STARTER INSTALLATION INSTRUCTIONS

FOR STARTER MODELS
641 C, D, X, Y, Z - 001A
Reference for obsolete models 641 E, F, Q -001A

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INTRODUCTION

In 2011, Siemens/Furnas made their line of definite purpose starters obsolete. Shivvers attempted to find suitable drop-in replacements, but was unable to find exact equivalents. Older panels might require some field adjustments in order to install the new starters. Review the part numbers carefully, as they have changed some. In general, the contactor portion has been changed to a Square D brand. The overload for single phase has changed to a Siemens stand alone bi-metallic overload (E-6515), similar to what was used in the past. It will still require one heater element per overload, based upon the motor current draw.

For three phase, the overload has changed to a Siemens electronic overload. The motor leads pass through holes in the overload to sense current draw. It has a dial setting which can be adjusted for motor full load amps, and does not require heater strips. Three sizes are currently offered, 3-12 Amps (E-6516), 10-40 Amps (E-6517), and 25-100 Amps (E-6518).
SAFETY

The installer of this equipment must assume the responsibility for his own safety, and that of those working around him. He must also make sure that the equipment is installed as shown in this manual.

If any items covered in this manual are not completely understood, or there is a concern with the safety of this product, contact Shivvers at the address shown on the front page.

TAKE NOTE ANYTIME THIS SYMBOL APPEARS. YOUR SAFETY, AND THAT OF PERSONS AROUND YOU IS AT STAKE.

ALL ELECTRICAL WIRING SHALL BE INSTALLED IN COMPLIANCE WITH THE LATEST EDITION OF THE ANSI/NFPA STANDARD 70, NATIONAL ELECTRICAL CODE, AS A MINIMUM REQUIREMENT, AND IN COMPLIANCE WITH LOCAL WIRING CODES AS APPLICABLE.

WIRING MUST BE DONE BY A COMPETENT ELECTRICIAN. A LICENSED ELECTRICIAN IS RECOMMENDED, AND MUST BE USED WHEN REQUIRED BY LOCAL OR STATE STATUTES.
### STARTERS:

<table>
<thead>
<tr>
<th>Shivvers Part #</th>
<th># Of Poles</th>
<th>Max HP 220VAC</th>
<th>Amp Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>641C-001A</td>
<td>2 POLE</td>
<td>10 HP</td>
<td>60 AMP 1 PHASE</td>
</tr>
<tr>
<td>641D-001A</td>
<td>3 POLE</td>
<td>5 HP</td>
<td>40 AMP 1 PHASE</td>
</tr>
<tr>
<td>641Q-001A</td>
<td>3 POLE</td>
<td>10 HP</td>
<td>60 AMP 1 PHASE</td>
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### SINGLE PHASE BEFORE 2011

<table>
<thead>
<tr>
<th># Of Poles</th>
<th>Max HP 220VAC</th>
<th>Amp Rating</th>
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<tbody>
<tr>
<td>2 POLE</td>
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<td>3 POLE</td>
<td>5 HP</td>
<td>40 AMP 1 PHASE</td>
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<tr>
<td>3 POLE</td>
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<td>60 AMP 1 PHASE</td>
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### SINGLE PHASE 2011 and LATER

<table>
<thead>
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<th>Amp Rating</th>
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<tbody>
<tr>
<td>3 POLE</td>
<td>10 HP</td>
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</tr>
<tr>
<td>4 POLE</td>
<td>7.5 HP</td>
<td>OBsolete - use 641C-001A</td>
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### HEATER SIZE AND INFORMATION:

#### THREE PHASE 3 PER STARTER

<table>
<thead>
<tr>
<th>Siemens/ Furnas Overload</th>
<th>Shivvers Part #</th>
<th>Max Motor Amps</th>
<th>Recommended Breaker or Fuse</th>
<th>HP</th>
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<tbody>
<tr>
<td>E-47</td>
<td>E-5718</td>
<td>5.54</td>
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<td>E-50</td>
<td>E-5719</td>
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<td>E-51</td>
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# THREE PHASE

<table>
<thead>
<tr>
<th>Shivvers Part #</th>
<th>Contactor # of Poles</th>
<th>Overload Only Part #</th>
<th>Overload Amp Setting</th>
<th>MOTOR HP 208/230V</th>
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<th>575V</th>
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<tr>
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<td>641X-001A</td>
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<td>E-6517</td>
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<td>E-6518</td>
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# THREE PHASE - OBSOLETE 2011

<table>
<thead>
<tr>
<th>Shivvers Part #</th>
<th>Contactor # of Poles</th>
<th>Amp Rating</th>
<th>Max HP 230 VAC</th>
<th>Starter Part #</th>
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<tbody>
<tr>
<td>641E-001A</td>
<td>3</td>
<td>60</td>
<td>15</td>
<td>E-6291</td>
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<td>641F-001A</td>
<td>4</td>
<td>40</td>
<td>10</td>
<td>E-6292</td>
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</table>
SINGLE PHASE (1 Pole Overload)

