<b>4</b>
Rearranging Control Units Of Different Sizes .....	<b>4</b>
<b>Outgoing Power And Control Wiring</b> .....	<b>5</b>
<b>Pre-Operation Checks</b> .....	<b>5</b>
<b>600A Bolted Clamp Assembly Instructions</b> .....	<b>5</b>
Description .....	<b>5</b>
Clamp Removal .....	<b>6</b>
Clamp Assembly .....	<b>6</b>
Part Illustrations .....	<b>7</b>
<b>E "Standard Trip" Heater Elements for Ambient Temp. Comp. Bimetal Relays</b> .....	<b>8</b>
<b>High Density Unit Installation</b> .....	<b>9</b>
Coil Removal .....	<b>9</b>
Terminal Block Swing Plate .....	<b>9</b>
Arc Cover Access Slots .....	<b>9</b>
Hinge Installation .....	<b>9</b>
Unit Access For Maintenance .....	<b>9</b>
Periodic Cleaning .....	<b>10</b>
<b>Fingers And Vertical Bus</b> .....	<b>10</b>
<b>Recommended Tightening Torques</b> .....	<b>10</b>
<b>Disconnect Operating Handle Adjustment</b> .....	<b>11</b>
<b>Adjustment Notes</b> .....	<b>12</b>

### IMPORTANT


These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

## Receiving

Before being packaged for shipment from the factory, the control unit is given a thorough electrical test and mechanical inspection. Upon receipt, inspect the package for damage during shipment. After unpacking, inspect the equipment for concealed damage which may have occurred in transit.

If damage or loss is discovered, file a claim with the carrier who delivered the control unit. As much identification as possible should accompany the claim, together with a full description of the damage. When filing a claim with the carrier, photographs of the damage are very helpful.

## Addition And Replacement Of Control Units

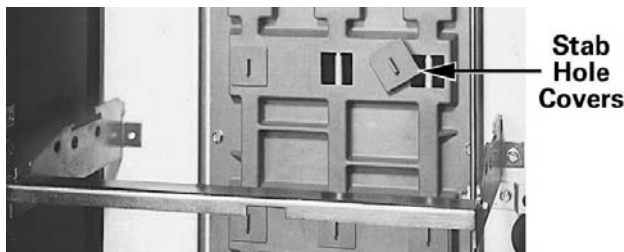
	<b>⚠ DANGER</b>
	<b>Hazardous voltage.</b> <b>Will cause death or serious personal injury.</b> Energized vertical bus may be partially exposed through the access holes in the barrier when the unit is not fully inserted. Use extreme caution when performing any wiring or maintenance with the unit withdrawn.

### 1. Adding To A Blank Unit Space

- Remove blank door by withdrawing hinge pins, close door halfway and slide off hinges.
- Remove door gasket angle (intermediate angle, see Parts Illustration on page 7) by removing the screw which fastens it to the Separator Angle and tipping slightly to remove formed tab at top from slot in shelf bracket above.
- If necessary, install unit support assembly by inserting shelf brackets at a slight angle into the appropriate holes in the vertical bus support angle and snapping into place. Secure support assembly with the two screws provided. One screw fastens the right-hand shelf bracket to the vertical bus support angle. The second screw fastens the separator angle to the left side of the structure. See Figure 2.
- Remove appropriate unit stab hole covers.



**Figure 1** - Unit Construction  
See page 7 for description of parts.



**Figure 2** - Detail of Unit Support

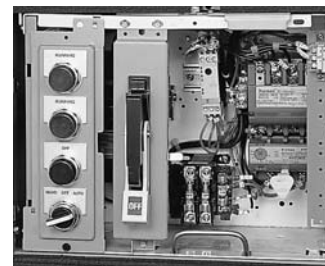
- Mount unit door by sliding into place on hinges while half open. Open completely and insert hinge pins.
- Plug-in: Slide control unit into place on support assembly, making sure handle is in OFF position. Complete unit engagement by sliding over stop on shelf brackets with the supplementary installation handle on bottom barrier plate and closing racking lever in top barrier plate. Engage locking latch at lower left of the unit to separator angle and screw down.
- Fix mounted: For location of panel mounting brackets, see fixed mounted panel diagram on page 7. Use bracket with tab for top mounting holes.
- Follow procedures for connecting outgoing power and control wiring. Mount pilot device panel on door.
- Close door and perform all pre-operation check procedures.

### 2. Replacement With A Unit Of The Same Size

- Put disconnect operating handle in the PARK position (Figure 13). (Interlocking mechanism will not permit removing or inserting the unit with the handle in the ON position.)
- Unscrew locking latch at lower left of the unit. Rotate latch until it disengages the separator angle.
- Transfer pilot device panel from door to slot on unit. Remove from door by rotating cam counterclockwise (do not loosen cam screw).
- Open vertical wireway door.
- Move unit to .Test. position by opening racking lever in top barrier plate while pulling on the supplementary installation handle on the bottom barrier plate.
- Disconnect control and load wiring.
- Remove unit by tilting and sliding out.
- Add replacement control unit following steps 1e-i outlined above.

### 3. Rearranging Control Units Of Different Sizes

- Remove all necessary existing units and doors including structure-side hinge as described above, steps 2a-g.
- Remove all necessary intermediate angles as described above, step 1b.
- Remove all unit support assemblies by unfastening the screws for each assembly, tilting upward and sliding out of their holes.
- Realign support assemblies as appropriate, following the procedure in step 1c.
- Include intermediate angles in all spaces.
- Remove stab hole covers at appropriate heights and replace covers on unused stab holes.
- Remount hinges and unit doors where appropriate as in step 1e.
- Install new control units as described in steps 1f-i above.



**Figure 3** - Pilot Device Panel Mounted on Unit

## Outgoing Power And Control Wiring

Connect power and control wires for the control unit with the control unit stabs disengaged from the vertical bus. Use stranded wire and leave enough slack in the wire to permit partial withdrawal of each unit for test position maintenance checks.

Wiring between control units is pulled through the vertical wireway at the right side of the section. These wires can be fastened to the wireform wireties provided. Route wiring to control units in other sections through the horizontal wireways.

For control units with Size 3 or smaller starters and load terminal blocks, the load connections are made to the terminal blocks. Load connections for Sizes 3 1/2.5 control units are always made directly to the starter.

When load cable conduit is in the bottom of a Motor Control Center, additional room for pulling cable may be obtained by removing bottom plug-in units.

For rear units of back-to-back Motor Control Centers, connect motor T1 to terminal unit T3 and motor T3 to terminal unit T1 in order to obtain the same motor rotation as for motors controlled by front units.

### Pre-Operation Checks

Before energizing and operating the motor control center, perform the following checks:

1. Test insulation resistance for all electrical circuits within the control center for grounds.
2. Operate all magnetic devices by hand to be sure that all parts operate freely. Some contactors are shipped with restraining devices to minimize vibration during shipment. Be sure that all such blocks have been removed. Check electrical interlocks for proper contact operation.
3. Current transformers for customer remote devices are shipped with secondaries shorted out. Be sure all such shunts are removed when the metering circuits are completed.
4. Be sure that each motor is connected with the proper starter.
5. Check the overload heater element against the full load current shown on the nameplate of each motor.
6. Check all heater elements to insure that they are properly installed.
7. Check all timers for proper time interval setting and contact operations.
8. If HMCPs are used, adjust as follows:
  - a. Determine motor full load current from the motor nameplate data. Refer to the table and determine the appropriate setting position. Use screwdriver to set indicator on adjustment screw to the appropriate position.
  - b. For maximum protection the trip position should be set as low as possible. Turn the adjustment screw counterclockwise to successively lower positions until the breaker trips on motor starting. After this position is determined, turn the adjustment screw clockwise to the next higher setting for normal operation. The adjustment screw is infinitely adjustable for customer convenience. If the breaker does not trip at the lowest setting, leave the indicator at this setting.
  - c. If nuisance tripping occurs, check voltage and load with peak reading ammeter to locate problem.
9. If fusible disconnect type starters are used, check for proper fuse size. Fuses are normally sized for short circuit protection. For high capacity units (100 KA), fuse size should not exceed 150% FLA for RK5 time delay, 250% FLA for RK5 non time delay, and 300% FLA for Type J.
10. Clean the motor control center and be sure that all extraneous material has been removed.
- 11. Check all connections for tightness, both mechanical and electrical. Factory connections may loosen during shipment and storage. It is of utmost importance to inspect all connections and bolted joints for tightness PRIOR TO energizing the equipment.**
12. Close all access plates and doors before the motor control center is energized.
13. Jog motors to determine proper rotation.

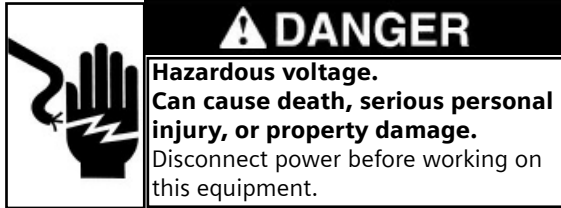
### 600A Bolted Clamp Assembly Instructions

- A** - Vertical Bus Bar G - Tie Bar
- B** - Carriage Bolt H - Carriage Bolt
- C** - Flat Washer I - Flat Washer
- D** - 3/8" x 16" Standard Hex Nut J - 3/8" x 16" Standard Hex Nut
- E** - Clamping Spring K - Riser
- F** - Bar
- G** - Tie Bar
- H** - Carriage Bolt
- I** - Flat Washer
- J** - 3/8" x 16" Standard Hex Nut
- K** - Riser

### Description

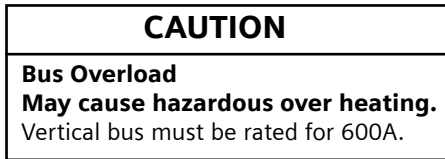
The clamp assembly is required for replacement or assembly of 400 and 600A circuit breakers or disconnect switches that are mounted directly to the vertical bus on Furnas System/89 Motor Control Centers.