641C-001A
3 POLE, 60 AMP
1 Contactor (E-6513)
2 Overload (E-6515)
3 Aux. Switch (if required) (E-6514)
4 Starter Harness (E-6293)
5 Braided Conductor (E-5266)

641D-001A
4 POLE, 40 AMP
1 Contactor (E-6511)
2 Overload (E-6515)
3 Aux. Switch (if required) (E-6512)
4 Starter Harness (E-6293)
5 Braided Conductor (E-5266)

641Q-001A - Obsolete, use 641C-001A
3 POLE, 60 AMP
THREE PHASE

641X-001A
4 POLE, 40 AMP Contactor
10-40 AMP Overload
1. Contactor (E-6511)
2. Overload (E-6517)
3. Aux. Switch (if required) (E-6512)
4. Starter Harness Assy. (E-6293)
5. Electronic O.L. Bracket (641-077P)
6. DIN Rail, 3-3/8" Long (E-6522)

641Y-001A
4 POLE, 40 AMP Contactor
3-12 AMP Overload
1. Contactor (E-6511)
2. Overload (E-6516)
3. Aux. Switch (if required) (E-6512)
4. Starter Harness Assy. (E-6293)
5. Electronic O.L. Bracket (641-077P)
6. DIN Rail, 3-3/8" Long (E-6522)

641Z-001A
3 POLE, 60 AMP Contactor
25-100 AMP Overload
1. Contactor (E-6513)
2. Overload (E-6518)
3. Aux. Switch (if required) (E-6514)
4. Starter Harness Assy. (E-6293)
5. Electronic O.L. Bracket (641-077P)
6. DIN Rail, 3-3/8" Long (E-6522)

(in all 3 phase kits)
P-12727 Decal

SIEMENS ELECTRONIC MOTOR OVERLOAD SWITCH

DIP switches are shipped set for CLASS 20 trip delay. For longer trip delay, change to CLASS 30. For shorter trip delay, change to CLASS 10.

If overload trips when this motor or other motors start up, turn off PHASE UNBAL switch. PHASE LOSS switch is set to ON. RESET MODE switch should always be set to MAN for Manual Reset. GROUND FAULT switch is set to OFF.

Test Switch only trips the overload while the motor is running.

Blue Reset Button
Press to reset.
MACHINE MOTOR DISCONNECT SWITCH
(MECHANICAL INSTALLATION)

A Machine (Circu-Lator or Dri-Flo) Motor disconnect switch must be located adjacent to the bin entrance door. It must be of sufficient capacity to safely switch the Machine Motor, usually 10 or 15 Hp. This switch must also have the capability of being locked into the OFF position. Contact Shivvers Incorporated if assistance is needed to size the proper disconnect.

Make sure the safety decal P-12184 is applied on or near the machine motor disconnect. See the "Operator's Safety Manual", for complete instructions.
INSTALLING THE CONTACCTOR AND OVERLOAD

⚠️ DANGER ⚠️

DISCONNECT AND LOCK OUT POWER TO THE ENTIRE DRYING SYSTEM BEFORE OPENING THE MAIN COVER ON THE CONTROL BOX.

Before installing the contactor and overload, disconnect and lockout all power before opening the main cover. Test several points with a known good tester to verify power is disconnected. Find the mounting location on the starter panel for the parts you are installing. Make sure the contactor and overload are sized properly for the motor connected to it. Check the motor name plate for the full load amps and check it against the information on page 3 and 4 to see if the contactor and overload are sized correctly. Each location on the starter panel is marked with a decal.

Older panels will require drilling of additional 9/64" diameter mounting holes. A template (641-078P) and drill bit (H-2706) are provided. Use two #8 x 3/8" screws to mount the template to the panel using the largest holes in the template and the original holes punched in the panel. Drill the holes labeled #1 on the template drawing to mount the contactor (single or three phase). For single phase only, drill the holes labeled #2 on the template drawing, to mount the 1 phase overload (E-6515). For three phase, the bottom original hole is usually sufficient for mounting the three phase overloads. However, as an option, or in panels which don't have enough depth, the holes labeled #3 on the template drawing can be drilled and used to mount the DIN rail (removed from the bracket) directly to the panel. This is usually only necessary for the 25-100 Amp Overload (E-6518).
INSTALLING THE CONTACTOR

To mount the contactor take 2 mounting screws supplied with the installation kit and start them in the mounting holes. The 60 Amp contactor takes two #8 X 1/2" screws. The 40 Amp contactor takes two #8 X 3/8" screws. Do not tighten the screws down, just get them started. At the top of the contactor bracket, in the center, there is a large hole with a slot at the top. The hole will allow the head of the screw to pass through. The bottom of the bracket has a slot to slide over the screw. Place the contactor over both mounting screws and slide it down. The heads of the screws should hold the contactor in place. Tighten the mounting screws to secure the contactor.