## Clamp Removal



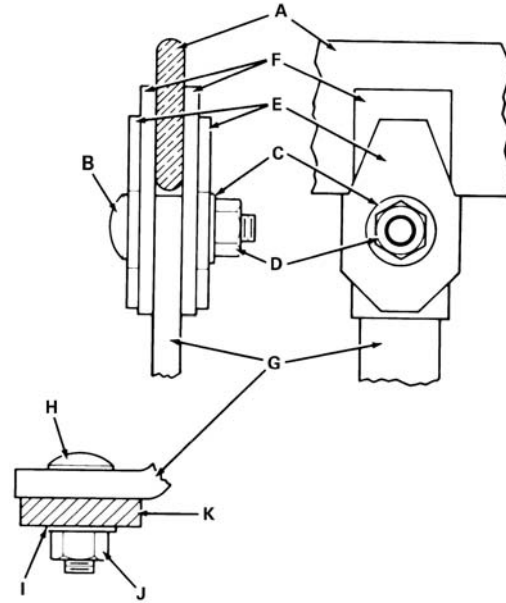
1. Refer to Figure 7 for parts identification. Loosen nut J and remove bolt H, washer I and nut from riser.
2. Loosen nut D and remove bolt B, washer C and nut from the clamp assembly.
3. Remove tie bar and clamp assembly simultaneously.
4. Repeat steps 1 - 4 for each phase.

## Clamp Assembly



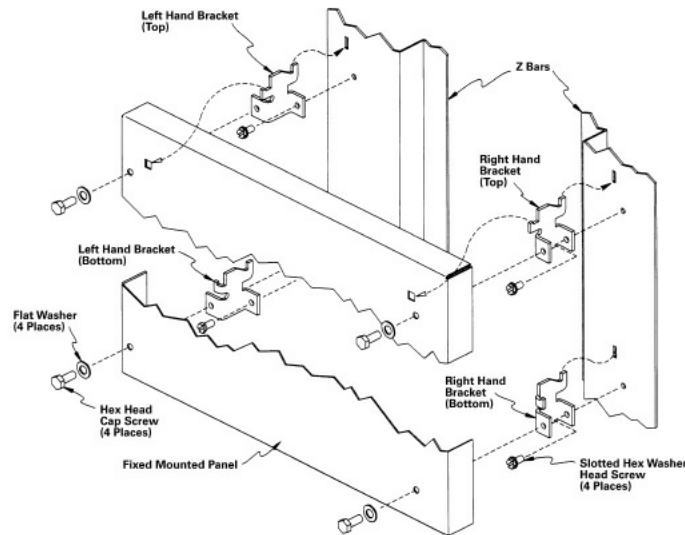
1. Connect tie bar to riser by sliding bolt H through tie bar and riser. Fasten with washer I and torque nut J to bolt H securing to 21 ft.-lbs.

2. Loosely assemble the clamp assembly, making sure that clamp spring E will compress against bar F, when the bolt is drawn tight.
3. Slide carriage bolt B through the one side of the clamp assembly and tie bar until it protrudes through the other side of the clamp assembly. Fasten with washer C and torque nut D to bolt B securing to 21 ft.-lbs.
4. Repeat steps 1 - 3 for all phases.



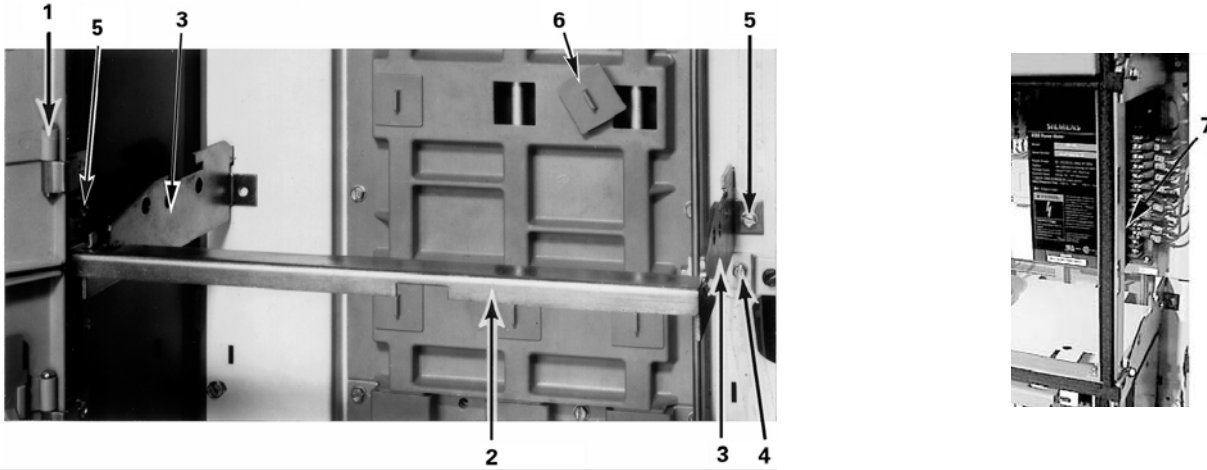
**Figure 4**

**NOTE:** The white side of clamping spring should be visible on outside of each assembly.



**Figure 5 - Fixed Mounted Panel Diagram**

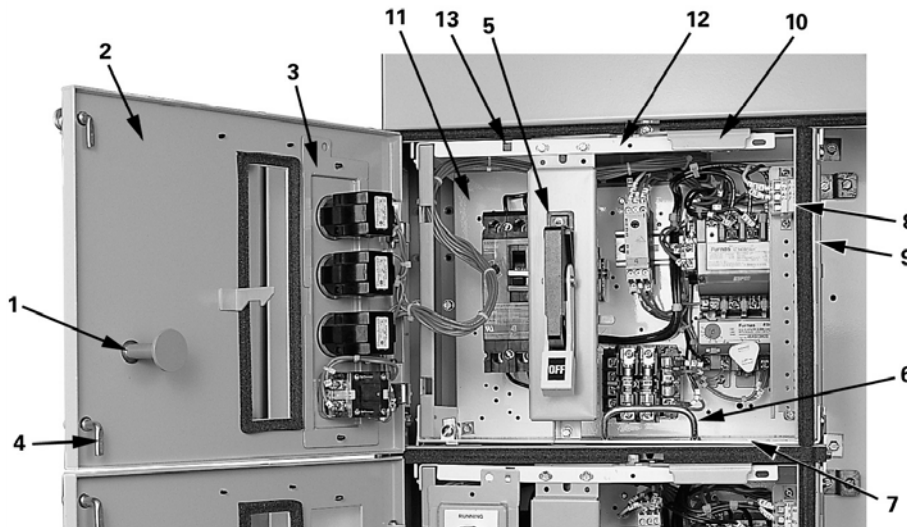
**Parts Illustrations**



**Key to Unit Supports**

- 1) Pin-type door hinge
- 2) Separator angle
- 3) Shelf bracket
- 4) Termination for motor/ground cable (optional)
- 5) Unit support mounting screw
- 6) Unit stab hole cover
- 7) Intermediate Angle. Specify height of unit space. Use with blank 15" wide spaces for gasket channel and door retaining bracket.

**Figure 6 - Detail of Unit Supports**



**Key to Unit Construction**

- 1) Starter reset mechanism
- 2) Door
- 3) Pilot device panel (normal operating position mounted to door for maximum access to unit)
- 4) Locking latch
- 5) Disconnect operating handle
- 6) Supplementary installation handle
- 7) Bottom unit barrier plate
- 8) Control terminal blocks
- 9) Swing plate with terminal blocks
- 10) Racking lever
- 11) Back plate
- 12) Top barrier plate
- 13) Pilot device panel mounting hole for mounting panel to unit to facilitate removing unit without disconnecting wires (see accompanying photo)