INSTALLING THE OVERLOAD
SINGLE PHASE

Mount the overload in line with the far left terminal on the contactor using the holes drilled out in a previous step and two #8 X 3/8" screws. A braided conductive strap connects from the terminal on the contactor to the terminal lug on the top of the overload.

![Diagram of contactor and overload installation](image-url)
INSTALLING THE OVERLOAD
THREE PHASE
(Command Center)

For 3-12 Amp (E-6516), 10-40 Amp (E-6517), and 25-100 Amp (E-6518) Overloads
Position the overload and bracket so that the 3 motor wire holes on the overload are
in line with the left 3 terminals on the contactor.
INSTALLING THE OVERLOAD
THREE PHASE
(Low Level, Or Aux. Auger Add-On Boxes)

For 3-12 Amp (E-6516) and 10-40 Amp (E-6517) Overloads
Position the overload and bracket so that the 3 Motor Wire Holes on the overload are in line with the right 3 terminals on the contactor.

For 25-100 Amp (E-6518) Overload
Because the Low Level and Aux. Auger boxes aren't deep enough, remove the DIN rail from the bracket and mount the DIN rail (E-6522) directly to the panel using two #8 X 3/8" screws (F-1061). Install the Overload on the DIN rail. The overload has channels on the bottom that the DIN rail snaps on to.
INSTALLING THE OVERLOAD
THREE PHASE

The contactor and overload are shipped in 2 separate pieces. The left connector on the overload is removed after testing but is still connected to the wire harness. During installation the connector will need to be re-installed. See illustration below.

To attach, slide the connector down until it snaps into place. To disconnect, pull the tab forward while pushing the connector straight up. The left and the right connectors are not interchangeable.

If more adjustment is needed to center up the overload to the contactor, a breakout tab on each side can be cut out to allow the overload to slide along the DIN rail from side to side.
WIRING THE STARTER

Connect the starter wiring harness to the switch/relay panel by locating the 5 pole connector on the relay panel that corresponds to the starter being installed. Each 5 pole connector is labeled with the starter it controls. The machine connector is located underneath the switch plate and can be accessed from the side. (See below.) High torque units have two machine starters. A "y" adapter is provided for making the starter connections.

When installing continuous flow or Auxiliary auger starters, a jumper must be connected across the unused slots on the relay board. The jumper is connected to spade terminal TP1 then to the terminal below and to the right of the last used slot. See chart below for jumper configurations.

<table>
<thead>
<tr>
<th>LAST AUGER IS</th>
<th>JUMPER</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONT. FLOW #1</td>
<td>TP1</td>
<td>TP5</td>
</tr>
<tr>
<td>CONT. FLOW/AUX #2</td>
<td>TP1</td>
<td>TP4</td>
</tr>
<tr>
<td>CONT. FLOW/AUX #3</td>
<td>TP1</td>
<td>TP3</td>
</tr>
<tr>
<td>CONT. FLOW/AUX #4</td>
<td>TP1</td>
<td>TP2</td>
</tr>
<tr>
<td>EXPANSION BOX</td>
<td>REMOVE JUMPER</td>
<td></td>
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</tbody>
</table>
WIRING THE STARTER, cont'd

Run power wires and a good ground from the breaker panel through conduit to the Command Center control box. Enter through the left hand side of the Command Center bottom, directly below the starter locations. For single phase applications, 6 gauge wire is recommended for the machine motor and 8 gauge wire for Cont. Flow motors, unless the motor is 7.5 to 10 HP, then use 6 gauge wire, to cover expansion capabilities. For 3 phase applications, check motor amperage at available voltage for wire sizing. Route the wires in the control box so they will terminate at the top of the starter. Next run wires from the bottom side of the starter and/or overload relay(s) to the Motor Safety Disconnect Switch. Then run wires from the Disconnect Switch to the motor. The wires should be in conduit and have a separate ground wire for each motor circuit. The ground wire will terminate at the ground lugs at the bottom right hand corner of the starter panel. The wiring for the spreader motor (if applicable) should be run at the same time. The Cont. Flow starters have an extra contact (both single and three phase) that can be used to run the spreader motor. The spreader motor(s) will need to also have a separate breaker. Page 19 has a diagram showing the completed motor wiring.

For single phase, install the heater strip in the overload relay(s). Make sure heater strips are sized properly. There are 2 types of heater strips, the bar type and the spring type. The amperage rating will determine the type.