**Figure 7 - Detail of Unit Supports**

## E .Standard Trip. Heater Elements for Ambient Temp. Comp. Bimetal Relays

Full Load Heater Max. Rat.				Full Load Heater Max. Rat.				Full Load Heater Max. Rat.				Full Load Heater Max. Rat.			
Mo. Amps.		Code	of Prot.	Mo. Amps.		Code	of Prot.	Mo. Amps.		Code	of Prot.	Mo. Amps.		Code	of Prot.
Min.	Max.	No.	Device*	Min.	Max.	No.	Device*	Min.	Max.	No.	Device*	Min.	Max.	No.	Device*
<b>Size 0 &amp; 1</b>				<b>Size 13/4</b>				<b>Size 3 &amp; 31/2</b>				<b>Size 41/2 &amp; 5</b>			
0.67	0.72	E14	3	2.27	2.54	E34	7	30.0	33.5	E69	100	88.0	98.0	E27	250
0.73	0.80	E16	3	2.55	2.69	E36	7	33.6	36.4	E70	100	98.1	108	E28	250
0.81	0.85	E17	3	2.70	2.88	E37	7	36.5	39.6	E71	100	109	114	E29	250
0.86	0.92	E18	3	2.89	3.14	E38	7	39.7	43.6	E73	100	115	122	E31	250
0.93	0.99	E19	3	3.15	3.40	E39	7	43.7	46.5	E73A	100	123	130	E32	250
1.00	1.08	E23	3	3.41	3.81	E41	7	46.6	51.6	E74	100	131	140	E33	250
1.09	1.23	E24	3	3.82	4.25	E42	7	51.7	54.4	E76	100	141	155	E34	250
1.24	1.37	E26	3	4.26	4.62	E44	7	54.5	58.0	E77	100	156	166	E36	250
1.38	1.54	E27	3	4.63	5.09	E46	7	58.1	63.0	E78	100	167	177	E37	250
1.55	1.69	E28	3	5.10	5.61	E47	7	63.1	67.7	E79	100	178	193	E38	400
1.70	1.80	E29	3	5.62	5.91	E48	7	67.8	72.4	E80	100	194	209	E39	400
1.81	1.94	E31	3	5.92	6.15	E49	15	72.5	80.0	E94	100	210	233	E41	400
1.95	2.07	E32	3	6.16	6.70	E50	15	80.1	88.1	E96	100	234	248	E42	400
2.08	2.26	E33	3	6.71	7.54	E51	15	88.2	91.5	E97	150	Size 5 only D25651-5			
2.27	2.54	E34	7	7.55	8.29	E52	15	91.6	96.8	E98	150	Size 6 D25665-3			
2.55	2.69	E36	7	8.30	8.99	E53	15	96.9	99.0	E99	150				
2.70	2.88	E37	7	9.00	9.85	E54	15	99.1	108	E101	150				
2.89	3.14	E38	7	9.86	10.4	E55	15	Size 3 1/2 only D26801-3							
3.15	3.40	E39	7	10.5	12.0	E56	15	Size 4 D36024-2							
3.41	3.81	E41	7	12.1	13.6	E57	30								
3.82	4.26	E42	7	13.7	15.6	E60	30								
4.27	4.62	E44	7	15.7	17.0	E61	30								
4.63	5.09	E46	7	17.1	19.4	E62	30								
5.10	5.61	E47	7	19.5	20.9	E65	30								
5.62	5.91	E48	7	21.0	22.2	E66	30								
5.92	6.15	E49	15	22.3	25.3	E67	30								
6.16	6.70	E50	15	25.4	26.9	E69	50								
6.71	7.54	E51	15	27.0	30.2	E70	50								
7.55	8.29	E52	15	30.3	33.3	E72	50								
8.30	8.99	E53	15	D25556-3				77.8	85.9	E96	150				
9.00	9.85	E54	15	<b>Size 2 &amp; 21/2</b>				86.0	91.9	E97	150				
9.86	10.4	E55	15					10.5	12.0	E56	50	92.0	96.7	E98	150
10.5	12.0	E56	15					12.1	13.6	E57	50	96.8	105	E99	150
12.1	13.6	E57	30					13.7	15.6	E60	50	106	115	E103	150
13.7	15.8	E60	30					15.7	17.1	E61	50	116	130	E104	150
15.7	17.0	E61	30					17.2	19.4	E62	50	D25385-7			
17.1	18.4	E62	30					19.5	20.9	E65	50	Size 1 only D25385-7			
18.5	19.4	E65	30					21.0	22.2	E66	50				
19.5	21.3	E66	30					22.3	25.3	E67	50				
21.4	24.4	E67	30					25.4	26.9	E69	50				
24.5	25.9	E69	30	27.0	30.2	E70	50								
26.0	26.0	E70	30	30.3	33.3	E72	50								
				33.4	35.3	E73	50	Size 21/2 only D26069-5							
				35.4	41.5	E74	50								
				41.6	45.0	E76 1	00								

Heaters shown in the table provide a maximum trip rating of 125% of the motor nameplate and amps, which is suitable for 40°C motors. For all other motors select heaters one code number lower than specified in the table, which give a maximum trip rating of approximately 115%.

The tripping current of any heater in a 40°C ambient is 25% greater than the lower value of motor amps shown in the table.

Starters do not provide protection from short circuits. A protective device should be provided in accordance with the NEC (CEC in Canada) and not exceed the values shown in the table.

Note: If the rating specified is not a standard size for the circuit breaker manufacturer, use the next largest size.

### CAUTION

**Automatic reset will continue to reset on two-wire control. May result in unexpected start or equipment failure.**

When not desired, use three-wire control. Do not use manual trip button when relay is set in automatic reset position.

**Wye-delta starters:** If the motor nameplate shows the full load delta line current only, divide this value by 1.73 or multiply by .58 to select the proper heater rating.

\* Ratings specified are for instantaneous trip circuit breakers.

Maximum current rating for thermal magnetic-circuit breakers is 250% of maximum heater FLA.


Maximum current rating of fuses is:

- a. 150% of maximum heater FLA for Class R, K or L (time delay).
- b. 250% of maximum heater FLA for Class K or L (non-time delay).
- c. 300% of maximum heater FLA for Class J (non-time delay).

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



## High Density Unit Installation

	⚠ DANGER
	<p><b>Hazardous voltage.</b>  <b>Will cause death or serious personal injury.</b>                  Energized vertical bus may be partially exposed through the access holes in the barrier when the unit is not fully inserted. Use extreme caution when performing any wiring or maintenance with the unit withdrawn.</p>

### Coil Removal

1. For easy coil replacement, remove the unit from the structure.
2. Loosen screw .A. which secures the cover.
3. Rotate the cover as shown in Figure 8 around the pivot point.
4. Disconnect wiring to coil.
5. Remove coil through top of unit.

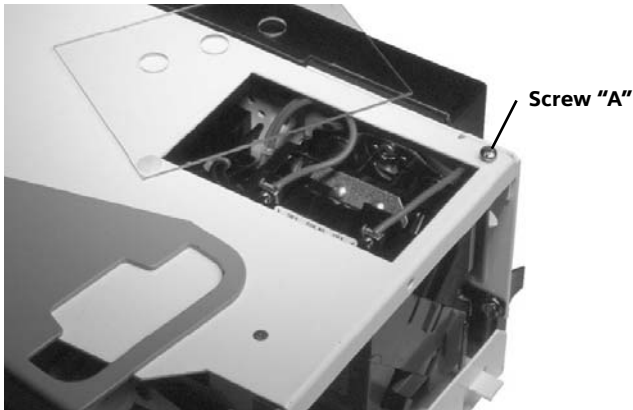


Figure 8

### Terminal Block Swing Plate

1. To wire the unit, rotate the terminal block swing plate as shown in Figure 9.
2. Route the wires from the vertical wireway into the unit behind the right unit side angle.



Figure 9

### Arc Cover Access Slots

Withdraw the unit for access to the arc cover screws through the slots in the unit bottom plate as shown in Figure 10.



Figure 10

### Hinge Installation

1. Remove the existing hinge (if present) in the 6. space.
2. Install the unit support bracket per .Adding To A Blank Unit Space. on page 4.
3. Locate and install the new hinge with the two mounting screws.
4. Install the door using two new hinge pins supplied with the unit.

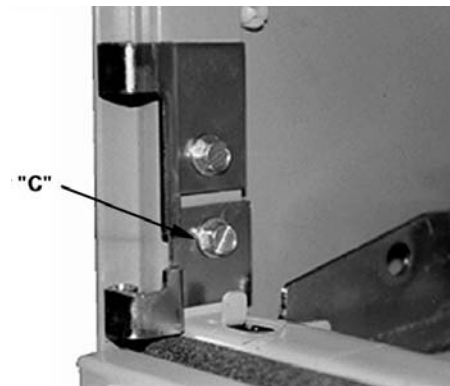


Figure 11

### Unit Access For Maintenance

1. Remove the unit from the structure.
2. Loosen screw .B. shown in Figure 12.
3. Lift the handle bracket and pull forward to disengage.
4. Rotate the left side of the unit open as shown in Figure 12.
5. When closing the unit, the handle must be in the OFF position.

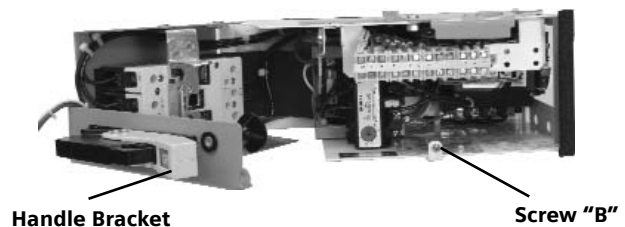


Figure 12



5. Operate each switch or circuit breaker several times to insure that all mechanisms are free and in proper working order. Check the operation of the mechanical safety interlocks provided with the operator (see section on Circuit Breaker/ Disconnect Operator). Never attempt to operate a switch or circuit breaker by use of excessive force.
6. Visually inspect instruments and pilot lights. Replace defective pilot lights. Check instrument calibrations.
7. Check all devices for missing or broken parts, proper spring tension, free movement, rusting or corrosion, dirt, and excessive wear. Perform periodic maintenance on components as detailed in the component instruction books.
8. Recommended to go along with the maintenance program for a motor control center is an adequate stock of renewal parts. This is important where service becomes a critical factor or downtime is extremely expensive. The items kept in stock will depend on the type of motor control center and its application. Typical items kept in stock should include contact kits, magnet coils, and fuses. When ordering renewal parts, the following information must be provided.
  - a Complete part numbers of items required.
  - b Quantity of parts required.
  - c Description of parts.
  - d Motor control center catalog number. The catalog number is found on the control center nameplate located on front of the center.
  - e Unit identification number. The number is located on a label on the side of the control unit for which the ordered parts are needed.

See the Siemens control catalog and the following replacement part publications for starters.

0 - 13/4	14 - GCF	4	14 - GJB
2 - 21/2	14 - GFF	4 1/2 - 5	14 - GKF
3 - 31/2	14 - GHF	6	14 - GMF

### Periodic Cleaning

Accumulation of dust and foreign material such as coal dust, cement dust, or lampblack must be removed from all control equipment and all surfaces must be wiped clean at regular intervals. Dirty, wet, or contaminated parts should be replaced unless they can be cleaned effectively. Dust can collect moisture, causing voltage breakdown and it can reduce the effectiveness of heat sinks.