The spring type heater strip will have 2 ears that stick up from the tab mounted to the spring. These ears must face up when installing. This will place most of the spring body in the cavity of the overload relay. The bar type has an offset that must be mounted in the relay cavity. Remove the 2 heater strip mounting screws and place them through the holes on the heater strip and install screws back into the relay.
After the heater strip(s) have been installed, verify that the overload relay is set for manual reset. (See illustration on previous page for location of auto/man reset adjustment lever for single phase.) To set the relay for manual reset, use a small screwdriver in the slot on the adjustment lever and pull it out.

**SINGLE PHASE**

**MANUAL RESET**  
(Proper Setting)

**AUTOMATIC RESET**  
(Do Not Use)

If the heater strip rating needs to be adjusted, it can be set 15% up or down. This adjustment can be used to compensate for low or high voltages. (See illustration on previous page for adjustment location.)

**NORMAL**  
MOVE NOTCH UP TOWARDS CONTACCTOR

**15% INCREASE**  
MOVE NOTCH UP TOWARDS CONTACCTOR

**15% DECREASE**  
MOVE NOTCH AWAY FROM CONTACCTOR

Rotating the adjustment wheel notch up towards the contactor will increase the trip current. Rotating the notch away from the contactor will decrease the trip current.
Three phase overload relays have the adjustments in different locations and also have a manual trip button. (See illustration below.)

Set the Full Load Amps dial to the motor nameplate full load amps. The trip current is 1.25 times the dial setting.

Place decal P-12727 on panel, or panel cover.

To remove the overload from the DIN rails, push down on the overload and pull the bottom of the overload out of the rail first.
WIRING THE STARTER, cont'd

REFERENCE ONLY, USING 3 POLE ELECTRONIC OVERLOAD FOR 1 PHASE

120 / 240 Volt, Single Phase

1. Motor wires must be routed as shown above.
2. Set Full Load Amps (FLA) at motor nameplate FLA times 0.80.
   For example, if 1 phase motor FLA = 40, set overload dial at 40 X 0.80 = 32 Amps
3. Turn OFF the PHASE UNBAL and PHASE LOSS switches on the overload.
WIRING THE STARTER, cont'd
REFERENCE ONLY, FOR OBSOLETE 3 PHASE BI-METAL OVERLOAD

Three phase overload relays have the adjustments in different locations and also have a manual trip button. (See illustration below.)

THREE PHASE BI-METAL OVERLOAD

The trip current is adjusted the same way for 3 phase relays except the adjustment is opposite from the single phase. Moving the notch on the adjustment wheel towards the contactor decreases the trip current and away from the contactor increases the trip current.

NORMAL

15% INCREASE

MOVE NOTCH AWAY FROM CONTACCTOR

15% DECREASE

The adjustment for auto/manual is a thumb wheel, below the trip current adjust. It should be set for manual reset by moving the wheel away from the contactor.

MANUAL RESET

AUTOMATIC RESET (Do Not Use)

PUSH AWAY FROM CONTACCTOR
SINGLE PHASE

GROUND L1 L2 NEUTRAL
MAIN DISCONNECT
MOTOR SHORT CIRCUIT PROTECTION
MOTOR SAFETY SWITCH
MACHINE
CONT. FLOW AUX AUGER
SPREADER 115VAC Usually plugged into an outlet

THREE PHASE

GROUND L1 L2 L3 NEUTRAL
WILD LEG
MAIN DISCONNECT
MOTOR SHORT CIRCUIT PROTECTION
MOTOR SAFETY SWITCH
MACHINE
SPREADER 115VAC Usually plugged into an outlet
NOTE: Some 3 phase systems can’t operate a 115VAC spreader when wired as shown
CONT. FLOW AUX AUGER
Use a permanent marker and fill out the decal inside the Command Center front cover for each starter installed.

MODEL 641A--001A
MAX MOTOR VOLTAGE 600VAC, MAX HP DETERMINED BY STARTER SIZE

ACTUAL MOTOR VOLTAGE ______
PHASE 1 OR 3 ______
MACHINE MOTOR HP ______ FLA____
CONT. FLOW #1 HP ______ FLA____
CONT. FLOW/AUX. AUGER #2 HP ______ FLA____
CONT. FLOW/AUX. AUGER #3 HP ______ FLA____
CONT. FLOW/AUX. AUGER #4 HP ______ FLA____

120VAC SPREADERS
1 SPREADER HP ______ FLA____
2 SPREADER HP ______ FLA____
3 SPREADER HP ______ FLA____
4 SPREADER HP ______ FLA____

MOISTURE CONTROL

PLENUM CONTROL

STARTER SCHEMATIC

115VAC
CONTACOAC
COIL

C
WHITE

OVERLOAD
RELAY
SWITCH

1
2
3
4
5

5 POLE
PLUG

20