Control equipment parts should be cleaned by vacuuming or wiping with a dry cloth or soft brush. Use care to avoid damaging delicate parts. Liquid cleaners, including spray cleaners, are not recommended due to the possibility of residues. Compressed air is not recommended for cleaning because it will only

distribute contaminants on other surfaces, and may damage delicate parts. The inside bottom of the motor control center should also be cleaned, including removal of any hardware or debris, so that any new or unusual wear or loss of parts occurring after the inspection may be more readily detected during subsequent maintenance. Inspect the motor control center for any signs of previous wetness or dripping inside the controller.

Condensation in conduits or dripping from an outside source is a common cause of failure. Seal off any conduits that have dripped condensate, and provide an alternative means for the conduit to drain. Seal off any cracks or openings which have allowed moisture to enter the enclosure. Eliminate the source of any dripping on the enclosure and any other source of moisture. Replace and thoroughly dry and clean any accumulation of deposited material from previous wettings.

### Fingers And Vertical Bus

Look for wear of the tin plating where the unit stab fingers engage the vertical bus. The plating is part of the environmental protection system. Oxide and/or other films can form on exposed bus resulting in a poor contact.

Lubricate stab connection points with an approved lubricant.

These parts must be replaced when the plating is worn to the point where copper can be seen because contact resistance becomes higher, increasing the heat generated at the contact point.

### Recommended Tightening Torques

When making bolted assemblies, the following considerations should be generally followed. The tightening torques are determined by the size of hardware used.

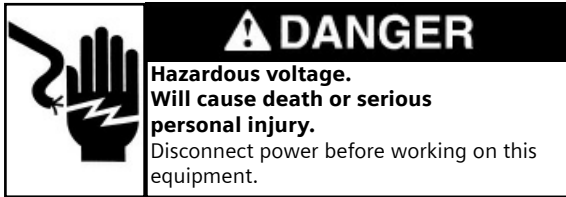
1. **Metal-to-Metal** - Apply standard tightening torque as listed:

#### Recommended Tightening Torques

Thread Size	Torque (lb.-in.)
8 - 32	20
10 - 32	27 - 32
1/4 - 20	75
5/16 - 18	100
3/8 - 16	247
1/2 - 13	613

2. **Metal-to-Insert Molded in Compound Part** - Apply 2/3 of standard tightening torque.
3. **Compound-to-Compound** - Apply 1/2 of standard tightening torque.
4. Control Terminals - 11 lb.-in.
5. Tighten box type incoming cable lug set screws to 85 ft.-lbs.
6. Tighten bolted bus connections to 20 ft.-lbs.
7. 400A and 600A fixed mounted unit clamp assembly bolts should be tightened to 35 ft.-lbs.

## Disconnect Operating Handle Adjustment



In rare circumstances, such as when changing a circuit breaker or a fusible switch or when a unit is taken apart, it may be necessary to adjust the disconnect operating handle. (The Siemens fusible disconnect switch for 30A, 60A, 100A, and 200A ratings does not require adjustment.)

1. Perform all disconnect operating handle adjustments with the unit removed from the motor control center or in the "test" position.
2. The adjustable link rod can adjust to increase or decrease its overall length by rotating the sleeve. By rotating the sleeve clockwise the length is increased and by rotating it counterclockwise the length is decreased. A hex nut is provided as part of the adjustable link rod and is tightened against the sleeve to prevent it from going out of adjustment. The hex nut must be loose and sufficiently away from the sleeve to allow it to rotate during the adjustment of the handle.



Figure 13

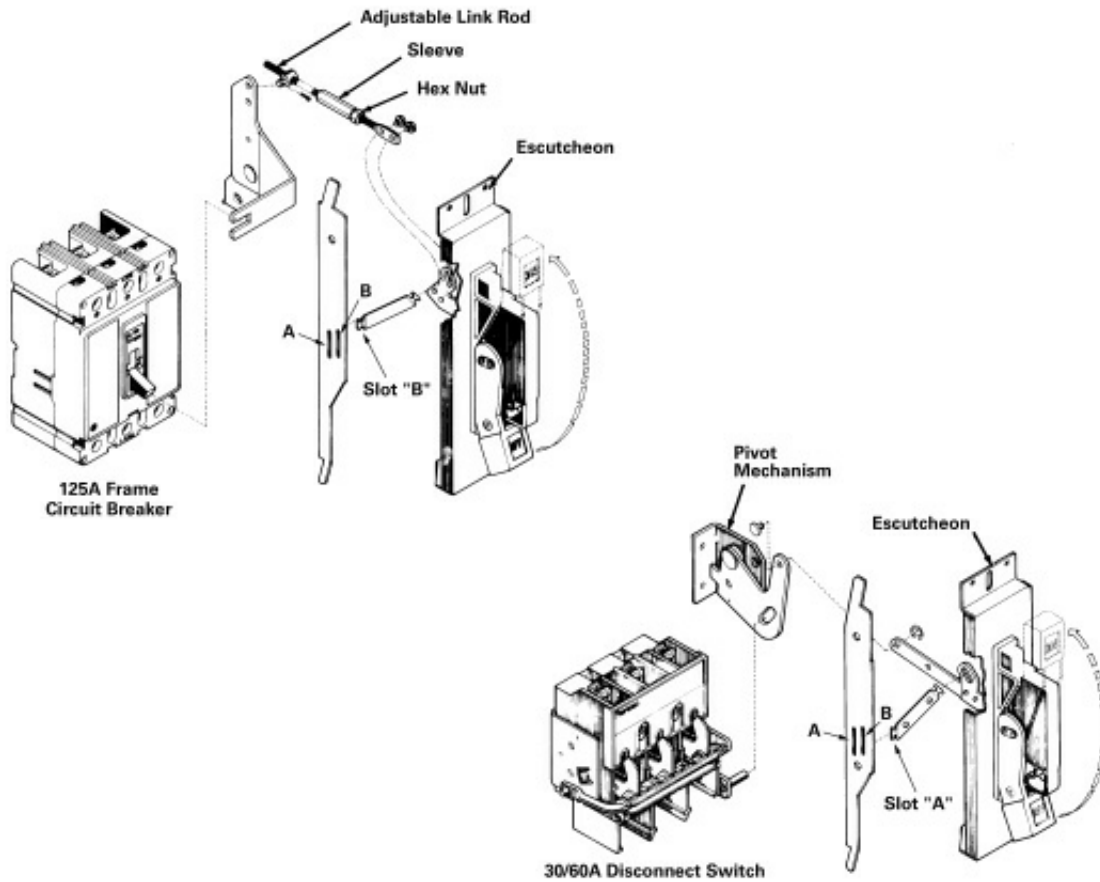


Figure 14

3. The handle assembly must be adjusted to perform the following functions:

**Circuit Breaker**

Unit must turn ON  
Unit must turn OFF  
Unit must indicate TRIP  
Unit must RESET

**Disconnect Switch**

Unit must turn ON  
Unit must turn OFF

4. Operate the handle from the ON position to the OFF position and circuit breaker or disconnect switch will turn OFF.

5. Return the handle to the ON position and the circuit breaker or disconnect switch will turn ON. If it does not, rotate the sleeve slightly clockwise and try again. Repeat this step until the handle assembly turns the unit ON. Then, repeat step 4.

6\* Once steps 4 and 5 have been satisfactorily completed, the adjustment for the disconnect switch will have been completed. Tighten the hex nut against the sleeve to lock in the adjustment. The following steps will now only pertain to circuit breakers.

7. Trip the circuit breaker and the handle should move to a position midway between the ON and reset positions. Circuit breakers from different manufacturers require different methods to trip them. One can be tripped by rotating a red button, another by passing a high current at low voltage through one of the poles. (The defeater mechanism should engage.)

8\* Now move the handle down past the OFF position to reset the circuit breaker. If the circuit breaker resets and can be returned to the ON position by the handle, the adjustment has been completed and the hex nut should be tightened against the sleeve. If the circuit breaker does not reset, turn the sleeve counterclockwise slightly and try again. Repeat this step until the breaker resets. Then repeat steps 4-8 to verify that the previous adjustments have not been adversely effected.

9. In the case of both the circuit breaker and disconnect switch, the adjustment should be such they turn on with the knob no closer the 1/8. away from the escutcheon.

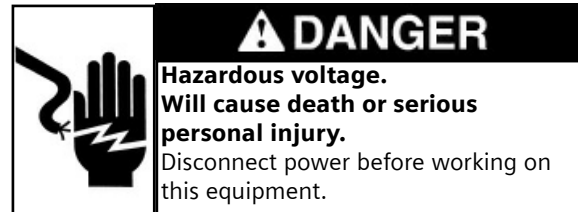
**\*Note:** Always use two wrenches when loosening, adjusting, or tightening the adjustable link rod. One wrench adjusts the hex sleeve while the second wrench holds the hex nut.

A provision is made for Qualified Persons to defeat the door-operator interlock when the handle is in the .ON. position. This is accomplished by turning the defeater screw counterclockwise approximately 1/8 turn until the door is released. It is not necessary to operate the defeater screw to close the unit door. Release the defeater screw and secure the 1/4 turn door fasteners.

This safety interlock also serves to prevent inadvertent closing of the disconnect when the door is open. Authorized personnel may defeat the interlock in this situation by pushing down the exposed interlock arm lever. This releases the interlock so that the protective device may be turned "ON".

**Adjustment Notes**

No field adjustment to the door interlock mechanism should be necessary under normal operating conditions. However, should adjustment become necessary as a result of mechanical damage or wear, the following procedure is recommended.



1. With disconnecting device in the .OFF. position, and the unit door open, defeat the interlock by pushing the top of the lever to the left and turn breaker .ON. and .OFF. several times.
2. If the disconnecting device fails to turn .ON. or if operating resistance is experienced, turn protector "OFF".
3. Withdraw the unit and inspect for misalignment of the operator extension(s) or the driver. Make necessary adjustments to correct any misalignment.







